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Title: Developing Effective Policies to Reduce Disability from Road Crashes in Cambodia

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Name of University : Queensland University of Technology

Country : Australia

Major : Health

Degree : PhD

Type of document : Thesis

Year : 2017

Key words : road safety, disability, Cambodia, road accident, policy, implication

DEVELOPING EFFECTIVE POLICIES TO REDUCE DISABILITY FROM ROAD CRASHES IN CAMBODIA

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BSc, MBA

Submitted in fulfilment of the requirements for the degree of
Doctor of Philosophy

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2017

Keywords

Cambodia, disability, fatalities, impact, injuries, lived experiences, long term impairments, persons with disabilities, policy, road crashes, road safety

Abstract

Road crashes and injuries have become a growing issue worldwide. The number of road crashes, fatalities and injuries is increasing alarmingly and constitutes a significant public health problem in many countries. Although road traffic injury has been recognised as a contributor to disability, very few studies have been conducted to explore the patterns of long term injury crashes that resulted in disability, and the impact this has on individuals and their families. At the same time, while the fatality data is mostly available, there is still limited injury data in many countries, and particularly data on the long term impacts of road crashes. This gap in the literature is particularly significant for low income countries such as Cambodia. Therefore, it is crucial to have more in-depth understanding of the disability issue due to road crashes in Cambodia that has its own characteristics, and requires its own policies within its existing and limited resources. Both road safety and disability are important public health issues for developing countries such as Cambodia, and both policies would benefit from a clearer picture of the impacts of disabilities as a result of road traffic crashes and the gaps in current approaches across the road safety and disability spectrum. In this context, Cambodia is selected for this PhD as a case study that can provide important findings for other countries on the long term impacts which have not been explained well.

The overall PhD research aimed to lessen the impacts of road crashes in Cambodia. In doing so, it sought to further our understanding of how to best develop evidence-based policies that will reduce the incidence and impact of long term disability resulting from road crashes in low- and middle-income countries. The research had four main objectives as below:

1. To examine the nature and extent of long term impairments resulting from road crashes in Cambodia
2. To identify the factors that increase the severity of long term impairments and lead to disabilities
3. To explore the impacts of disabilities on individuals and their families

4. To identify potential changes in road safety, health and disability policies to prevent long term impairments, improve post-crash care and better address the long term needs of persons with disabilities

The research deployed mixed methods and consisted of four studies:

Study 1: Institutional structures and policies: aimed to understand the institutional structures and policies in Cambodia related to road safety, health and disability through primary data collection and literature reviews. The primary data collection included meetings, email communication and in-depth interviews with selected policy makers, health professionals and traditional healers.

Study 2: Analysis of road crash and disability databases: to identify the characteristics of road crashes including those leading to long term impairments and to provide further information on the general situations of persons with disabilities (due to road crashes) who receive services from eleven physical rehabilitation centres in Cambodia. The de-identified data from two databases (Road Crash and Victim Information System – RCVIS and Physical Rehabilitation Centres – PRC) were accessed and analysed.

Study 3: Individual and family impacts of disabilities: to explore the impacts of disabilities following road crashes. The qualitative method contributed to understanding how a person with disability lives, interpreted their lived experiences, their local contexts, and how they think and view their world. Primary data collection was conducted via structured observations and in-depth interviews with the persons with disabilities (as a result of a road crash) and their families.

Study 4: Case study of policy development: to identify gaps in the National Road Safety Action Plan (NRSAP) and National Disability Strategic Plan (NDSP). It also aimed to propose relevant recommendations to improve quality of life among persons with disabilities (and their families) and for a safer system for all road users. A series of workshops and activities were organised among selected secondary participants based on the research findings to address the issues identified in the previous studies.

The studies contributed to the following research findings. Cambodia is one of the few low- and middle-income countries that collect information on road crashes

and casualties by combining data from traffic police and health facilities. The RCVIS database recorded 151,420 casualties from 2006 to 2012 comprising 11,879 fatalities, 45,305 severe injuries, and 87,672 slight injuries. Although the completeness of data collection by both sources (police and health) dropped over the years for overall injuries, the trends in the police only data are likely to be more representative of the real increasing trends in fatalities and serious injuries in the country.

The proportion of long term impairments among the records with discharge results varied from year to year, being highest in 2009 and 2010 (1%). Road crashes tended to inflict more severe injuries on those who were pedestrians or travelled by motorbikes and bicycles, than those who travelled by passenger/goods vehicles, reflecting the vulnerability of these unprotected road users to injury. Although there are some statistically significant differences in fatalities and long term injuries by characteristics of crashes, both groups have similar patterns and common contexts that lead to common priorities and interventions. It is also important to note that in addition to various types of human errors, vehicle defects and road condition, there was a variety of cultural/religious beliefs (such as Karma, spirits/ghosts) among interviewed persons with disabilities and their families around crash scenes and causes of crashes. Based on the PRC dataset, road crashes constituted 3% of physical impairment causes from 1980 to 2011, but 15% during the last five years (2007 to 2011) suggesting that road crashes are becoming an increasingly important contributor to disability in Cambodia.

Inadequate emergency responses were found from the in-depth interviews. The various types of transport modes, including motorbike, truck, remorque and agricultural vehicle, and inappropriate first aid support potentially contribute to the severity of injuries, especially those that sustained spinal cord injuries. The findings also illustrate the lack of a national emergency number and support services, in addition to the inadequate ambulance services and first aid from communities. The issue of having many health facility referrals was raised. Additionally, the study also illustrated the role of traditional healers in providing post-crash treatment. It emphasised the traditional belief and options of the persons with disabilities in the absence of a proper and formal health system and unaffordable cost for the treatment. In addition to a burden in terms of monetary value to cover the cost of treatment at

discharge, the interviewed persons with disabilities might also face poor health care quality because of substandard pharmacies and medicines.

After treatment at hospitals or by traditional healers, the interviewed persons with disabilities reported various types of treatment and support, including physical rehabilitation services, spinal cord rehabilitation centre, community based support and vocational training. It is important to note that all of the interventions from the non-governmental organisations and the government institutions tend to focus on individual-based approaches, where persons with disabilities are the focus of the intervention. On the other hand, approaches towards removing social barriers, such as improving systems of transportation, education, employment in private sectors and so on, have been very limited.

The interviewed persons with disabilities and their families described the impacts of disabilities in leading to a decreased sense of physical well-being, reducing psychological well-being, economic well-being, loss of social well-being and their experiencing societal barriers. In the absence of social protection schemes, the family is the main source of support to those interviewed persons with disabilities since the road crash. Various types of burdens to their families were described such as cost during their treatment, time consumed in care taking, limited time left for their young children, dropping out of school, debts and loss of family property. However, the role of the family members seemed overlooked by the policy makers during the workshops in Study 4 and in the national policies. Additionally, the study highlighted the disability and poverty circle. The poorer interviewed persons with disabilities are more likely to receive lower quality emergency and in-hospital care. They are less likely to go back to the society and more likely to become even poorer and dependent. Poverty increases the chance of disability and disability increases the chance of poverty.

In terms of the study implications and recommendations, better data collection systems at different stages are needed to capture data from the occurrence of road crashes to the consequential long term impairments. This requires better qualitative and quantitative data collection system and studies. Additionally, the PhD research identified policy gaps in the existing road safety, health and disability policies, including the need to develop better indicators for each action in the policies, the financial mechanisms and human resources for the implementation.

Furthermore, this PhD research serves as a case study for developing countries in terms of applying a policy integration approach of promoting knowledge use and influencing factors among policy makers. This study confirmed the feasibility of the SWOV concepts in translating research into policy, though the process was not fully completed as it lay beyond the timeframe of the PhD research. It then proposed a further follow up study to cover the second part of the policy development process (Reference, Adoption, Implementation and Impact). In addition, it also suggested three key research studies to identify more comprehensive information on quality and capacity of the health facilities; insurance scheme and contribution; implication of cultural and religious beliefs on road safety messages; and assessment of vocational training.

When the recommended policies/actions are implemented by the government, the quality of life of persons with disabilities and their families will be improved in Cambodia. This will benefit not only persons with physical disabilities due to road crashes, but all others persons with physical disabilities due to other forms of accidents and diseases. It is also expected that the road safety policy changes will lead to a safer road system for all road users. In addition, the research findings provide feedback to the Decade of Action for Road Safety 2011-2020. While differences in context exist, the results can be extrapolated on common issues such as a lack of priority setting in low-income countries that have limited resources, limited disability access concepts in the road infrastructure and transport system.

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List of Abbreviations

ADB	Asian Development Bank
AIDS	Acquired Immune Deficiency Syndrome
CABDICO	Capacity Building of People with Disability in the Community Organization
CCPS	Cambodia Censal Population Survey
CDHS	Cambodia Demographic Health Survey
CDPO	Cambodia Disabled People's Organization
CPA	Complementary Package Activity
CSCIA	Cambodian Spinal Cord Injury Association
CSES	Cambodia Socio-Economic Survey
CT	Cambodia Trust
DAC	Disability Action Council
DDSP	Disability Development Services Program
DRIC	Disability Rights Initiative Cambodia
DWPwD	Department Welfare for Persons with Disabilities
HI	Handicap International
HIV	Human Immunodeficiency Virus
ICF	International Classification of Functioning, Disability and Health
ISS	Injury Surveillance System
MDG	Millennium Development Goals
MLM	Multinomial Logit Model
MoEYS	Ministry of Education Youth and Sports
MoH	Ministry of Health
MoI	Ministry of Interior
MoSVY	Ministry of Social Affairs, Veterans and Youth

MPWT	Ministry of Public Works and Transport
MRD	Ministry of Rural Development
NCDP	National Centre of Disabled Persons
NDSP	National Disability Strategic Plan
NGO	Non-governmental organisation
NIS	National Institute of Statistics
NRSAP	National Road Safety Action Plan
NRSC	National Road Safety Committee
OECD	Organisation for Economic Co-operation and Development
PoSVY	Provincial Department for Social Affairs, Veterans and Youth Rehabilitation
PPCIL	Phnom Penh Center for Independent Living
PRC	Physical Rehabilitation Centre
PRSC	Provincial Road Safety Committee
PWDF	Persons with Disabilities Foundation
RCVIS	Road Crash and Victim Information System
RQ	Research Question
RRR	Relative Risk Ratio
SCRC	Spinal Cord Rehabilitation Centre
SDGs	Sustainable Development Goals
St.Re	Standardised Residuals
UNCRPD	UN Convention on the Rights of Persons with Disabilities
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund
UXO	Unexploded Ordnance
VI	Veterans International
WHO	World Health Organization

Glossary

Agricultural vehicle	a vehicle that has been improvised by local people, mostly in the rice farming areas. It comprises a two-wheeled walking tractor (also known as a “hand tractor”), intended to be operated by a farmer walking behind it, which instead has a cart of some kind attached behind it so that it becomes a very slow four-wheeled vehicle. This improvised vehicle is often driven on public roads by villagers, especially during the farming seasons, and carries cargo (including livestock) and passengers
Amputee	person with one or more amputated limb
Blackspot	a place (a section of road), where many crashes happened. It was believed that the locations engaged with spirits/ghosts who made the locations dangerous
Casualty	a person injured in a road crash
Counterpart vehicle	a vehicle that crashed with the vehicle of casualty or research participant, or hit them when they were walking along the road
Disability	results of the interaction between the survivors with impairments and attitudinal and environmental barriers that hinders their full and effective participation in society on an equal basis with others
Fatality	a person who died within 30 days due to a road crash
Fortune teller	a person who is regarded as having an ability to predict the future, including fortunate and unlucky periods or events of someone
Functional limitation	limitation of four limbs in mobility such as difficulty to walk or lift something up
Holy water	water that has been blessed by a traditional healer or monk
Impact (of disability)	consequences as results of disability on individuals
Karma	referred to receiving effects of own actions that was done in the past, mostly in their previous life
Long term impairment	any kinds of injuries (resulting from road crashes) that cause or are likely to cause a loss or difference of physiological or psychological function of an individual and sustained for at least one year

Motorbike	2-wheeled vehicle propelled by a motor and has no pedals
Motor-tricycle	3-wheeled vehicle propelled by a motor
Paraplegia	paralysis of the lower part of a body, particularly due to spinal cord injuries
Primary participant (I)	a person with a disability as a result of a road crash, who was interviewed in the research study
Primary participant (II)	family members of a primary participant (I). They could be their spouse, children, or parents. They were interviewed during or after the interviews with primary participant (I)
Remorque	French word for “trailer”, in Cambodia refers to a vehicle comprising a motorbike with a cart attached behind. The types/sizes of the motorbikes and carts vary, as there is no standard regulation for this type of local improvised vehicle.
Road crash	a crash on a public road involving at least one vehicle with or without other vehicle(s) or object(s) or pedestrian(s)
Rural area	area outside the capital city, provincial and district towns. The primary participants involved in this research lived in rural areas along national/provincial/rural roads where houses are usually two storeys or less, and typically wooden
Sdos/Phlom	a Khmer term referring to a praying action of a Khmer traditional healer to heal his patient. During the prayer, the healer spreads holy water, mixed with a type of leaf (Mlou) or blows it on the injured part of the body of the patient
Secondary participant	people working in the disability or road safety sectors who were interviewed in the research study
Tetraplegia	paralysis of all four limbs, particularly due to spinal cord injuries
Traditional healer	individuals who provided treatment to patients, based on their traditional methods in communities
Urban area	a place in a city or district centre, with markets or administrative buildings
Vehicle controller	a person who controls and drives a vehicle, such as a car, truck, bus, motorbike or bicycle

Statement of Original Authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

QUT Verified Signature

Signature:

Date: 28th March, 2017

Acknowledgements

This thesis and my PhD journey might not have been started and fully completed without support from many important individuals.

First of all, my heartfelt gratitude is extended to my family, parents, brothers and sisters in law, who have been providing unconditional support, although they might not even remember my research title and read this full thesis. At the same time, I would like to express my sincere thanks to my supervisors, Prof. Narelle Haworth, Dr. Julie King and Dr. Mark King for their invaluable guidance and encouragement. They have built my confidence to progressively walk step by step throughout this unforgettable journey.

My special thankfulness also goes to all the final seminar panel members, Prof. Barry Watson, Prof. Andry Rakotonirainy, Dr. Kathy Ellem for their time and substantial comments, which have significantly contributed to this thesis. Additionally, I also would like to thank Mr. Rob Klein for his ongoing support since the early stage of my application for this PhD program until the end.

Additionally, I acknowledge Jane Todd for professional copy editing and proofreading advice as covered in the *Australian Standards for Editing Practice*, Standards D and E.

Last but not least, many thanks to my friends, colleagues and CARRS-Q team for all their friendly support, fun, talks and every moment we spent together. You all kept me calm, smiling and going on.

Chapter 1: Introduction

This chapter starts with the context of road safety and disability, followed by the research aim, objectives, questions, key term definitions, conceptual framework and significance of the study. Finally, Section 1.6 provides an outline of the remaining chapters of the thesis.

1.1 CONTEXT

Road crashes and injuries have become a growing issue worldwide, as evidenced by the publication of WHO reports in 2004, 2009 and 2013, and the launch of the UN Decade of Action for Road Safety in 2011 (Guillen, Ishida, & Okamoto, 2012; WHO, 2004b, 2009, 2013a, 2015b). Disability has been recognised as a global public health issue (WHO, 2014a; WHO & WorldBank, 2011). Persons with disabilities, especially in developing countries, experience more disadvantages than persons without disabilities, in education, employment and health care (Ingstad & Eide, 2011; WHO, 2014a). In 2010, road traffic injuries ranked as the 10th highest cause of the loss of Disability Adjusted Life Years (DALYs) worldwide (Murray et al., 2012). Importantly, it was the 5th ranked cause in Southeast Asia (Murray et al., 2012). This constitutes a marked increase in rank from 12th in 1990, and a 34% increase in numerical value (Murray et al., 2012). The figures alerted decision makers at national and global levels to emphasise the need for more research in this area to inform policies and action (WHO & WorldBank, 2011).

As a developing country, Cambodia has also faced similar issues of road crashes, fatalities, injuries and disabilities. Building on the Global Plan for the Decade of Action for Road Safety 2011-2020 and the UN Convention on the Rights of Persons with Disabilities, Cambodia has developed its own National Road Safety Action Plan and Disability Strategic Plan to tackle the growing issues of road crashes, injuries and disabilities (Disability Action Council, 2014; National Road Safety Committee, 2014b). Although very few studies have been conducted in this area of Cambodia, Canoquena (2013), Whitzman (2015) and M. J. King and Wood (2013) addressed key issues of policy development and integration, which did not

include a proper development consultation process and adopt evidence based approaches in the road safety and disability fields in Australia and Papua New Guinea. Additionally, Oliver (2009) outlined gaps in disability research, which have not properly incorporated the lived experiences of persons with disability from their point of view. In other words, the perspective of persons with disability about their lives has not been captured. Another concern, identified by Oliver (2009), is the gap in policy development, in which information about persons with disability has not been integrated into the policy-making process. In addition, M. King and King (2006) found a lack of connection between road safety experts and communities, in which experts' opinions about community attitudes and behaviours may be incorrect. They illustrated, as an example, that the understanding among experts of road user motivations and attitudes is likely to be different from the beliefs shared by communities (M. King & King, 2006).

Therefore, although road traffic injury has been recognised as a growing issue and a contributor to disability, the policy development process is still evolving and the translation of research into policy is not well understood. It will be beneficial to undertake the full process of translating research into policy, based on local contexts, where limited resources are a crucial challenge, in addition to the lack of cooperation among different sectors. At the same time, while the fatality data is mostly available, there is still limited injury data in many countries, and particularly data on the long term impacts of road crashes. In this context, Cambodia is selected for this PhD study as an example of a developing country and a case study that can teach other countries about the long term impacts of road crashes which have not been explained well.

1.2 RESEARCH AIM, OBJECTIVES AND QUESTIONS

The overall PhD research aimed to contribute to policy changes that will lessen the impacts of road crashes in Cambodia. In doing so, it sought to further our understanding of how to best develop evidence-based policies that will reduce the incidence and impact of long term disability resulting from road crashes in low- and middle-income countries. The research had four main objectives as below:

1. To examine the nature and extent of long term impairments resulting from road crashes in Cambodia
2. To identify the factors that increase the severity of long term impairments and lead to disabilities
3. To explore the impacts of disabilities on individuals and their families
4. To identify potential changes in road safety, health and disability policies to prevent long term impairments, improve post-crash care and better address the long term needs of persons with disabilities

These objectives led to the formulation of eight main research questions (RQ):

RQ1: How much do road crashes contribute to long term impairments?

RQ2: What are the characteristics of road crashes that lead to long term impairments?

RQ3: What role do emergency and post-crash care play in influencing the occurrence and severity of long term impairments?

RQ4: What are the impacts of disabilities resulting from road crashes on the persons themselves?

RQ5: What are the impacts of disabilities resulting from road crashes on their families?

RQ6: What potential changes to road safety policy would reduce the prevalence of long term impairments as an outcome?

RQ7: What potential changes to health policies would reduce the prevalence of long term impairments?

RQ8: What potential changes to disability policy would better meet the long term needs of persons with disabilities and their families?

1.3 RESEARCH DEFINITIONS

In this research, “road crash” refers to a collision involving at least one vehicle in motion on a public or private road that may or may not lead to injury (WHO,

2004b). The research targeted injured persons (drivers, passengers and pedestrians), who are still experiencing the consequences of injury at least one year after the crash (our operational definition of long term impairments).

Additionally, “impairments” refer to any kinds of injuries (resulting from road crashes) that cause or are likely to cause a loss or difference of physiological or psychological function of an individual (Oliver, 2009). Long term impairments in this research included amputation, para/tetraplegia and functional limitations. “Disability” results from the interaction between the survivors with impairments and attitudinal and environmental barriers that hinder their full and effective participation in society on an equal basis with others (United Nations, 2006). According to WHO and WorldBank (2011), as a result of impairments and various barriers, disabilities include:

- activity limitations: difficulties in executing activities of daily living – for example, walking or eating
- participation restrictions: problems with involvement in any area of life – for example, facing discrimination in employment or transportation

In this research, persons with disabilities and their families who were recruited for the study are defined as “primary participants (I)” and “primary participants (II)” respectively. At the same time, related stakeholders and staff members in hospitals, non-governmental organisations and government institutions that participated in the study are defined as “secondary participants”. The sampling for primary participants (I) was purposive. The research only included male adults (at least 18 years old), who acquired at least one year long term impairments from road crashes, which might lead to disabilities. The research also only focused on injuries that resulted in no diagnosed cognitive impairment. Table 1.1 below summarises the inclusion and exclusion criteria for the research. Children (less than 18 years old) were excluded because of ethical issues in gathering their consent. At the same time, they are less likely to be involved in road crashes, compared to adult males. Further, only males were recruited because of the limitations in resource and data availability, which led to having smaller scope of research participants but more in-depth and accurate information on this specific group. In addition, males are more likely to be breadwinners and accidents can lead to crucial impact on their families, in cases of their absence from work. Additionally, the impacts of disabilities on women might

be different hence this needs another comprehensive research program to capture the full contextual information on them. The issue of giving consent was also anticipated among people with cognitive impairments and became a reason for excluding this group.

Table 1.1: Inclusion and exclusion criteria in the research

Aspects	Included	Excluded
Impairment	- No diagnosed cognitive impairment - At least one year of injury	Cognitive impairment
Persons with disabilities	Males at least 18 years old	Children, women

1.4 CONCEPTUAL FRAMEWORK

Building on the work of previous studies, theories, concepts, the Cambodian context and existing related policies, the general framework for this research was developed, as shown in Figure 1.1. It is in line with the overall research approach to best develop evidence-based policies. Canoquena (2013) summarised the limitations and benefit of policy integration in the road safety sector and presented relevant implications for transport policy. This concept of policy integration was adopted in this PhD study, which encouraged close multi-sectoral collaboration across government sectors, especially disability and road safety. The multi-sectoral approach has been endorsed by the United Nations (2006); WHO (2004b, 2011, 2014a); WHO and WorldBank (2011). To start the process of the policy integration and a multi-sectoral approach, there is a need for accurate and comprehensive information for further evidence based policy development.

To do so, the conceptual framework consisted of “generating knowledge” and “policy implication” components, as presented in Figure 1.1. The first component examined the existing structures and policies related to road safety, health and disability in Cambodia (Study 1). Then, a further two studies (2 and 3) identified and explored the characteristics of road crashes, long term impairments, disabilities and their impacts on persons with disabilities and their families. The overall PhD study took into account the quantitative data (Study 2) as well as individual experiences on road crashes, including the disability impact (Study 3).

Following the data collection in the field and analysis from Studies 1 to 3, the second component, policy implication, formed the basis of Study 4. The research findings from the chain of events, starting from road crashes to impacts of disabilities, were integrated into the existing NRSAP and the NDSP.

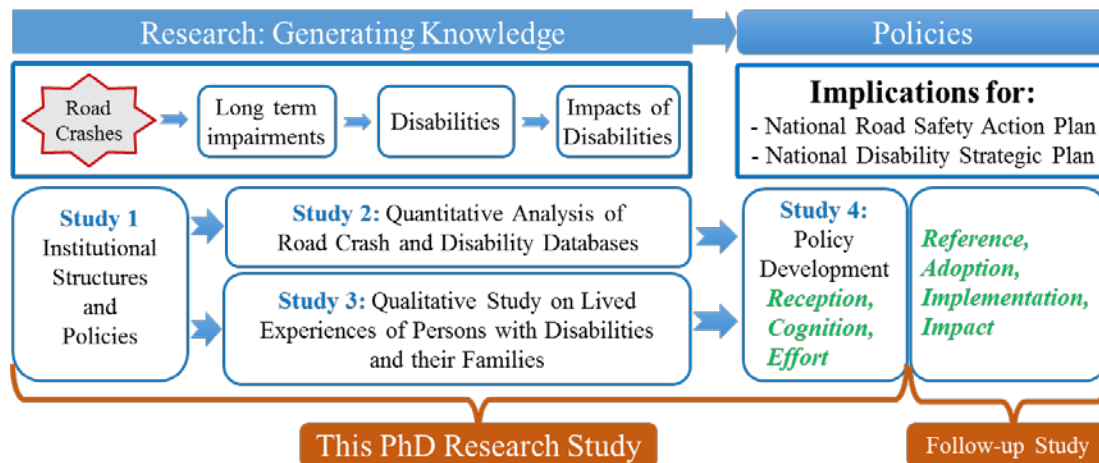


Figure 1.1: Conceptual framework of the research studies

Approaches introduced by Knott and Wildavsky (1980) and SWOV (2012) contributed to the underlying conceptual framework. SWOV (2012) presented a scale of the level of knowledge use based on Knott and Wildavsky (1980) and adapted by later authors. It consists of seven levels, as shown in Table 1.2. While SWOV presented the levels in relation to “practitioners and professionals”, the following description refers to “policy makers”, consistent with the aim of the thesis. The first level is *reception* of the research results by policy makers, for example, a presentation or simply being given a written report. At the next level, *cognition*, the reports are read and understood. The third level is *reference*, where the policy makers cite the research findings. At the next level, *effort*, they try to include the results in policy development (although they may not succeed). *Adoption* is when they have succeeded in adopting the research results in their choices and decisions about the policy. *Implementation* is when this policy is then implemented, and *impact* is when, as a result of implementation of a policy based on research, the policy has the effects that were wanted.

Table 1.2: Degree of knowledge use

Level	Term	Description
1	Reception	Policy makers, practitioners and related stakeholders involved receive or are presented the research results
2	Cognition	Research findings are understood
3	Reference	The research findings / report are cited and quoted by policy makers, practitioners
4	Effort	Policy makers and stakeholders have made an effort to include the research findings in their policy, perhaps unsuccessfully
5	Adoption	The research results have been adopted in the choices and decisions about the policy
6	Implementation	The policy in which the research results have been adopted, has been implemented
7	Impact	The policy implementation shows the desired effects

Adapted from (SWOV, 2012, p. 2)

As shown in Figure 1.1, although Study 4 adopted the SWOV approach (*Reception, Cognition*) and included implications for policies to address road crash prevention and the needs of persons with disabilities due to road crashes (*Effort*), it is not considered as full applied research. Due to the limited timeframe, this PhD study ended with final recommendations for policy changes without including any further steps to *adopt* and *implement* the recommendations and research findings. Hence, the research could not show the desired effects of the recommendation (*Impact*). Further discussion about this approach and how it was adapted into this study is presented in Section 7.2: Study 4 Methodology. The *Reference, Adoption, Implementation and Impact* of the policy change were not able to be included into this study. They are suggested to be researched in a follow up study after this PhD program.

1.5 SIGNIFICANCE OF THE RESEARCH

This PhD research is the first study conducted in Cambodia to explore the characteristics of road crashes, long term impairments and disability impact. It is the only study that conceptualised the chain of events from road crashes to the quality of life of persons with disabilities. It has originally contributed to knowledge and the literature review through:

- Description of road crash extent and characteristics that led to long term impairments
- Exploring factors that might influence the severity of long term impairments and disabilities, including the societal barriers
- Identification of consequences of road crashes on the persons with disabilities and their families

The research study was informed by earlier studies in other countries through existing methodology (quantitative and qualitative analysis) and SWOV approach. At the same time, its initiatives in term of specific examination on the nature and extent of the long term impairments due to road crashes, contextual information on disabilities and impacts, and the identification on the potential changes related to road safety, disability and health policies, make this study became unique.

Additionally, it is expected that the findings will also benefit non-governmental sectors working in disability and road safety to have a better understanding of the contextual factors, which will enable them to implement better evidence-based project designs. Further, the research findings were used to contribute to the knowledge of policy makers in Cambodia via a series of workshops. Through the process, the voices of persons with disabilities due to road crashes were heard by the high level policy makers. Based on the findings from the research, relevant recommendations for the government policies were developed to prevent road crashes that lead to long term impairments and to improve the quality of life of those persons with disabilities.

At the same time, the study adopted the SWOV (2009, 2012) approach to assess the feasibility of promoting knowledge use based on the research findings among policy makers. It initiated the starting point of the action research related to road safety and disability, although it could only cover the reception, cognition and efforts. As another benefit, the study included planning follow up on the policy process to accelerate the adoption, implementation and impact of the policy changes. When the recommended policies or actions are implemented by the government, the quality of life of persons with disabilities and their families will be improved in Cambodia. The benefit will be absorbed by not only persons with physical disabilities due to road crashes, but to all other persons with physical disabilities due

to other forms of accidents and diseases. At the same time, as M. King (2000) addressed that the road safety policy changes will lead to a safer road system for all road users.

Moreover, the result from the PhD study could also provide commentary on the relevance and the needs for improvement of the international concept and theory on the Safe System Approach, Global Plan of Action for Road Safety, Incheon Strategy and UN Convention on the Rights of Persons with Disabilities. This study could be considered as a showcase of developing country context and provide feedback to those concepts which were developed mostly based on the high-income country context. While differences in context limit the generalisability of this study, some extrapolation of the results will be possible on common contextual issues such as insufficient emergency responses, trauma care, poverty and lack of resources.

1.6 THESIS OUTLINE

The thesis begins with an introductory chapter that outlines the context of road safety and disability, followed by the purposes and significance of the study. Then, Chapter 2 reviews literature related to road safety and disabilities. It starts with an overview of disabilities worldwide, followed by disabilities due to road crashes and their impact. Then, it includes an overview of Cambodia, road traffic injuries and disability and experiences of being disabled in Cambodia. The chapter ends with the road safety and disability related policies and the summary section.

The third chapter presents an overview of the research design for all studies and ethics for this PhD research. It then describes the comprehensive methodology for the qualitative study (Study 3). This chapter ends with the limitations for the overall PhD research.

Chapter 4 discusses the institutional structures and policies in Cambodia related to road safety and disability (Study 1). This chapter starts with a description of the study methodology, followed by the overviews of road safety institutions and existing policies. The chapter also includes descriptions of the health system and services after discharge for persons with disabilities. It ends with a conclusion section.

Chapter 5 presents Study 2: Analysis of Road Crash and Disability Databases. It contributes to the first objective of the PhD research in identifying and exploring the characteristics of road crashes in Cambodia using quantitative data. Similar to the previous chapter, this chapter starts with methodology. Then, it presents descriptions and analysis of the Road Crash and Victim Information System (RCVIS). Findings from the analysis include characteristics of road crashes, especially those that led to long term impairments. After that, disability databases, including physical rehabilitation centre (PRC) databases are also described and analysed. The final section of the chapter compares the findings from the RCVIS and PRC databases, followed by the discussion and conclusion sections.

Chapter 6 discusses the research findings in Study 3: Individual and family impacts of disabilities after a road crash. This chapter starts with a description of crash information, which includes characteristics of crashes among the primary participants (I), ineffectiveness of the traffic law enforcement and their perception of road crash causes. Then, the chapter presents contextual information on preventive measures, inadequate emergency response, insufficient post-crash treatment, issues of insurance, followed by the comprehensive description of the impact on individuals and their families. It ends with discussion and conclusion sections.

Chapter 7 presents the research findings of Study 4: Case Study of Policy Development. The main objective for this study was to identify gaps in the National Road Safety Action Plan (NRSAP) and National Disability Strategic Plan (NDSP). It also aimed to propose relevant recommendations to improve quality of life among persons with disabilities (and their families) and for a safer system for all road users. This chapter begins with the Study 4 methodology and results of the workshops. It then includes a discussion on the policy recommendations emanating from analysis of the workshop outputs and a mention of the study challenges. A conclusion section is presented at the end of the chapter.

The last chapter presents a full discussion of the research findings, based on the research questions. It starts with the discussion on improvements of the data system in Cambodia, followed by sections on the extent of long term impairments, characteristics of road crashes, the influence of the emergency responses and post-crash care. It then discusses the impacts of disabilities and the cycle of disability and poverty. It also illustrates proposed implications for policies to address road crash

prevention, health services and the needs of persons with disabilities due to road crashes, including the implication for the Decade of Action for Road Safety 2011-2020. This chapter ends with the follow up study, potential topics for further research and concluding remarks.

Chapter 2: Literature Review

Chapter 2 gives a review of literature related to road safety and disabilities. It starts with an overview of disabilities worldwide, followed by disabilities due to road crashes and their impact. Then, it includes the overview of Cambodia, road traffic injuries in the country and disability and experiences of being disabled in Cambodia. The chapter ends with the road safety and disability related policies and the research gaps.

2.1 OVERVIEW OF DISABILITIES WORLDWIDE

About 15% of the population in the world are persons with disabilities (WHO & WorldBank, 2011) and it has been estimated that “this number will continue to increase as population age with the global increase of chronic health conditions” (WHO, 2014a, p. 4). About 80% of the persons with disabilities live in developing countries (WHO, 2014a). The lives of persons with disabilities are characterised by poorer health outcomes, lower educational achievements, less economic participation, higher rates of poverty, increased dependency and restricted participation (WHO & WorldBank, 2011). Disability increases the likelihood of poverty and poverty increases the likelihood of disabilities (Ingstad & Eide, 2011). The poverty and disability cycle is evident. WHO (2014a) emphasises the need to take proper action to improve the quality of lives of the persons with disabilities within the development agenda.

Although disability was not explicitly mentioned in the United Nations Millennium Development Goals (MDG), it has been progressively included into the implementation of the MDG and the monitoring and evaluation process (Ingstad & Eide, 2011). More recent attention and actions have been observed through the introduction of the UN Convention on the Rights of Persons with Disabilities (UNCRPD) (Ingstad & Eide, 2011; United Nations, 2006; WHO, 2014a). Additionally, the WHO has been progressively developing the Global Disability Action Plan 2014-2021: Better health for all People with Disabilities (WHO, 2014a). Following the experience of the MDG, an important step has been achieved through

the inclusion of disability and road safety into the Sustainable Development Goals (SDGs) ("The Global Goals for Sustainable Development," 2015; WHO, 2015b). The SDGs were launched in September 2015 by the United Nations and consist of 17 goals with 169 targets (WHO, 2015b). They aim to end extreme poverty, fight inequality and injustice and address climate change in the next 15 years in all countries ("The Global Goals for Sustainable Development," 2015). Road Safety and Disability are included into the SDGs as below ("The Global Goals for Sustainable Development," 2015):

- Goal 3: Good Health and Well-being: *By 2020, halve the number of global deaths and injuries from road traffic accidents*
- Goal 4: Quality Education:
 - *By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations*
 - *Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, nonviolent, inclusive and effective learning environments for all*
- Goal 8: Decent Work and Economic Growth: *By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value*
- Goal 10: Reduced Inequalities: *By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status*
- Goal 11: Sustainable Cities and Communities:
 - *By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons*

- o *By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities*
- Goal 17: Partnerships for Goals: *By 2020, enhance capacity-building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts*

Although the SDGs include important targets related to road safety and persons with disabilities, there are still gaps in term of emergency response and rehabilitation which are not mentioned among the targets. This gap is crucial for low income countries to prioritise the reduction of injury severities, especially the long term impairments. At the same time, only accessible transport systems are included under Goal 11, but it does not cover road infrastructures for persons with disabilities. Additionally, Goal 17 mentions the data monitoring and accountability through increasing reliable data. However, it does not clearly emphasise data related to road traffic injuries and fatalities.

2.2 DISABILITIES DUE TO ROAD CRASHES AND THEIR IMPACTS

Every year, around the world, 1.24 million people die due to road traffic injuries in addition to 20-50 million non-fatal injuries occurring (WHO, 2013a). Road traffic injury is also recognised as a major contributor to disability (WHO & WorldBank, 2011), ranging from brief short term impairments to serious long term conditions.

Official statistics on disability due to road crashes display the same drawback as statistics on disability in general, that is, a wide variation from country to country. For example, the World Report on Disability (WHO & WorldBank, 2011) cites a range of surveys which suggest that low income countries have very low levels of disability, and high income countries the highest, whereas the World Health Survey puts high income country rates as lowest and middle income country rates as highest, while the Global Burden of Disease estimates are roughly equivalent across high,

middle and low income countries. It is therefore not surprising that, due to the limitations and difficulties in measuring non-fatal outcomes of injuries, the prevalence estimates of post-crash disability vary dramatically – from 2% to 87% (WHO & WorldBank, 2011). More detailed and focused studies in Thailand, the Netherlands and South Africa showed that long term disabilities due to road crashes accounted for 68-76% of all years lived with a disability, even though only 1-2% of injuries result in long term impairments (Haagsma et al., 2012). People who become disabled through road crashes may experience inequality in accessing health care, education, job opportunities and disability assistance (WHO & WorldBank, 2011). For example, the employment rate among persons of working age with disabilities (44%) is much less than for people without disabilities (75%) across 27 developed countries in the list of the Organisation for Economic Co-operation and Development (OECD) member countries (WHO & WorldBank, 2011).

While quantitative information on disability due to road crashes is patchy, qualitative information is even more difficult to find. Unfortunately most of the research, case studies and examples of interventions in the World Report on Disability, which is the most comprehensive source available, relate primarily to developed countries. WHO and WorldBank (2011) have highlighted the need for more qualitative research, which can inform larger quantitative research programs. Similarly, Crowe, Inder, and Porter (2015) also emphasised the contribution of the qualitative research in providing contextual information to gain a better understanding of subjective experiences. Given the tendency to conduct more research in developed than in developing countries, there is a need for more research to be conducted in low income countries such as Cambodia. Additionally, Eide and Ingstad (2011) highlighted the limitation of the quantitative approach represented by the International Classification of Functioning, Disability and Health (ICF), in exploring the contextual perspective of persons with disabilities and their lived experiences. It is crucial to generate this knowledge to inform policy development in order to bring about better, more sustainable changes (Eide & Ingstad, 2011).

Several studies in low- and middle-income countries have shown the significant impact of road crashes in leading to disabilities. A study conducted in Nigeria illustrated the consequences of traffic injuries including long term impairments which have led to difficulties in daily activity performance, cost of

treatment, loss of jobs and reduction of earnings (Juillard, Labinjo, Kobusingye, & Hyder, 2010). For example, 67% of the interviewees who suffered long term impairments due to a crash had difficulties in performing daily activities and almost 90% reported job loss and income reduction in their families (Juillard et al., 2010). The study also highlighted similar findings in Ghana (Juillard et al., 2010). Since these two countries are also in the “developing country” stage, similar to Cambodia, similar significant impacts of road crashes and disabilities are more than likely to be found in Cambodia. Additionally, Nguyen et al. (2015) conducted a study of cost and impoverishment one year after hospitalisation due to injuries in Vietnam. Although the study did not target persons with disabilities due to road crashes, they confirmed that road traffic injuries imposed significant economic impact, which was nearly 1.2 times the annual average income of a casualty.

A study in Thailand demonstrated the burden of traffic crash-related spinal cord injuries on individuals and their families (J. King & King, 2011). The study illustrated the social and cultural value of the Buddhist concept of Karma as a possible contributing factor in the stigmatisation of the persons with disabilities and as a barrier to the effectiveness of road crash prevention messages. This is one of the few studies that considers and highlights societal barriers for road crash victims with a disability, such as access to public transport, job opportunities, and isolation from the communities in Thai rural areas (J. King & King, 2011). The findings of the study may have some relevance to cultural and social values in Cambodia and their impacts on persons with disabilities, as the two countries have similar culture, beliefs and traditions and both countries have the Theravada Buddhism as their state religion. Additionally, Jayatilleke (1969) and Ly (1965) described the Karma concept in Buddhism as acts that could be good or bad, and are liable to give rise to consequences in the current or next life. Inequalities among people are defined based on their Karma, resulted from their previous life (Jayatilleke, 1969). According to Ghose (2007), in Buddhism, Karma could be purified or eliminated if people act in an entirely non-selfish manner, with meditation practice and refined morality.

Moreover, another challenge in low- and middle-income countries is the accessibility of public transport for persons with disabilities. This is an important problem because services are not as widely distributed as in high income countries, and people with disabilities tend to be poor, so cheap and accessible public transport

may be the only way they can access services. Savill, Stone, Venter, and Maunder (2003) conducted a three-year study in Malawi, Mozambique and India to identify barriers to accessible public transport for persons with disabilities. Data was analysed based on 150 interviews with persons with disabilities in each country, in addition to focus group discussions in South Africa (Savill et al., 2003). The study found structural, social and psychological barriers (during travelling by public transport), which hinder persons with disabilities from employment opportunities, access to education, and social and recreational participation (Savill et al., 2003). Lack of funding and awareness were raised by Savill et al. (2003) as obstacles to improving accessibility.

In addition to various barriers such as lack of resources, inaccessible infrastructure and non-existent policies, Eide and Ingstad (2011) highlighted the involvement and importance of families of the persons with disabilities. In the absence of public welfare and social protection schemes, families shared their resources to cover the living cost of their family member with disability. The arrangement of the household resource also reflected that the poorer the household is, the poorer the condition of the member with disability is. Hence, Eide and Ingstad (2011) emphasised the need to have social protection policies and supporting schemes targeting the family as a unit, not only the individuals with disabilities.

2.3 OVERVIEW OF CAMBODIA

Road safety and disability in a particular country are best understood in their context, including the institutions which both constrain and facilitate policy, legislation, advocacy and action. This section gives a brief overview of the Cambodian context.

Cambodia is located in the southwest of the Indochinese peninsula, bordered by Vietnam to the east, Lao PDR to the north, and Thailand to the west. It is one of the poorest countries in the world, being ranked 136th out of 187 countries in the UN's Human Development Index and 20.5% of the population live below the national poverty line (Human Development Index, 2014). The total population is 14.3 million, and estimates by several institutions (Asian Development Bank and Cambodian Socio-economic Survey) of the prevalence rate for disabilities give

figures ranging from 1.4% to 15% of the population (Secretariat of Disability Action Council, 2012; Thomas, 2005).

According to WHO (2015a), 31% of the population are under 15 years old, and 8% were older than 60 years old in 2013. Around 20% of the population live in urban areas (WHO, 2015a). It is interesting to note that the fatality rate due to HIV/AIDS per 100,000 population was 17.1, compared to 1.7 due to malaria (WHO, 2015a) and 13.4 due to road crashes in 2012 (National Road Safety Committee, 2013).

The Ministry of Social Affairs, Veterans and Youth Rehabilitation (MoSVY) has been tasked by the Royal Government of Cambodia to oversee the disability sector in the country, through its coordinating body, the Disability Action Council (DAC) (Royal Government of Cambodia, 2009). The responsibilities of the DAC are mainly to provide technical advice, assist relevant stakeholders to develop and implement policies and strategies, and monitor implementation (Royal Government of Cambodia, 2009). There is another semi-governmental organisation, the National Centre of Disabled Persons (NCDP), supported by the MoSVY, which aims to provide services and opportunities to persons with disabilities to enable them to fully participate and develop their capacity in social, economic and political activities (National Centre of Disabled Persons, 2012). Although the responsibility for ensuring the wellbeing and welfare of persons with disabilities lies with the MoSVY, it has been recognised that disability is a cross-cutting issue and requires the cooperation of other government ministries, especially Ministry of Health, Ministry of Education, Youth and Sports, Ministry of Women's Affairs, Ministry of Labour and Vocational Training and Ministry of Planning (Secretariat of Disability Action Council, 2012). Additionally, around 50 non-governmental organisations are currently working in the disability sector (Secretariat of Disability Action Council, 2012). This diversity of actors suggests the need for a strong coordinating role and cooperation among related stakeholders in providing support to the persons with disabilities. On the other hand, those stakeholders in the disability sectors have not been actively involved in the road safety sector. The gap in collaboration and cooperation has been observed among stakeholders working in both sectors.

In 2005, the government developed a National Road Safety Action Plan, which aimed to prevent road crashes and promote safer behaviours by road users. Two years later, the National Road Safety Committee (NRSC) was established with the

specific task of coordinating and implementing the national plan. The committee consists of representatives from more than 10 ministries, but only the Ministry of Public Works and Transport and the Ministry of Interior have been working and designating full time staff members for the General Secretariat of the NRSC. One of the important milestones was the approval of a traffic law in 2009, for the first time allowing persons with disabilities to drive vehicles in the road system with special driving licences (General Secretariat of the National Road Safety Committee, 2013). Although this is a good step, it is relevant only to the minority and lack of accessible public transport remains a key issue.

According to the Council of Ministers (2011), there have been social protection schemes for the poor and vulnerable people in Cambodia, including persons with disabilities. However constraints have been observed (Council of Ministers, 2011):

- The interventions to support the poor and vulnerable people mostly focused on immediate priorities, and lacked long term vision
- Limited coordination among stakeholders involved
- Evidence based approaches are still limited to monitoring and improving the ongoing interventions

In 2010, the Royal Government of Cambodia developed the 2011-2015 National Social Protection Strategy for the poor and vulnerable, including persons with disabilities. One of the objectives in this strategy is to ensure persons with disabilities receive income, in-kind and psychosocial support and adequate social care. The scope of the strategy covered a wide range of social protection interventions, which included labour market policy, social insurance, and social safety net (Council of Ministers, 2011). The social safety net consisted of public work programs (cash or food for work), conditional or non-conditional cash or in-kind transfers, and social subsidies (to facilitate access to public utilities, health, education, housing, etc.).

In addition to those formal policies, action plans and structures, the Council of Ministers (2011) identified the role of informal safety nets that have contributed to households. These informal nets consisted of various assistance from family members, relatives and neighbours in the form of labour or animal exchanges, money lending without paying interest or food provision. However, the support might not

apply to very poor households or minorities who could not pay back the assistance (Council of Ministers, 2011).

2.4 ROAD TRAFFIC INJURIES IN CAMBODIA

The numbers of road fatalities have been increasing every year since 2006, when 1,292 were recorded. In 2013, the National Road Safety Committee reported 1,950 fatalities and 14,277 injuries. With a total population of 14.67 million (an increase of 13% between 2005 and 2013), the fatality rate per 100,000 inhabitants in Cambodia was 13.2 (National Road Safety Committee, 2014a). The 2015 Global Status Report on Road Safety estimated Cambodia's fatality rate at 17.3, compared to 14.3, 36.2, 24.5 for Lao PDR, Thailand and Vietnam in 2013 respectively (WHO, 2015b).

In 2013, road crashes had an annual economic cost of USD337M, equivalent to 2.1% of the gross domestic product (National Road Safety Committee, 2014a). The crashes affected mostly young road users and especially students, workers and farmers, who play important roles in the country's economic development (National Road Safety Committee, 2012).

According to this report, at least 1% of patients discharged from hospital and health centres after a road crash have life-long impairments, which can lead to social discrimination, exclusion and disability (National Road Safety Committee, 2012). This percentage is similar to the findings in Thailand, the Netherlands and South Africa (Haagsma et al., 2012), although there are some doubts about whether the real figure is higher, as there are limitations on the capacity of hospital staff to assess the severity of injuries and follow up the patients beyond emergency treatment. Almost 40% of those with long term impairments were 20-24 years old, who would either have been, or would have been expected to become, breadwinners in their families (National Road Safety Committee, 2012). Their disability potentially would have a huge negative impact on their family in terms of both loss of income and requirement for additional expenditure on ongoing treatment and costs of access.

Moving from the level of the individual and their family, there is evidence to support the view that road traffic injuries will have a significant impact on progress towards the achievement of the Millennium Development Goals: poverty, primary

education, gender, income gap, child health and mortality (Ericson & Kim, 2011). Ericson and Kim (2011) identified a sample of households in Cambodia where a member had been injured in a road crash, and measured the impact of the crash on individual and household characteristics directly related to the achievement of the Millennium Development Goals. As an example, they found that 21% of the households lost income and that the school dropout rate was eight times higher than the Cambodian average after a family member was injured in a road crash (Ericson & Kim, 2011).

Although the RCVIS reports provide some details on the context of road crashes via brief descriptions of some casualties with long term impairments, detailed characteristics of crashes among those with long term injuries have never been further explored. The system does not provide follow up information on those discharged from hospitals, as the data collection forms are completed in the emergency rooms only. This gap in information has led to limited understanding of the contexts of the long term impairment related to crashes in Cambodia. Therefore, as part of this research (Study 2), RCVIS data has been further analysed to gain a better understanding of the impact of road crashes in terms of long term injuries. The result is shown in Chapter 5: Analysis of Road Crash and Disability Databases.

2.5 DISABILITY AND EXPERIENCES OF BEING DISABLED IN CAMBODIA

An important implication for road safety is that the characteristics of the road system are relevant to disability in two ways: through causation of disability, and as potential barriers to inclusion. Four sources of disability prevalence are presented below (Hasan, 2014; National Institute of Statistics, 2013, 2014; Secretariat of Disability Action Council, 2012).

- The Cambodia Socio-Economic Surveys (CSES): 4% in 2004, 8.1% in 2009 and 4% in 2013
- The Cambodia Population Census (CPC): 1.4% in 2008, 2.1% in 2013
- Cambodian Demographic Health Survey (CDHS): the result of 2014 CDHS is not available yet, the 2010 version revealed 1.7% of the population as having physical impairment

- The Commune Database: 0.59% in 2011

In Cambodia, definitions and classifications of disabilities vary with the different organisations that have worked in the disability sector and conducted disability related studies. The three nationwide surveys (CPS, CSES, CDHS) have different classifications for long term impairments (Hasan, 2014):

- CPS: seeing, speech, hearing, movement, mental retardation, mental illness, others
- CSES: seeing difficulties, hearing difficulties, speaking difficulties, feeling difficulties, psychological difficulties (strange behaviours), learning difficulties, fits, others
- CDHS: problem of vision, problem of hearing, problem of walking/climbing, problem of remembering or concentrating, problem of self-care, problem of communicating

In addition, although these surveys provide nationwide disability statistics, they are still limited in terms of information about disability. Only basic types of long term impairments could be disaggregated from the data sources. At the same time, almost all surveys and administrative databases included only information on individual characteristics without information on environmental factors. For example, the CPS had no further information on severities or causes (such as traffic crashes). The CSES included this information in addition to a question on participation of people with long term impairments in education, housing land ownership, employment, health services and transport (Hasan, 2014). In addition, the latest 2014 CDHS consisted of six Washington Group questions to identify functional issues rather than only impairments (Am & Nguon, 2014). Additionally, the populations in each data sources were different. For example, the CSES used only the population living in normal households, while the CPC included the total population (National Institute of Statistics, 2014).

Hasan (2014) highlights the key issues of the data sources, including improper definition and survey instrument design, lack of qualification of enumerators and the insufficient sample sizes. All data sources could complement each other. However, each data source has its own strengths and weaknesses and does not provide the full context of disability in Cambodia. The actual rate probably lies between 10% and

15%, as estimated by the Asian Development Bank (Thomas, 2005). This aligned with the estimation of WHO and WorldBank (2011) that about 15% of the population in the world are persons with disabilities.

Furthermore, the 2004 Cambodia Socio-Economic Survey reported higher disability prevalence rates among the rural population (5%), compared with the capital city and urban areas (3.3% and 4.1% respectively) (Handicap International France, 2009). Similarly, the 2013 Cambodia Censal Population Survey revealed that the disability prevalence rate in rural area is 2.3%, compared to 1.3% in the urban (Hasan, 2014). However, Thomas (2005) provided a differing view on disability rates among rural and urban areas. He demonstrated that higher rates of disability were found in wealthier households because of their ability to look after their elderly parents with age-related disabilities. Additionally, wealthier people were more aware of minor impairments, and their disabled children had higher survival rates due to their ability to pay more for better health care (Thomas, 2005). Another potential factor is that wealthier people in urban areas can afford more vehicles, in particular motorbikes. This in turn leads to more exposure to the risk of road crashes leading to disability (Thomas, 2005). This factor aligns with the finding in 2011 that motorbike riders are at very high risk of road crashes. Motorbikes comprise 84% of the vehicle fleet in Cambodia and the majority of road crash fatalities are motorbike riders (67%) (National Road Safety Committee, 2012). Additionally, 90% of persons with long term injuries due to road crashes are motorbike riders (National Road Safety Committee, 2012). In the age group most likely to be supporting a family (25-54 years old), young men were more likely to have long term impairment, compared to women (Handicap International France, 2009).

A report of the National Road Safety Committee (2012) also showed that men accounted for 80% of overall road traffic fatalities. The majority of the long term impairments involved physical difficulties (moving, hearing and seeing), accounting for 74% of all impairments (National Institute of Statistics, 2009). This information is limited, and raises questions about the severities of the impairments and the level of participation of the persons with those long term impairments in their societies.

DAC has recognised road traffic injuries as one of the main causes of disabilities in Cambodia, along with landmines, work accidents, disease, poverty and malnutrition (Secretariat of Disability Action Council, 2012). WHO (2013a)

estimated that 1.2% of road traffic casualties sustained long term impairments. Road crashes caused 46% of all recorded injuries and led to almost 7% of physical impairment and disability in Cambodia in 2004 (National Institute of Statistics, Directorate General for Health, & ICF Macro, 2011). This low percentage might be due to the fact that the study was conducted in 2004, when motorisation was at a lower level. Road traffic injuries probably make a greater contribution now, as their numbers have been increasing significantly, compared to other factors such as landmines. Over the last seven years (2005-2011), the number of fatalities due to road crashes has doubled, in part due to a population increase of 10% and a 231% increase in registered motorised vehicles (of which motorbikes made up 84%) (National Road Safety Committee, 2012). Those road crashes have affected individuals as well as their families and the societies.

In Cambodia the poverty and disability cycle is evident. Poverty increases the chance of disability and disability increases the chance of poverty, making the attainment of the Millennium Development Goals difficult, as demonstrated by Ingstad and Eide (2011). In a country such as Cambodia this can lead to greater risk of marginalisation, lack of resources and lack of access to services such as medical care and education which makes it difficult for families to escape poverty when a member of the family is disabled. This is supported by data from Handicap International France (2009) that found that the household wealth of persons with disabilities is half of the wealth of non-disabled people. Additionally, persons with disabilities generate 65% less average income than persons without disabilities (Handicap International France, 2009). Although the overall cost of disability related crashes comprised only 5.2% of the total road crash cost in 2011, individual cost related to disability (included loss of output and medical cost) was double the cost of a fatality and 10 times higher than a serious injury from which the person recovered (Sann, Ear, Morrison, & Jong, 2012). Greater link to the impact on families and economic development is also found in the below studies.

As noted above, there is a paucity of qualitative studies that explore the long term impacts of disabilities in Cambodia. Only two such studies could be found and they addressed disability due to landmines and unexploded ordinance among poor communities. Taksdal (2011) demonstrated the challenges of being disabled, such as less access to healthcare, the negative impacts on the person's whole family and

especially on the next generation. Children can be at risk of dropping out of school to work to help the family survive when the breadwinner becomes disabled (Taksdal, 2011). Additionally, Thapa (2011) presented similar findings, which included being socially isolated and losing their rights after being disabled. Both studies highlighted the need to improve assistance for persons with disabilities, especially for those in poorer communities. However, the studies tended to explore only the individual impairment and limitations, and did not clearly demonstrate the societal barriers in their communities. Moreover, three other studies, conducted by Song (2015), Song et al. (2013) and Powell, Mercer, and Harte (2002) tended to focus on amputees to measure the changes in quality of life before and after receiving physical rehabilitation services. The studies found that the amputees suffered phantom limb pain after being amputated and this type of pain negatively influenced their quality of life (Song, 2015).

According to Handicap International France (2009), the key issues raised by persons with disabilities and their representative organisations were the lack of access to employment, education and health care. A small study in Kandal province illustrated a higher rate of illiteracy among persons with disabilities (43%), compared to non-disabled people (9%) (Handicap International France, 2009). It illustrates the lack of education for persons with disabilities, especially children. The issue was also identified by UNESCO (2010) in low and middle income countries that disability increased the probability of never having attended school or being dropped out of schools, such as in Burkina Faso, Malawi, Tanzania, Bulgaria and Romania.

2.6 ROAD SAFETY AND DISABILITY RELATED POLICIES

The Safe System Approach, the Global Decade of Action on Road Safety, the UN Convention on the Rights of Persons with Disabilities (UNCRPD) and the Incheon Strategy to Make the Right Real for persons with disabilities contributed to the development of the National Road Safety Action Plan (NRSAP) and National Disability Strategic Plan (NDSP), as summarised in Figure 2.1.

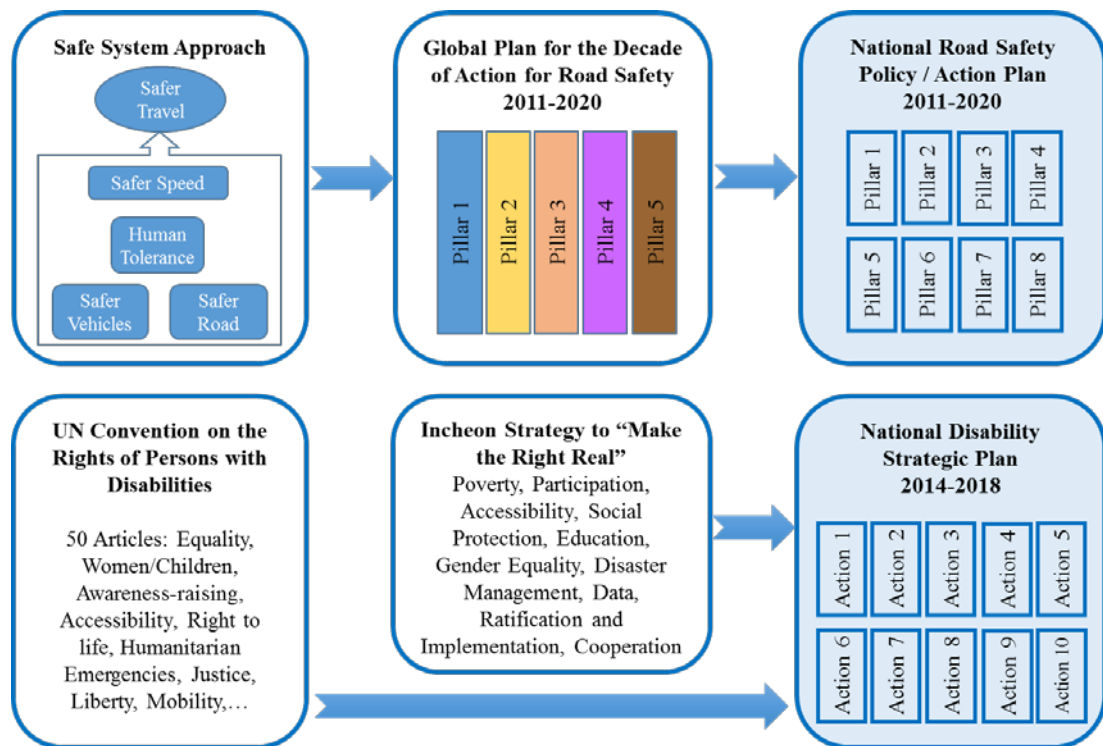


Figure 2.1: The originality of the National Road Safety Action Plan and National Disability Strategic Plan

The Safe System Approach was developed and served as a fundamental theory and guiding principle for the Global Plan for the Decade of Action for Road Safety 2011-2020 (WHO, 2011). The approach aims to reduce deaths and serious injuries in the transport system while accepting human error at the same time (Global Road Safety Partnership, 2008; WHO, 2011). It introduces a shared responsibility between road users, system designers, health services, judicial system, schools and non-governmental organisations (WHO, 2011). The approach consists of important elements, including speed management, vehicle safety, safe road and roadside, which accept human errors in road crashes (Global Road Safety Partnership, 2008).

Building on the Safety System Approach, the Global Plan was introduced in 2011 to reduce the forecast level of road traffic fatalities around the world by 2020 (WHO, 2011). The plan consists of five pillars and covers main elements such as road safety management, road engineering, safe vehicle, safe road user behaviours and post-crash response. Although there is no scientific evidence on the process of adapting the safe system approach into the global plan, WHO (2011) demonstrates in the plan that safe system approach is one of the main guiding principles for the plan's development.

Based on the Global Plan, the NRSAP was developed and approved in 2011. The NRSAP capture all pillars in the Global Plan with three additional ones, law enforcement, driving licence and fleet safety management. The description of the NRSAP is included in Section 4.3.1: National Road Safety Policy and Action Plan.

In addition, this PhD research also extended its scope towards disability as a result of road crashes. Disabilities are articulated in the widely used Social Model (often placed in opposition to the “medical model”) as an exclusion of impaired people from political, economic, social, cultural organisations and communities (Mertens, Sullivan, & Stace, 2011). Mertens et al. (2011) considered disability as a social problem, which requires an adjustment from both abled and disabled persons. Additionally, the World Report on Disability (WHO & WorldBank, 2011) promotes both the medical and social perspectives on disability, however in the past decade the Rights Based Model has gained more international prominence, that is, the establishment of an agreed set of rights for persons with disabilities, enshrined in international instruments as a basis for advocacy, legislation and action. A framework is provided by the United Nations Convention on Rights of Persons with Disabilities (UNCRPD), which asserts the rights of persons with disabilities to access services and systems in the same way as people without disabilities, as part of an inclusive society (United Nations, 2006). This is directly relevant to developing countries, as Biyanwila (2011) highlights the concept of disability as a potential focus for development aid, to mainstream and empower disabled people to allow their full participation in policy development and practices towards real inclusion.

In Cambodia, the UNCRPD has played a very important role to lead the legal process of developing important legal documents, including the Law on the Protection and the Promotion of the Rights of Persons with Disabilities, which was approved in 2009. In 2012, the Incheon strategy was adopted by the governments in Asia and the Pacific to improve the quality of life of persons with disabilities (UNESCAP, 2012). The strategy was developed mainly based on the UNCRPD principles and consists of 10 goals, 27 targets and 62 indicators to promote disability inclusive development (UNESCAP, 2012).

In early 2014, the government approved the 2014-2018 NDSP. The NDSP included all important elements of the UNCRPD and in the Incheon Strategy such as actions on poverty reduction, provision of health and rehabilitation services, access

to justice, liberty, security, education and so on. The description of the NDSP is presented in Section 4.5.1: National Disability Strategic Plan.

Both national policies (NRSAP and NDSP) have served as the fundamental concepts for road safety and disability in Cambodia. The policies have been endorsed officially by the government and considered as the overall framework by the government and non-government institutions. Therefore, implications for improving these policies would benefit the country as a whole in the road safety and disability sectors.

2.6.1 Disability Related Policies in Cambodia

The introduction of the UNCRPD in 2006 has served as an important framework in the disability sector. The UNCRPD aims “to promote, protect and ensure the full and equal enjoyment of all human rights and fundamental freedoms by all persons with disabilities, and to promote respect for their inherent dignity” (United Nations, 2006, p. 4). It provides key guidance to promote the rights of persons with disabilities which included equality, rights based approaches, accessibility, mobility, employment, education, health, rehabilitation, social protection, culture and data collection (United Nations, 2006).

In addition to the promotion of rights of persons with disabilities, the Convention also clearly highlights the need for interconnected networks and disability mainstreaming across different development sectors and has seen the rise of Disability Inclusive Development practice often using a Twin Track Approach which includes disability mainstreaming and disability specific approaches working side by side (United Nations, 2006).

Although Cambodia is one of the 130 countries that have signed and ratified the Convention, cooperation and policy development and implementation across different sectors have not been adequate in addressing the rights of persons with disabilities within the UNCRPD framework. Following the signing of the Convention, the Cambodian government approved its first Law on the Protection and the Promotion of the Rights of Persons with Disability (Royal Government of Cambodia, 2009). The law defined the roles of relevant government sectors in supporting persons with disabilities and reducing environmental barriers (Royal Government of Cambodia, 2009). However, implementing mechanisms for the law

are not yet in place. For example, one of the clear links between Cambodia's Road Safety Action Plan and the disability law is the accessibility of driving licences for persons with disabilities. Although the law has been clear in stating the rights, the mechanisms and procedures needed to license persons with disabilities have not yet been set up.

In addition, in the law persons with disabilities are defined as “any persons who lack, lose, or damage any physical or mental functions, which result in a disturbance to their daily life or activities, such as physical, visual, hearing, intellectual impairments, mental disorders and any other types of disabilities toward the insurmountable end of the scale” (Royal Government of Cambodia, 2009, p. 1). This definition tends to draw only on the medical model of disability, while the social model has been overlooked. This gap is further illustrated in the government official policy in classifying different types of impairment (Handicap International France, 2009):

1. Seeing difficulties or seeing impairment
2. Hearing difficulties or hearing impairment
3. Speaking difficulties or speaking impairment
4. Moving difficulties or moving impairment
5. Feeling difficulties or feeling impairment
6. Psychological difficulties
7. Learning difficulties
8. People who have fits
9. Others

This definition and classification focuses more on an inherent characteristic of an individual or the impairment and not on the impact of that impairment which leads to disability, such as the response of society to that characteristic. They do not take into account the level of participation of persons with disabilities, that is, how inclusive their society is.

In early 2014, the government approved the National Disability Strategic Plan 2014-2018 (NDSP). The plan (Disability Action Council, 2014) aims to:

- Provide social protection, education, vocational training, employment and support services to persons with disabilities
- Empower persons with disabilities and ensure their participation in political life
- Improve physical environment, public transport system, knowledge, information and communication

The NDSP consists of 10 actions, which tend to focus more on individual support with limited intervention on long term impairments and social protection schemes. Only one activity is designed to target maternal health, while other impairment prevention interventions are not included. The social protection scheme is introduced in the NDSP for poor persons with disabilities, but it does not apply to the general social scheme, especially for health services at the time of emergency treatments, which might lead to long term impairments. Additionally, although it mentions responsible organisations, budgeting and its mechanism are not included. It has been anticipated that on-going financial contributions from donors and international non-governmental organisations would be provided (Am & Nguon, 2014). As of the middle of 2015, an annual report on the progress of the strategic plan implementation was not yet available. Further description and analysis of the NDSP is presented in Section 4.5.1: National Disability Strategic Plan.

2.6.2 Road Safety Policy in Cambodia

The government has developed and endorsed the National Road Safety Action Plan 2011-2020, in accordance with the Global Decade of Action Framework (National Road Safety Committee, 2014b). The new plan consists of eight pillars, which are:

- Pillar 1: Road safety management
- Pillar 2: Infrastructure
- Pillar 3: Safe vehicles
- Pillar 4: Safe road user behaviour
- Pillar 5: Post-crash care
- Pillar 6: Traffic legislation and enforcement

- Pillar 7: Driver licensing
- Pillar 8: Management and evaluation of passengers and goods transport services

The first five pillars were developed based on the Global Plan for the Decade of Action for Road Safety 2011-2020 (National Road Safety Committee, 2014b; WHO, 2011). Most of the activities proposed in the global plan were included into the Cambodia NRSAP. The last three pillars were added based on the political commitment to strengthen law enforcement, driver licence system and passenger and goods transport services. Section 4.3.1: National Road Safety Policy and Action Plan provides descriptive information about the policy and its progress by the early 2015.

2.6.3 Policy Gaps

Although the NRSAP and NDSP have been approved and implemented since 2011 and 2014 respectively, there has been no comprehensive study to assess the development process and effectiveness of the policies. Based on the experiences from studies in other countries, there were two different issues related to the policy development. The first one is the lack of research taking into consideration the lived experiences of persons with disabilities, as highlighted by Oliver (2009). Second, once the research is conducted, another issue might arise in terms of translating the research into policy practice (Canoquena, 2013; M. J. King & Wood, 2013; Whitzman, 2015). Such issues might occur for the national policy development in Cambodia too. Additionally, Knott and Wildavsky (1980), SWOV (2009) and SWOV (2012) introduced levels of knowledge uses and groups of factors that influence the knowledge uses. These concepts helped to better translate the research into policies. However, they have not been adapted in Cambodia in terms of the development of the NRSAP and NDSP yet. It is crucial, then, to test these concepts in a developing country, based on evidence from the research, local contexts and resources.

2.7 RESEARCH GAPS AND IMPLICATIONS

Road traffic injuries are an emerging issue in Cambodia and a burden to public health development. They also have a significant impact on progress towards the

Millennium Development Goals and contribute to reduced quality of life of persons with disabilities with limited access to support services. Previous studies and reports of WHO and WorldBank (2011), Haagsma et al. (2012), Juillard et al. (2010), Ericson and Kim (2011) and National Institute of Statistics et al. (2011) recognised road traffic injury as a contributor to disability. However, they did not analyse the patterns of long term injury crashes and post-crash factors that might influence the severity of impairments and lead to disabilities, especially in low income countries such as Cambodia. The gap in the literature led to the research questions below.

RQ1: How much do road crashes contribute to long term impairments?

RQ2: What are the characteristics of road crashes that lead to long term impairments?

RQ3: What role do emergency and post-crash care play in influencing the occurrence and severity of long term impairments?

Juillard et al. (2010), J. King and King (2011), Savill et al. (2003) highlighted the impacts of disabilities on the individuals and their families, such as the social and cultural value of the Buddhist concept of Karma, difficulties in performing daily activities, job loss, income reduction; and structural, social and psychological barriers that hindered persons with disabilities from full participation in societies. Although some of the findings might have some relevance to the Cambodian context, Cambodia has its own characteristics and requires its own interventions within its existing and limited resources. Further information is needed to guide appropriate and effective interventions and to obtain a clear picture of the lives of persons with disabilities for this country. At the same time, it is also important to note the linkage between disability and poverty in Cambodia, where social networks and assistance exist to only a limited extent and exacerbate the disability-poverty loop. Several disability related studies were conducted by Thomas (2005), Handicap International France (2009), Taksdal (2011) and Thapa (2011) in Cambodia, but they mostly demonstrated the lived experiences and context of persons with disabilities due to landmine and unexploded ordnance (UXO). None of them clearly highlighted the road crash injuries and subsequent long term impairments.

Therefore, it is crucial to have a more in-depth understanding of disability after a road crash and how it is experienced by the persons themselves and by their

families. There is a gap in knowledge of the long term impact and this PhD study contributed to filling this gap. It is essential that studies in low income countries such as Cambodia are undertaken to ensure that there is an understanding of the contextual factors that would impact on this issue in similar countries. While differences in context limit the generalisability of this study, some extrapolation of results will be possible on common contextual issues such as poverty, stigma and lack of resources. This will in turn inform better policy and contribute to sustainable and targeted implementation of services. Hence, additional research questions were proposed:

RQ4: What are the impacts of disabilities resulting from road crashes on the persons themselves?

RQ5: What are the impacts of disabilities resulting from road crashes on their families?

Moreover, although the institutional structures and policies are in place, they have not addressed the needs of persons with disabilities effectively, in addition to their limited implementation. As a consequence of signing and ratifying the United Nations Convention on the Rights of Persons with Disabilities, Cambodia has an obligation to update its national policies, legislation, and evaluate its current system and services to ensure it is abiding by the UNCRPD. Additionally, as noted earlier, a better qualitative understanding of the disability impact resulting from road crashes is lacking in developing countries in general, and especially in Cambodia. The lived experiences of persons with disabilities can provide rich contextual information to help identify the gaps in national policies, such as in prevention and transport system design and treatment as well as full inclusion and assistance (Eide & Ingstad, 2011; J. King & King, 2013). J. King and King (2013) provide some examples of how information on the lived experiences of persons with disabilities can contribute to the development of road safety management, infrastructure, transportation and advocacy that provide benefits for all road users as well as persons with disabilities. At the same time, Oliver (2009) outlined gaps that disability research did not properly incorporate the lived experiences of persons with disability and in the policy development, in which information about persons with disability has not been integrated into the policy-making process. Therefore, the findings from this PhD study have the potential to contribute to all pillars in the current National Road Safety Action plan as well as the actions in the National Disability Strategic Plan.

Furthermore, M. King (2000) introduced a concept of “iceberg” that presented the special needs of a road user group (including older road users, school children and disabled) and the flow-on effects to other road users. The study analysed road crash data on older driver and school age pedestrian crashes and implications for road safety planning and strategy. It illustrated the substantial flow-on benefit of the countermeasures that were taken to address those special needs road users, in reducing other crashes and improving the safety of other road users. Through this iceberg concept, M. King (2000, p. 5) highlighted that “*tailoring traffic environment for special needs road users should contribute to much greater levels of safety for all road users*”. Later studies conducted by Wiman and Sandhu (2004) and Whitzman (2015) also concluded that promoting accessibility for persons with disabilities in infrastructure design and implementation would benefit all people. This iceberg concept has been applied in this research study. It is important to focus on the special needs of persons with disabilities in the transport sector and road environment. This will, at the later stage, provide flow-on benefit to other road users, especially children and the elderly. The concept of this PhD research study was to cover the road safety and accessibility for all road users.

Therefore, these led to the last three research questions, which identify the implications for policies to address road crash prevention, treatments and the needs of persons with disabilities.

RQ6: What potential changes to road safety policy would reduce the prevalence of long term impairments as an outcome?

RQ7: What potential changes to health policies would reduce the prevalence of long term impairments?

RQ8: What potential changes to disability policy would better meet the long term needs of persons with disabilities and their families?

Chapter 3: Research Design

3.1 INTRODUCTION

This chapter presents a brief description of the research design for all studies for this PhD research. The comprehensive description of the methodologies of Studies 1, 2 and 4 is presented in Chapters 4, 5 and 7 respectively. Only the methodology of the qualitative study (Study 3) is described in this chapter, Section 3.4: Study 3 Methodology, since it requires a comprehensive description and does not fit with Chapter 6:, which is already lengthy. This chapter also includes sections on the Study 2-3 interaction and the Ethics and Limitations for the overall PhD research.

As mentioned in the previous chapter, there were eight research questions as below:

- RQ1: How much do road crashes contribute to long term impairments?
- RQ2: What are the characteristics of road crashes that lead to long term impairments?
- RQ3: What role do emergency and post-crash care play in influencing the occurrence and severity of long term impairments?
- RQ4: What are the impacts of disabilities resulting from road crashes on the persons themselves?
- RQ5: What are the impacts of disabilities resulting from road crashes on their families?
- RQ6: What potential changes to road safety policy would reduce the prevalence of long term impairments as an outcome?
- RQ7: What potential changes to health policies would reduce the prevalence of long term impairments?
- RQ8: What potential changes to disability policy would better meet the long term needs of persons with disabilities and their families?

In response to the research questions above, the conceptual framework was developed as presented in Section 1.4. It consisted of “generating knowledge” and “policy implication” components. The concepts of action research and policy integration were proposed as a general methodological guide. According to Sarantakos (2013), this action research method has been employed since the 1920s in the social research area. The concept of action research is to ensure that the research findings have been informed and applied to improve the quality of actions, collaboration and cooperation between the researchers and policy makers (Sarantakos, 2013). The concept helped to promote broad participation from policy makers (such as the National Road Safety Committee, Disability Action Council), disability service providers and representatives of persons with disabilities through the research process. In addition, the concept of policy integration was adopted, based on Knott and Wildavsky (1980), SWOV (2009) and (SWOV, 2012). They introduced the level of knowledge uses and factors that influenced the knowledge uses.

Additionally, the UNCRPD helps to frame the qualitative study (Study 3) methodology related to disability by involving persons with disabilities (research participants) at different levels from the study design to data collection, data analysis and promoting research findings. The researcher worked with the persons with disabilities as results of road crashes and their families to explore their lived experiences as well as building collaboration, and gathering their feedback on the research findings and tools. Based on the UNCRPD research concept, the researcher empowered the participants to express how social barriers were shaped, the impacts on their community and their life and how to improve the quality of their life. Interaction between policy makers and disability representatives were encouraged from the data collection stage. This qualitative and action research gave them opportunity to raise their voices to the policy makers.

Moreover, the research methodology was consistent with the critical-interpretivist approach, which captures the overall policy as well as grass-root concepts. The research valued the human aspect and explored it based on lived experiences and daily activities of the participants. At the same time, the research identified relevant policies, strategies and action plans that lie at a much higher level.

This enabled the researcher to have a rounded perspective of the context from the grass-roots as well as the national point of view.

3.2 OVERVIEW OF THE RESEARCH STUDIES

Figure 3.1 summarises the components of the research and their interactions. Study 1 provided insight on the institutional structures and policies related to road safety, health system and disabilities. The information helped to define the scope of Study 3, explore related policies and identify relevant participants for Study 4. The interaction between Studies 2 and 3 is shown in Section 3.2.4, while the contribution of both studies on Study 4 is presented in Section 7.2.1.

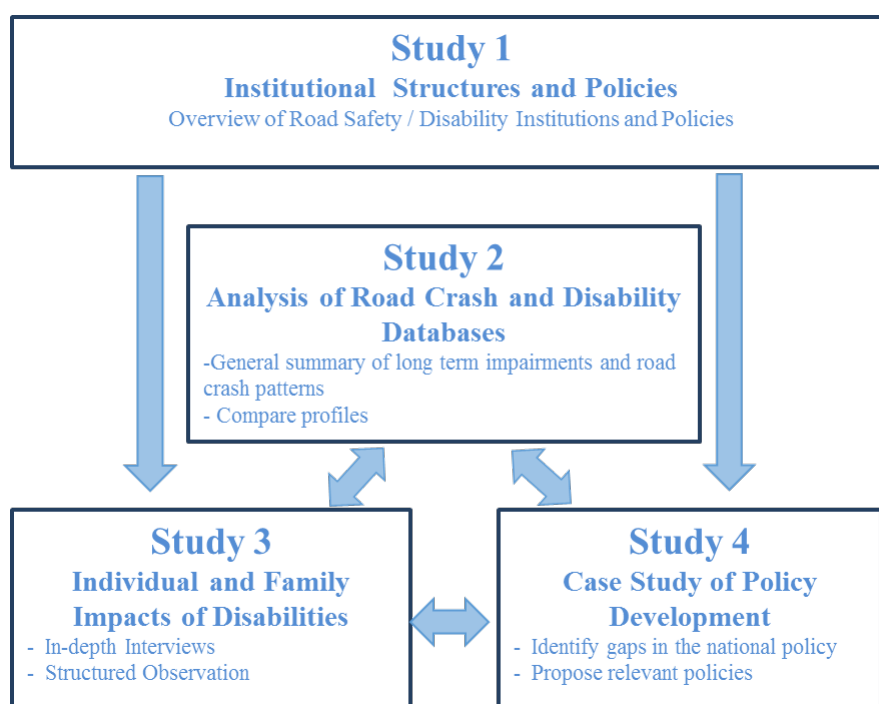


Figure 3.1: Summary of the studies

As summarised in Figure 3.2, Study 1 included overall information on structures and policies related to road crashes, long term impairments, disabilities and impact. Study 2 explored deeper into the context of road crashes that led to long term impairments. Study 3 focused on the impacts of disabilities, taking into account how those disabilities and long term impairments happened. The last study included recommendations to prevent road crashes, long term impairments and reduce disabilities and impact.

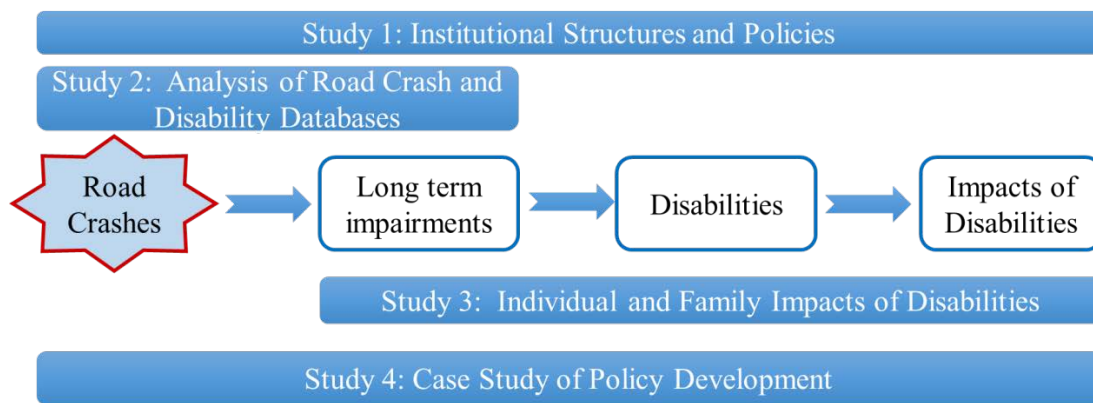


Figure 3.2: Scope of Studies 1, 2, 3 and 4

Table 3.1 presents the contribution of Studies 1, 2, 3 and 4 to the research questions. RQ1 was addressed through the data analysis in Study 2 on RCVIS and PRC databases. The second and third research questions were answered through the findings from Studies 2 and 3, which identified characteristics of road crashes by analysing data from the two national databases and conducting in-depth interviews with persons with disabilities and their families. Study 3 contributed to RQs 4 and 5 on the impacts of disabilities on individuals and their families. Additionally all four studies sought for answers to the last three RQs to identify potential changes to road safety, health and disability policies.

Table 3.1: Contribution of Studies 1, 2, 3 and 4 to the research questions

Research Questions	Research Studies			
	Stud 1: Institutional Structures and Policies	Study 2: Analysis of Road Crash and Disability Databases	Study 3: Individual and Family Impacts of Disabilities	Study 4: Policy Development
RQ1: How much do road crashes contribute to long term impairments?		Analysis of characteristics of road crashes that led to long term impairments based on RCVIS and PRC databases		
RQ2: What are the characteristics of road crashes that lead to long term impairments?		Analysis of characteristics of road crashes that led to long term impairments based on RCVIS and PRC databases	Perception and characteristics of road crashes, based on lived experiences of persons with disabilities	
RQ3: What role do emergency and post-crash care play in influencing the severity of long term impairments?		Analysis of the post-crash characteristics based on RCVIS and PRC databases	In-depth interviews of individuals and families related to post-crash context	
RQ4: What are the impacts of disabilities resulting from road crashes on the persons themselves?			In-depth interviews with individuals on impacts of disabilities	
RQ5: What are the impacts of disabilities resulting from road crashes on their families?			In-depth interviews with families on impacts of disabilities	
RQ6: What potential changes to road safety policy would reduce the prevalence of long term impairments as an outcome?	Structures and policies related to Road Safety	Characteristics of road crashes, based on RCVIS	Characteristics of road crashes, based on lived experiences	Road Safety policy gaps and relevant recommendation
RQ7: What potential changes to health policies would reduce the prevalence of long term impairments?	Structures and policies related to health	Characteristics of road crashes, based on RCVIS and PRC databases	Characteristics of road crashes, based on lived experiences	Health policy gaps and relevant recommendation
RQ8: What potential changes to disability policy would better meet the long term needs of persons with disabilities and their families?	Structures and policies related to disability	Characteristics of road crashes, based on PRC database	Lived experiences of persons with disabilities and their families	Disability policy gaps and relevant recommendation for supporting persons with disabilities

The following sections provide an overview of each study (Studies 1 to 4) and the relationship between Studies 2 and 3. The methodology sections of Studies 1, 2 and 4 are presented in Chapter 4, Chapter 5 and Chapter 7 respectively.

3.2.1 Study 1: Institutional structures and policies

As summarised in Table 3.1, Study 1 helped to answer RQs 4 and 5 to understand the institutional structures and policies in Cambodia related to road safety, health facility and disability. The findings from this study provided a snapshot to arrange further studies (2, 3 and 4) in cooperation and with support from relevant organisations, including the government institutions and NGOs.

The information for this section was gathered through primary and secondary data collection. The primary data collection included meetings, email communication and in-depth interviews with the secondary participants (policy makers). A total of 32 secondary participants were met or interviewed. Meetings with secondary participants were arranged to gather updated information on road safety and disability sectors. They were organised during visits to Cambodia by the Principal Supervisor, Prof. Narelle Haworth, and Associate Supervisors, Dr. Julie King, and Dr. Mark King.

Then, following an ethics approval (Number 15000000001), in-depth interviews were arranged with 17 secondary participants. The main objective of the interviews was to gain a better understanding of the general perceptions of policy makers and stakeholders on intervention and progress of road safety and disability policy implementation as below:

- Disability focus: overview of the scope of impacts of disabilities due to road crashes in Cambodia, such as type of long term impairments, difficulty in performance of daily activities, effect on family interactions
- Social impact focus: how the general disability concept in the social model is applied and implemented in communities and at societal level, and how family support fits in
- Their current projects: overview of projects, implemented by the organisations, including the process of emergency, registrations in hospitals and community based activities

- Update on related road safety and disability action plans and policies

The information gathered from meetings, email communication and in-depth interviews added to the information collected through the secondary data. Thematic analysis was conducted for the in-depth interviews to find patterns across the data and interpret it into study findings. As at the beginning of the analysis, initial codes were generated, followed by theme development (Crowe et al., 2015).

3.2.2 Study 2: Analysis of road crash and disability databases

The main objective of the analysis was to understand the characteristics of road crashes that lead to long term impairments and to have further information on general situations of persons with disabilities (due to road crashes) who come to receive the services from 11 physical rehabilitation centres in Cambodia. To do so, de-identified data from two databases were gathered in Cambodia from the Road Crash and Victim Information System (RCVIS) and Physical Rehabilitation Centres (PRC).

Descriptive statistical analysis (frequencies and cross tabulation) was performed on the RCVIS and PRC dataset, using SPSS software (Version 21). *Pearson Chi-square* (χ^2) test was used to test for statistically significant differences at the .05 level. Additionally, *standardised residual test* was also applied to measure the contribution of each cell of a table to the Chi-square value. Moreover, *Multinomial Logit Model* (MLM) was also applied to the RCVIS dataset to estimate the outcome probabilities of the hospital discharge results, which included fatality, long term impairment, being transferred to other health facilities (for further treatment) and being fully treated. At the same time, to estimate the effects of a risk factor, “*Relative Risk Ratio*” (RRR) was also calculated.

3.2.3 Study 3: Individual and family impacts of disabilities

The main objective of Study 3 was to identify and explore the impacts of disabilities following a road crash on the casualties and their families. In Study 3, the lived experiences are classified into:

- o Perceptions of characteristics of road crashes and their attribution
- o Experiences related to emergency responses and post-crash treatment
- o Support on discharge
- o Impacts of long term impairments and disabilities, including physical, psychological, economic and social well-being, and societal barriers.

The primary data collection was conducted through in-depth interviews with 46 primary participants (I) and 31 primary participants (II) and 44 observations. Two research assistants were recruited to provide assistance during the interviews and observations. In order to facilitate rapport and trust, in-depth interviews were conducted in two stages. The first stage was conducted as preliminary semi-structured interviews with primary participants (I and II) to collect general information (name, family status, etc.) overview of the road crashes and overall lived experience. The second interviews were in-depth interviews and conducted around six to nine months after the first stage. The second interview started with an open-ended question on how life was for them at present and to see if there were any changes since the first interview. The description of the primary participants (I) and (II) is presented in Sections 3.4.6 and 3.4.7.

The analysis was concurrent with data collection. The interviews were tape recorded and transcribed in English by the researcher. Then, all transcripts were transferred to Nvivo computer program for coding and analysis. They were reviewed and initial notes were taken with descriptive codes to extract concepts from the raw data in Nvivo. The data analysis process of the field notes from the observations was similar as the process in the in-depth interview analysis.

3.2.4 Relationship between Study 2 and 3

As summarised in Figure 3.3, Studies 2 and 3 supplemented each other. Study 2 guided what and where should be explored more in Study 3. The analysis of the existing databases provided the overview of the road crash context and general summary of the pattern of disability from road crashes. It captured where the crashes happened, where persons with disability lived, and where they went to access the services. This helped the researcher to identify areas for interviewing. It was also interesting to identify in Study 3 the reasons for movements between the locations where they were injured, where they lived and where they went to access the rehabilitation service. Study 2 also presented the overview of demographic information of the injured persons (age, occupation, gender, type of transport) that guided the research to target participants for interviews in Study 3. Additionally, the limited information in the existing databases in Study 2 enabled the researcher to develop a question guide for Study 3, such as: emergency services during the

transportation, context of road environment at the time of crashes, and any social security that they were offered after the crashes.

Moreover, Study 3 provided feedback to improve the existing data collection systems on road crashes and physical rehabilitation. Emerging issues were identified through the in-depth interviews in Study 3. These highlighted important factors that should be included in the surveillance systems in order to capture a better picture of the road safety and disability issues in the future. The contribution of Study 3 to Study 2 is in line with Pillar 1 of the UN decade of action for road safety (WHO, 2011) and Objective 3 of the Global Disability Action Plan 2014-2021 (WHO, 2014a), which recommend to strengthen the data collection system for road crashes, injuries and disability.

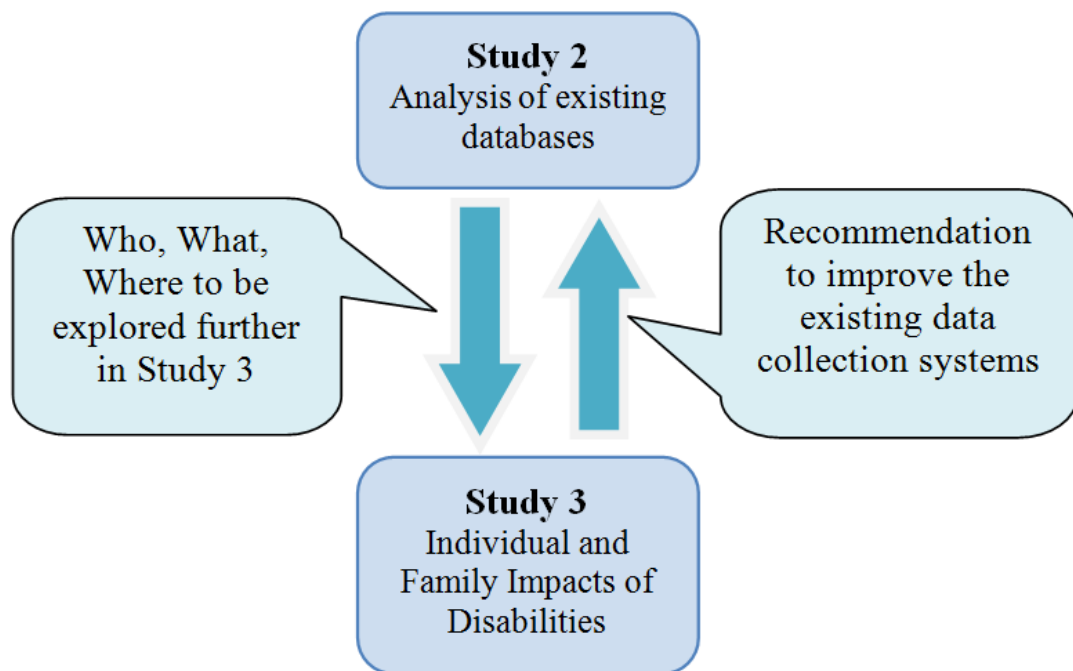


Figure 3.3: The relation of Study 2 and Study 3

3.2.5 Study 4: Case study of policy development

The main objective of this study was to identify gaps in the National Road Safety Action Plan (NRSAP) and National Disability Strategic Plan (NDSP), based on contributions from policy makers. SWOV (2009) discusses influencing factors of road safety knowledge use by policy makers in the policy development process. Additionally, SWOV (2012) presented a scale of the level of knowledge use, which

consists of seven levels. The SWOV approach and concept are used as a framework for Study 4 to conduct a case study of policy development.

Furthermore, this study included the preliminary stage, Stage 1 (Workshops 1, 2) and Stage 2 (Workshop 3). The preliminary stage aimed to gather related information to ascertain whether the methods proposed for the overall PhD study (Studies 1, 2, 3 and 4) were viable. It was conducted through meetings with relevant policy makers, who are referred as secondary participants. Additionally, Stage 1 helped to provide ongoing information to policy makers on the research findings from the analysis of road crash and disability databases (Study 2) and the updated data that were collected from the field (Study 3). The workshops in both stages also enabled the gathering of feedback from the secondary participants on the research findings and discussion of current policies. Then, Stage 2 attempted to encourage participants to include the research findings in two related policies: NRSAP and NDSP. Through a presentation of the key findings, secondary participants were involved in the development of relevant recommendations for NRSAP and NDSP, based on the findings. Stages 1 and 2 were organised through a series of workshops with policy makers.

To arrange all workshops in Stages 1 and 2, invitations were sent to 47 representatives from 35 organisations. A total of 39 secondary participants from 26 organisations participated in the workshops. Thematic analysis was used for this study. All workshops were tape recorded (with permission from participants in advance). The outputs from the group discussions were summarised based on the questions for each discussion and group activity. Then, main themes were identified based on findings from the workshops.

3.3 ETHICS

3.3.1 Ethics Applications and Approvals

A low risk ethics approval was granted from the QUT ethics committee in February 2015 for Study 1: Institutional Structures and Policies (QUT ethics approval number: 1500000001) for the in-depth interviews with the secondary participants. According to Chapter 5 of the National Ethics Statement (p. 79), Study 2 (analysis of road crash and disability databases) can be exempted from the ethical

review, because it related to a request to access an existing collection of data that were provided in a non-identifiable form to the researcher. The collection of the de-identified data was completed in July 2013. Additionally, an ethics application for a full committee review (for Study 3) was approved in mid-2014 for the primary data collection (QUT Ethics Approval Number: 1400000202). Study 4 included two low risk ethics applications which were approved in June 2013 (QUT Ethics Approval Number: 1300000372) and May 2014 (QUT Ethics Approval Number: 1400000259). In addition, another ethics application for the overall PhD study was also submitted to the Cambodian National Ethics Committee for Health Research in Cambodia in March 2014 and was approved.

3.3.2 Informed Consent

There are two main participant groups: primary participants (I and II) in Study 3 and secondary participants in Studies 1 and 4. It was considered impracticable to ask primary participants (I and II) in Study 3 to sign a consent form because some were unable to read or write very well in Khmer language, as illiteracy is still an issue in Cambodia. Additionally, although there might be some primary participants (I and II) who can read and write well, they might not be able understand clearly the concept of signing a consent form, as they have not heard of such a form before. Moreover, during the time of the data collection, there were some political clashes (between the ruling party, Cambodian People Party, and opposing party, Cambodia National Rescue Party) and people in communities were afraid of being cheated by their signatures being collected for political purposes leading them to hesitate to sign any form. Therefore, the researcher only asked for verbal consent, which was audio recorded. This process was clearly stated in the ethics application for the full committee review and it was approved.

Study 1 involved in-depth interviews and meetings, while Study 4 consisted of a series of workshops. The secondary participants in both studies were asked to sign a consent form. Before the interviews, meetings and workshops, official letters were sent to the heads of the organisations. The letters provided information on the overview of the research proposal and requested the heads of the organisations to identify staff members who may be approached as voluntary participants to attend the interviews, meetings or workshops. A consent form was attached to the letter. At least one staff member was identified (by the head of the organisation) and their

contact details were sent to the researcher. The researcher directly followed up with the appointed staff members to make detailed arrangements, including an explanation of the consent form. During the interviews, meetings and workshops, the researcher informed all participants in both studies that their participation was entirely voluntary and if they agreed to participate they could withdraw from the project without comment or penalty. If they withdrew, on request any identifiable information already obtained from them would be destroyed. They were also informed that their decision to participate or not would in no way impact upon their current or future relationship with QUT or with their organisations.

3.3.3 Privacy and Confidentiality

The interviews in Studies 1 and 3 and workshops in Study 4 were audio recorded and transcribed into English. The identifying information and raw data were not included in the research report to ensure that all information from the interviews and workshops is confidential and anonymous and contains no raw data. Only the researcher has access to the original records and transcripts, which have been kept in a locked filing cabinet. The researcher and supervisors have access to the electronic notes, which have been kept as password-protected files on the researcher's computer and on the CARRS-Q part of the QUT network drive for an appropriate period of time.

3.4 STUDY 3 METHODOLOGY

The section starts with the positioning statement, featuring the background of the researcher. It then presents the study framework and procedures, followed by the description of the primary participants (I) and (II), data analysis and qualitative rigour.

3.4.1 Background of the Researcher

As Bergeron, Bizjak, Krause, and Beaudour (2005) highlighted, reflexivity is a concern in qualitative research and it is important to openly present the researcher's background and self-awareness of experiences in the field. Therefore, to start the qualitative research (Study 3) methodology section, my background and experience are presented below to position myself. I was born in a middle class family in the

capital city of Cambodia. My parents worked in a university as professors. They valued the importance of education and fully encouraged my brothers and me to pursue higher degrees. As the only daughter in the family in the city centre, I have been taken care of and protected so well. I have been fully supported and exposed to new and modern society, such as the best school and universities in the country. Although Phnom Penh is the capital city of a developing country, I have seen it as a beautiful part of the world, which was equipped with good people, infrastructures and culture. My point of view has been extended to the full context of people living in provinces, especially rural areas after I started my full time job and especially conducting this research.

In January 2004, I was offered my first full time job as a road safety education officer in Handicap International Belgium for the first road safety project in Cambodia. My first working day started by attending a national workshop to develop the first National Road Safety Action Plan, supported by the Asian Development Bank. I actually did not notice that it was a starting point of my journey into the road safety field until I wrote this section. At that time, I was appointed as a group representative to present results from our group discussion in the workshop. I knew nothing about road safety, but managed to understand and summarise the results from the group discussion. I do not remember how the group members selected me as their representative, but can recall how interested I was in the topics during the workshop. I started to realise these emerging issues related to road crashes and the lack of proper interventions. Perhaps it was one of the reasons that I came up with this research topic, which linked to the national road safety action plan and policy.

For exactly nine years, I worked in the same project and the same organisation, but with increasing responsibility from the education officer to the overall program manager, regional liaison officer (including technical support to the project teams in Laos PDR and Vietnam) and as a consultant. I enjoyed my working experiences and have seen the development of the road safety concept and implementation in the country, in close collaboration with the project partners, especially the national road safety committee team. In the management position, I mostly spent my time in the office, national workshops and policy meetings with limited time in the communities. I then realised that I missed community voices while engaging myself with mostly the national and policy discussions. This also reflected the gaps between the national

teams, especially the central government and the grassroots teams in those communities. This actually became one of the reasons that I included the linkage between national policy point of views and the voices from communities, especially in rural areas into my research. I questioned myself whether our policies were developed with full consideration of the community contexts, and what we could do to bring those community voices to the policy makers.

In addition, working in Handicap International Belgium provided me with an opportunity to understand the organisation's principle, mission and other projects, which were mostly related to the disability field, such as the support to a rehabilitation centre and livelihood project. At the same time, my road safety project focused mostly on prevention, including public education and strengthening law enforcement. I observed the limited linkage between the road safety and disability projects, and a gap in terms of the national target to prevent road crashes and reduce the number of fatalities in our national policy without considering the severe injuries that might lead to long term impairments and disabilities. These became a motivation for me to undertake research to fill this gap.

When I moved to Australia and became a member in the Centre for Accident Research and Road Safety – Queensland, I was amazed with the research culture and evidence-based approaches that have been adopted there. There is a strong relationship between the practitioners in the government sector, such as the Department of Transport and Main Roads and the research team in exchanging the research results to develop and evaluate their road safety interventions. Such a culture has not been adopted in Cambodia yet. I decided to introduce this culture by constructing my last study which led to an exchange of ideas and concepts from the policy makers and the data collection from the field.

Last but not least, through my PhD journey, I interviewed 46 persons with disabilities due to road crashes and 30 family members. Listening to their lived experiences made me realise that I am so fortunate to be born in a middle class family, to access the best schools in Cambodia, have a good job and benefit from this scholarship award to study in Australia. For them, road crashes changed their life from being breadwinners of their families to persons with disabilities, mostly because of the societal barriers and their physical impairments. I almost cried several times because of the interviews with some of them, who were very unfortunate

without any social protection scheme. They expressed their depression, hopelessness and did not have any motivation to continue living. They believed that the responsibility for disability was with individuals and their families, while I have seen it as a responsibility of the whole society. I knew that I made the right decision to select this research topic and to bring the voices of those unfortunate people to the policy development teams and seek changes in the society. Additionally, because I have been given so much, compared to them, I need to give back to the society by preventing road crashes and improving their quality of life as much as I can. This thesis is the end of my PhD journey, but for sure, this is not the end of my journey in the road safety and disability fields.

3.4.2 The Study Framework

As outlined by WHO and WorldBank (2011) and Oliver (2009), the lived experiences of persons with disabilities from their point of view have not been captured much in disability research. In addition, there is a need to strengthen the policy development that reflect the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) (WHO & WorldBank, 2011) especially in regards to Cambodia. It is crucial to have a more in-depth understanding of disability after a road crash and how it is experienced by the persons themselves and by their families.

The WHO defines health as *“a state of complete physical, mental and social well-being and not merely the absence of disease and infirmity”* (WHO, 2006). This definition is an ideal to explore the state of well-being among those persons with disabilities due to road crashes. At the same time, the term “well-being” was explained by CDC (2013) as good living condition, based on what people feel, think and perceive about their lives, such as the quality of their relationships, their positive emotions or overall satisfaction with life. In line with this, a qualitative research methodology was selected for this study. The definition of the “disability” is presented in Section 1.3. The study complemented the previous study (Study 2) and helped to explain the context that plays a crucial role in the lives of persons with disabilities and their families (Liamputtong, 2009). Study 2 provided an overall picture of the road crash context and physical rehabilitation services, while this qualitative research study brought depth of understanding of the context, cultural factors, and meaning individuals attributed to their life and circumstances

(Liamputtong, 2009). It provided an in-depth understanding of the lived experience of disability due to road crashes in Cambodia, taking into account its specific socio-cultural context. Definitions for key terms are summarised in Table A3.27 in Appendix 3. The description of the health facilities and traditional healers is presented in Section 4.4.

3.4.3 Procedures of the In-depth Interviews and Observations

The primary data collection was conducted between May 2014 and March 2015 through in-depth interviews with 46 male persons with disabilities (as primary participants (I)), their 31 family members (as primary participants (II)) and 44 observations. Two research assistants were recruited to provide assistance during the interviews and observations. Their main tasks were pre-defined through training on how to conduct observations and take detailed observational notes, based on the observation guidelines. An overview of the research objectives, conceptual framework and methods was also included in the training. Only one of them accompanied the researcher to each study site. They were introduced to the primary participants (I) and (II) at the beginning of the visits as a research team member, and participants were asked if they were comfortable with their participation and there were no objections to their presence. The research assistants did not participate in the dialogue between the researcher and the primary participants (I) and (II), but rather observed the surrounding environment. With a verbal consent from the primary participants (I), they took photos during the interviews.

In-depth Interviews

The in-depth interviews assisted in eliciting thick, rich information (thoughts, perceptions, feeling, experiences) and was captured in participants' own words (Liamputtong, 2009). Although the in-depth interviews contributed extensively to the qualitative data collection process, one limitation is the need for rapport, trust, and willingness to divulge sensitive information. In order to facilitate rapport and trust, in-depth interviews were conducted in two stages.

The first stage was conducted as preliminary semi-structured interviews with the primary participants (I and II) to collect general demographic information, overview of the road crashes and overall lived experience. This enabled the researcher to establish rapport with the participants (Merriam, 2009). Transcripts for

these interviews were transcribed verbatim and thematically analysed. The emerging themes formed the basis of the second interviews to gain a deeper understanding of the lived experience of the participants.

The second interviews were in-depth and semi-structured. They were conducted around six to nine months after the first stage. The second interview started with an open-ended question about how life was for them at present and to see if there were any changes since the first interview. Following questions probed around the themes as below:

- Crash information: Blackspots (belief, treatment, solution), drink driving, role of traffic police
- Structure/System at emergency and post-crash care: issue of advanced payment, emergency services, traditional healers, description of counselling services, medical care, community based support services, issue of assistive equipment
- Impact on persons with disabilities and their families: changes in roles, family income, participation in their families and community, travelling/access

Schedules for the first and second interviews with the primary participants (I) are in Appendix 2. The two-stage data collection procedure also allowed the researcher to analyse changes to each primary participant. This allowed for a greater understanding of the lived experience over time and explored transitions and changing circumstances of the participants with disability and their family during a six month period. The analysis of the transcripts considered transitions or changes on the status of the participants' well-being, changes to careers and income, and social barriers, such as physical environment and attitude of people towards them.

To start the interviews, the primary participants (I) were asked to choose any setting they wanted. All of them were happy with the selected interview site. Almost all of the in-depth interviews were conducted at the homes of the primary participants (I). Only three primary participants (I) were interviewed at the Physical Rehabilitation Centre in Kampong Cham and the Spinal Cord Injury Centre in Battambang, based on the arrangement of the centres. Almost half (19) of the first interviews were attended by the staff from those organisations, with no objection

from the primary participants (I). The other 27 were conducted without their attendance. Most of the second interviews were organised without the presence of the staff from the supporting non-governmental organisations.

As summarised in Table A3.28 in Appendix 3, most of the interviews in the first stage included the primary participants (I) and primary participants (II) at the same time. The other one-third of the interviews were conducted with the primary participants (I) only. Before the interviews, the primary participants (I) confirmed that they were happy to have their family members in their interviews. Participants gave verbal informed consent to take part in the study. The primary participants (II) also contributed to the description of crashes, although none of them had been with the primary participants (I) at the time of the crashes. This was second-hand information that they heard from other sources including police and witnesses of the accident. At the beginning of each interview, the primary participant (I) was asked an introductory question. During the interview, primary participants (II) were invited to contribute. Although there were two separate questionnaires for the primary participants (I) and (II), some of the questions were similar, for example difficulties and impacts after the road crashes. Interviews mostly started with an open-ended question about how crashes happened. The interviews with the primary participants (II) were transcribed and analysed separately from those with the primary participants (I).

Observations

Observations assisted the researcher to minimise bias and verify information in order to gather valid and reliable data (Angrosino & Rosenberg, 2011). The observations also enabled the researcher to capture recurring patterns of behaviours and interactions of the primary participants (I) and (II) through their body language, affect, tone of voice and other paralinguistic messages, in addition to their words (Marshall & Rossman, 2011). Additionally, observation helped to identify information or topics that the primary participants were unable to express or willing to share openly (Merriam, 2009).

The observations were conducted during the first and second interviews. The roles of the researcher and research assistant were defined in advance, before the interviews. The researcher and research assistant initially noted down key words/phrase on whatever happened to capture information as much as possible

during the first few observations (Sarantakos, 2013). The notes included the activities and interaction of the primary participants (I) and (II) during the interviews such as the body language, tone of voice, facial expression. This helped the researcher to develop a check list and observation guideline, which was used on later observations, as shown in 0. The observations were structured and consisted of a standardised procedure with pre-defined categories based on the checklist (Sarantakos, 2013). In addition to key words or phrases based on the checklist, the research assistants noted in detail what they saw as much as they could. The checklist consisted of elements to be observed as below. The guide consisted of:

- The physical setting: description of the house, space, other objects, resources, particular focus on obstacles that impacted on physical movement of the persons with disabilities (primary participants (I))
- The participants / other members: description of the physical impairment of the primary participants (I), who else was present at the time of the interviews (family members), who was (or was not) expected to be there and any relevant characteristics
- Interactions: between primary participants (I) and family members including behaviour, roles and non-verbal communication

During the in-depth interviews and observations, photos of the primary participants (I) and (II) and their houses were taken, after gaining verbal informed consent. Taking photos was approved by the ethics committee (QUT Ethics Approval Number 1400000202). The photos were taken to illustrate their environmental context, such as houses, toilets, or facilities to support their mobility.

Once the observation and interview were completed, the researcher and research assistant reviewed the notes taken on the observations and added all other relevant information. This included important elements, such as emotional responses of participants during the interview and the drawing of diagrams of the settings. These were then incorporated into the original notes.

More than 60% of the primary participants (I) (29) lived in rural areas. The living context of the primary participants (I) was observed during the in-depth interviews and classified into:

1. Category 1: live in a wooden house or a shelter, without vehicles, they are the poorest compared to other categories. Twenty-five primary participants (I) were in this category.
2. Category 2: live in a wooden house, with at least one vehicle (motorbike), or a concrete house (ground floor or both floors). Sixteen primary participants (I) live in this category context.
3. Category 3: live in a concrete house, there are at least three motorbikes, or a car in the house; they are in the best living condition, compared to those in the other two categories. The remaining five were in this category.

3.4.4 Study Site

The study was conducted in the capital city, Phnom Penh and seven provinces: Pursat, Kampong Cham, Kampong Speu, Battambang, Tboung Khmum, Siem Reap, Kampong Chhnang, to capture the similarities and differences in experiences in different locations (both rural and urban) in Cambodia. These provinces have some of the highest rates of road crashes. Additionally, those provinces were selected based on the data availability from PRCs and disability NGOs. The study sites included a wide range of contexts, such as rural and urban areas and those in provincial towns, along national roads or rural roads.

3.4.5 Recruiting Procedure

A total of 46 primary participants (I) were recruited for the study through a network of existing organisations that have been working in the disability sector and providing support to them. A list of criteria to identify those primary participants (I) was sent out to those organisations, and this included:

- Male
- 18 years old and above
- Sustained a long term impairment as a result of a road crash, at least one year ago

A total of 126 contact details were provided for the research study and 46 were recruited as primary participants (I). Those contact details were gathered through two main types of projects, implemented by eight organisations (Table A3.47 in Appendix 3). The description of the rehabilitation and community based services is

included in Section 4.5. Reasons for exclusion included: not fitting the selection criteria (31), incorrect contact details (24), outside the coverage areas (11), unavailability (4), reaching saturation in the category of amputation (9), death (1).

After the first 32 interviews, the researcher realised that the sample did not reflect a cross-section of disability types or reflect severity of impairment. Only one out of the first 32 was a person with paraplegia, while the others were amputees or had functional limitations. This presented a need to extend the research scope to ensure a better reflection of a wider range of disability types and severity. Further contacts were made to more non-governmental organisations to seek their support in identifying persons with paraplegia and tetraplegia due to road crashes. Additionally, snowball sampling was conducted through meetings with local authorities to gather more contact details. Because of the extending network, a further 14 primary participants (I) who were diagnosed with paraplegia or tetraplegia were recruited for the study. Finding and recruiting these participants was difficult, and these issues will be discussed in the study findings.

To recruit those last 14 primary participants (I), many issues emerged in terms of the lack of available data on the severe disabilities. Only two out of 11 PRCs could provide contacts of severe impairments (paraplegia and tetraplegia) due to spinal cord injuries, sustained from a road crash. This could be concluded that those PRCs mostly have information on their clients with amputations, but not other types of long term impairments. Additionally, an assessment was conducted on a list of 53 organisations that worked in the disability sector. The list is provided in a report on the analysis of the rehabilitation sector situation in Cambodia prepared by Yoeung and Kleinitz (2013). As a result from the assessment on the list, 10 organisations were identified as having direct communication / project activities with persons with disabilities, who fit with the research criteria and might have contact details of persons with severe disabilities. In addition to the list assessment, a snowball method was also used to identify three other organisations. So, a total of 13 organisations were contacted in this stage. At the end, only five organisations were able to provide contact details of 41 persons with disabilities and only 14 were accurate and selected for the interviews. Moreover, staff members in three big hospitals in Phnom Penh were also contacted to identify patients with severe impairments (paraplegia and tetraplegia). None of them were able to assist in this data collection because of their

lack of follow up information on their patients and limited capacity of their information system in generating those contact details. A study conducted in two referral hospitals in Cambodia highlighted an issue of limited information on discharged diagnosis and to track discharged patients, with a lack of a coordinated system in terms of referring and transferring patients (Yan et al., 2015).

Among all of the primary participants (I) who were referred to the study by eight organisations and local authorities, only 33 were initially contacted for an appointment before the interviews. Through phone calls, those 33 primary participants (I) or their family members received a brief explanation of the purpose of the study. Then, once they agreed to participate into the research study, they were asked to confirm interview schedules and venue. The other 11 primary participants (I), were approached by the organisation staff at their houses on the day of the interviews because they did not have any contact numbers, besides their home address.

3.4.6 Description of the Primary Participants (I)

The sample size of Study 3 is 77: 46 primary participants (I) and 31 primary participants (II). All of the primary participants (I) were males aged between 19 and 67, with the majority being working age (n=44). The research study covers seven provinces and Phnom Penh, the capital city of Cambodia. Table A3.48 in Appendix 3 summarises the numbers of the primary participants (I) living in those provinces and organisations that provided contact details of the participants. Handicap International (HI) has implemented a community based support project in Battambang and provided a list of 31 contacts, 17 of whom were interviewed. Additionally, two organisations also referred 11 contact details of their project beneficiaries and six of them were included in the study. This resulted in a higher proportion of the primary participants (I) in this Battambang province (30%) compared to other provinces.

Almost half of the primary participants (I) were persons who had undergone an amputation. “Functional limitation” included participants who had all four limbs and had a limitation in mobility, either their legs or arms, as a result of their accident. These included difficulty in walking and other activities of daily living.

Table 3.2: Long term impairment types of the primary participants (I)

Type of long term impairments	Numbers
Amputee-Leg	19
Amputee-Arm	1
Paraplegia	8
Tetraplegia	7
Functional limitation	11
Total	46

As shown in Table A3.49 in Appendix 3, nine participants were students before the road crashes. The other 24 were government officials, drivers or farmers. None of them were unemployed, however as a result of their accident just under half are now unemployed (n=22).

3.4.7 Description of the Primary Participants (II)

Family members who were interviewed as part of the study are defined as “primary participants (II)”. Table A3.28 summarises the presence of the family members during the first and second interviews (31 and 16 respectively). Wives made up almost two-thirds of the interviews with primary participants (II). In around one-fourth of the interviews, the primary participants (II) were either mother or father. Primary participants (II) in the remaining interviews were a mix of relatives of the spouse or parents.

The researcher acknowledged the influence of family members on the interviews. However, most primary participants (I) chose to have the interviews at their houses. At the same time, it might be uncomfortable for them if they were asked to be interviewed separately and might create suspicion. The researcher respected the decision of the primary participants (I) to have interviews accompanied by their family members.

3.4.8 Data Analysis

Continuous, iterative analysis was conducted throughout the data collection by applying thematic analysis. It included six phases: becoming familiar with the data, generating initial codes, searching for themes, reviewing themes, defining themes and producing the report (Braun & Clarke, 2006). The information gathered from a new participant built up on previous information and contributed to the next data

collection and analysis (Corbin & Strauss, 2008). The interviews were recorded and transcribed verbatim into English by the researcher. Additionally, five English transcripts were translated back into Khmer and checked again with the tape records to ensure the accuracy of the transcription and translation. Then, all transcripts were transferred to Nvivo10 computer program for coding and analysis. They were reviewed and initial notes were taken with descriptive codes to extract concepts from the raw data in Nvivo (*NVIVO 10 for Windows, Getting Started* 2014). Those descriptive codes were listed and applied to several transcripts to test if the codes were working. Then, they were assembled into a master list, which were applied to all transcripts. During this process, those codes were used to define key concepts, which were classified into relevant categories (Corbin & Strauss, 2008). Then, the researcher ran a text search query to find the general themes, patterns and comparisons, where applicable (*NVIVO 10 for Windows, Getting Started* 2014). Through the process of the thematic analysis, key themes or patterns were pinpointed, examined and recorded (Braun & Clarke, 2006). Additionally, memos were written to summarise the concepts of each category. The memos also included reflective thoughts from the raw data, including comparisons. Based on the memos, comparative analysis was elaborated to identify differences and similarities of data from the interviews. This helped to contextualise the overall categories, problems or circumstances.

The data analysis process of the field notes from the observations was similar to the process in the in-depth interview analysis. Codes (key words, notations) were noted down in the margin next to relevant transcript sections. Then, those codes were used to construct categories.

3.4.9 Qualitative Rigour

Qualitative research has been recognised as an appropriate methodology to explore contextual factors and lived experiences of individuals, such as persons with disabilities. The researcher used qualitative rigour to ensure the reliability of the research. This is a crucial strategy involved in the research design and processes (Liamputtong, 2009):

- **Methodological choices:** in line with the research objective to identify and explore the social and cultural construction and impacts of disabilities on individuals, the research methods consisted of in-depth interviews,

observations and narrative inquiries. The methods helped to explore lived experiences of persons with disabilities as a result of road crashes (Liamputtong, 2009).

- ***Prolonged engagement and field work:*** to reduce bias such as the likelihood of participants falsifying or withholding information, the researcher paid two visits to each participant and gathered additional information from their family members. This helped to understand the contextual factors from the point of view of the individuals as well as from their families (Liamputtong, 2009).
- ***Interpretation and evidence:*** to support and interpret the thematic findings, the researcher included verbatim quotations and narrative description of selected individual's lived experiences. They were aligned with the rich description and reflexivity of the researcher's position and personal perspective on the findings (Liamputtong, 2009).
- ***Triangulation:*** to strengthen credibility of the research, the convergence of information was based on multiple sources, which might also expose different perspectives of reality. These helped the researcher to have deeper understanding, increased scope, depth and consistency. These included:
 - o Methodological triangulation: multiple methods used in the data collection process, including in-depth interview and observation, which enhanced the validity of research results. Additionally, different aspects of findings (from the qualitative research as well as quantitative analysis on the existing databases) were combined in order to provide a more complete picture of the phenomenon (Liamputtong, 2009).
 - o Data and source triangulation: multiple quotations from different individuals, extended locations, involving multiple participants, to confirm and illustrate the emerging themes. Additionally, data from the quantitative analysis in Study 2 also complemented the findings in this study (Liamputtong, 2009).

- **Evaluative rigour:** to confirm the information provided by the primary participants and check the interpretation, the information was further gathered in subsequent interviews to contribute to the completeness of the analysis.
- **Reflexivity:** At the beginning of the study, the researcher's pre-understanding was made plain without prior assumptions (Hsiung, 2008), by positioning herself as a listener and gather all information from the research participants. After the data coding, all memos were kept to record all information, content and how interpretation was made from the data analysis (Giddings & Grant, 2009; Probst, 2015). Additionally, the researcher debriefed with supervisors during the analysis and wrote up processes to gather "third-party" viewpoints on the research activities (Probst, 2015; Wiman & Sandhu, 2004). At the same time, Section 3.4.1 presents the background of the researcher, including her working experiences and how the research topic was selected (Probst, 2015; Wiman & Sandhu, 2004).

Furthermore, Study 4 is qualitative, with small-scale situation, but in-depth and contextual. *"The purpose of the study is not to establish a random or representative sample drawn from a population but rather to identify specific groups of people who either possess characteristics or live in circumstances relevant to the social phenomenon being studied. Informants are identified because they will enable exploration of a particular aspect of behaviour relevant to the research."* (Mays & Pope, 1995, p. 110). Qualitative studies of this kind, which rely on systematic, non-probabilistic sampling, demonstrate their rigour by exploring the range of experiences of a particular group, so that the results are representative of the experiences of the group rather than providing statistical representation. The value and rigour of this approach to research in health-related fields has been emphasised by Mays and Pope (1995).

In addition, unlike a quantitative approach, where the purpose is to estimate how much something occurs or is present as a proportion of a particular population, in qualitative research the aim is to understand the characteristics and dimensions of an experienced phenomenon. To the extent that representativeness is needed, it is about the representation of the *range of experiences* in the sample, not the number of

people with particular experiences. For this reason qualitative research often involves sampling until saturation, i.e. new interviews or focus groups no longer contribute new experiences. So, for this type of mini-narrative study, generalizability is not involved (Grbich, 2013).

3.5 STUDY LIMITATIONS

One of the limitations in the PhD research is its small scope. It covered only physical impairments (amputee, functional limitation and para/tetraplegia). The other types of long term impairments were not included such as mental impairment, or blindness. At the same time, children and women were not recruited as the study aimed to explore the impacts of disabilities among male adults at least 18 years old only. Additionally, the study included seven provinces (Kampong Cham, Tboung Khum, Kampong Speu, Kampong Chhnang, Pursat, Battambang and Siem Reap) and the capital city, Phnom Penh. This meant that the other 17 provinces were not counted, especially those that have minority groups, such as Ratanak Kiri and Mondul Kiri.

The second limitation is the purposive sampling method in Study 3. Most of the primary participants were recruited through NGOs working in PRCs or the communities for road safety or disabilities projects. Their staff members referred those primary participants to the researchers. Therefore, although most of the primary participants received different types of support from those NGOs, they did not represent the context of persons with disabilities who have not been selected as beneficiaries of those NGOs. This is a qualitative study that presents what has been happening to those persons with disabilities who were the primary participants in the study, but did not attempt to generalise the context for all persons with disabilities.

Another limitation of the study is the incomplete process of the “generating knowledge” and “policy implication” components. The Study 4 did not fully reach the “effort” level. This requires further follow up study to measure the genuine efforts of policy makers (secondary participants) to include their point of view in actual policy documents.

Moreover, the qualitative study (Study 3) identified the key issues, such as ineffectiveness of the traffic law enforcement, inadequate emergency responses and

post-crash care based on perception of research participants. The findings clearly presented the existence of the issues among persons with disabilities, but could not justify how large the issues are in Cambodia. This requires further confirmation through more comprehensive study.

Chapter 4: Institutional Structures and Policies

4.1 INTRODUCTION

This chapter presents the institutional structures and policies in Cambodia related to road safety and disability. It describes Study 1, which aimed to explore the structures and policies related to road safety, health and disability. As presented in Chapter 1, the overall PhD research aimed to lessen the impacts of road crashes in Cambodia. In doing so, it sought to further our understanding of how to best develop evidence-based policies that will reduce the incidence and impact of long term disability resulting from road crashes in low- and middle-income countries. Therefore, it is important to understand the structures, institutions and policies related to road safety and disability in order to conduct comprehensive analysis and identify potential changes.

Study 1 was conducted through secondary data collection, meetings, email communication and in-depth interviews with key stakeholders, who are referred to as secondary participants. In the overall PhD study, primary participants (I) included persons with disabilities. Their families are referred to as primary participants (II). The descriptions of the primary participants (I and II) and findings from their interviews are included in Sections 3.4: Study 3 Methodology and Chapter 6: Lived Experiences and Impacts of Disabilities. In this chapter, only findings from the secondary participants in Study 1 are discussed. The study contributed to RQs 6 to 8 as below:

- RQ6: What potential changes to road safety policy would reduce the prevalence of long term impairments as an outcome?
- RQ7: What potential changes to health policies would reduce the prevalence of long term impairments?
- RQ8: What potential changes to disability policy would better meet the long term needs of persons with disabilities and their families?

This chapter starts with the Study 1 methodology. Then, sections on overviews of institutions and policies related to road safety, health and disability follow. The chapter also includes discussions of potential changes to those policies. It ends with a conclusion section.

4.2 STUDY 1 METHODOLOGY

The main objective of this study is to understand the institutional structures and policies in Cambodia related to road safety, health facility and disability. The information for this section was gathered through primary and secondary data collection. The primary data collection included meetings, email communication and in-depth interviews with the secondary participants. A total of 32 secondary participants were met or interviewed.

4.2.1 Procedures and Participants in Meetings

Meetings with secondary participants were arranged to gather updated information on road safety and disability sectors. They were organised during visits to Cambodia by the Principal Supervisor, Prof. Narelle Haworth, and Associate Supervisors, Dr. Julie King, and Dr. Mark King. A total of 15 staff members from seven organisations were met. They included:

- 3 organisations working in the road safety sector (two governmental organisations, one non-governmental organisation)
- 2 organisations working in the disability sector (one governmental organisation and one non-governmental organisation)
- 2 organisations working in both sectors: road safety and disability (non-governmental organisations)

Individual meetings were organised with the above seven organisations at their workplaces (three) and at restaurants (four) based on their preferences. Participants in each meeting included the researcher, one PhD supervisor and one to three staff members from the organisations. Introductory letters and phone contacts were made to arrange the meetings, which aimed to exchange information on:

- Overview of the Queensland University of Technology and the Centre for Accident Research and Road Safety – Queensland

- Projects and main activities of those seven organisations
- Existing road safety and disability policies

4.2.2 Participants and Procedure for In-depth Interviews

Following an ethics approval (Number 1500000001), in-depth interviews were arranged with 17 secondary participants. The main objective of the interviews was to gain a better understanding of the general perceptions of policy makers and stakeholders on intervention and progress of road safety and disability policy implementation as below:

- Disability focus: overview of the scope of impacts of disabilities due to road crashes in Cambodia, such as type of long term impairments, difficulty in performance of daily activities, effect on family interactions
- Social impact focus: how the general disability concept in the social model is applied and implemented in communities and at societal level, and how family support fits in
- Their current projects: overview of projects, implemented by the organisations, including the process of emergency registrations in hospitals and community based activities
- Update on related road safety and disability action plans and policies

The in-depth interviews were semi-structured, based on the pre-defined topics as above. Additionally, the main themes on road safety, health system and disability determined research participant types in the sectors as the process was a purposive approach to sampling. The topics defined a list of questions to elicit in-depth description of the main themes from the secondary participants (Crowe et al., 2015). In this interview stage, the secondary participants consisted of two different groups:

- Thirteen health care professionals: staff members from public hospitals (4), physical rehabilitation centres (3), and other disability related organisations (6)
- Four traditional healers: individuals who provided treatment to patients, based on traditional methods

The sample size of the in-depth interviews was decided during the data collection process, when saturation was achieved. Interviews with the health care

professionals were conducted in offices in Phnom Penh and five provinces (Battambang, Pursat, Kampong Cham, Tboung Khmom and Kampong Chhnange) where the selected hospitals and organisation head offices are based.

Official letters to arrange the in-depth interviews with health care professionals were sent to selected public hospitals, physical rehabilitation centres and NGOs that have been working with and supporting persons with disabilities. All of the organisations responded to the letters by approving their relevant staff members for voluntary participation in the research interviews. The discussions took place at their workplaces, which fostered the focus on their professional experiences. They were not asked to discuss or comment outside the scope of their professional lives.

Additionally, traditional healers, who provided treatments to persons with disabilities due to road crashes, were contacted through local authorities and primary participants (I and II) during the in-depth interviews in Study 3. A snowballing method was also applied. They were visited at their houses and asked about their daily activities in providing treatment to their patients. Any information that could have identified a patient was excluded from transcripts.

The interviews with all secondary participants were conducted in Khmer and audio recorded, with approval from them. Through the discussions, the secondary participants were also informed by the researcher about the concepts that had emerged in the literature review and findings from the first phase of the data collection (Studies 2 and 3). It was anticipated that this information exchange would contribute to their knowledge. Additionally, these preliminary interviews also helped to facilitate participant involvement in the later stage of the research (Workshop 3 in Study 4).

4.2.3 Email Communication

Five key staff in the Ministries of Public Works and Transport (MPWT), Interior (MoI), Education, Youth and Sports, Rural Development (MRD) and Health (MoH) were contacted through email because they were not available while the researcher was in Cambodia. The emails were sent mainly to ask for updated information about their relevant ministries, such as their current projects, staffing, capacity building issues among their teams and action plan implementation.

4.2.4 Analysis

The information gathered from meetings, email communication and in-depth interviews built up on the information collected through the secondary data. Notes were taken during the meetings, while the in-depth interviews with the secondary participants were tape recorded and transcribed in English. A summary was made for each meeting to synthesise the key information, provided by the secondary participants. Then, thematic analysis was conducted for the in-depth interviews to find patterns across the data and interpret it into study findings. As at the beginning of the analysis, initial codes were generated, followed by theme development (Crowe et al., 2015).

4.3 ROAD SAFETY INSTITUTIONS AND EXISTING POLICIES

Road safety as a concept was introduced to the Cambodian government through a small project initiated by Handicap International in 2002, followed by a regional road safety program supported by the Asian Development Bank (ADB) in 2003. The first National Road Safety Action Plan was developed for 2005-2010. Following the approval of the plan, the National Road Safety Committee was set up with its General Secretariat team.

Although the first National Road Safety Action Plan was initiated by the ADB, no further support was provided after the development of the action plan. The implementation of the plan was then partially supported by several non-governmental organisations. There were some achievements during 2005-2010, after the introduction of the first Road Safety Action Plan. At the same time, some challenges and obstacles were observed. First, all of the projects mentioned in the actions above were initiated and implemented by non-governmental organisations. Collaboration and participation by government agencies was observed during implementation, but the government teams did not fully manage the process. This led to limited knowledge transfer in terms of strategy development and project management. Second, the resources of these non-governmental organisations were limited, compared to the specific project needs and the growing road safety issues in the country. For example, in 2010, a total of USD0.8M was allocated by these organisations for road safety, compared to an annual economic cost of USD279M

due to road crashes in the same year (Sann, Gnim, Phan, Morrison, & Jong, 2012). The majority of the implementation occurred in Phnom Penh only.

Funding for road safety increased from less than half million USD in 2006 to more than USD2.6M in 2014 (General Secretariate of the National Road Safety Committee, 2015). The majority of the funding came from NGOs working in the road safety sector. They contributed to 70% of the overall national budget during these last nine years. Although the overall funding from the government constituted only 28% of the total over the nine year period, their contribution increased to more than 40% during the last two years. The funding from the private sector is very minor (2%), compared to other funding sources, but at least it demonstrated a degree of participation from those private companies in the road safety sector.

4.3.1 National Road Safety Policy and Action Plan

In early 2010, the second National Road Safety Action Plan for 2011-2020 was developed as part of the National Road Safety Policy. It was approved in 2011. The policy (National Road Safety Committee, 2014b) aims to:

- Increase road safety knowledge
- Strengthen traffic law enforcement
- Improve safety of road infrastructure
- Promote safer vehicles
- Improve emergency response services

The policy includes the National Road Safety Action Plan, which consists of eight pillars. It was developed based on the Global Plan of Action on Road Safety, which has five pillars that are replicated in the Cambodian plan. The additional three pillars were proposed based on the local context in the country: traffic legislation and enforcement have been identified as an essential supporting pillar for all aspects of the plan; driving licence issues have received insufficient attention; and there has been a dramatic increase in demand for transport services but their safety has not been taken into account effectively. The eight pillars are:

Pillar 1: Road safety management: financial mechanism for road safety, capacity building, data collection system and research, helmet testing centre

Pillar 2: Infrastructure: safe road infrastructure, especially for vulnerable road users, speed safety zones, safe school zones, black spot treatment, motorcycle/bicycle lanes, road safety audit

Pillar 3: Safe vehicles: vehicle check-up system and standard, vehicle modification for persons with disabilities

Pillar 4: Safe road user behaviour: public awareness campaigns, education programs, community based activities, targeted vulnerable road users and key risk factors: helmet, drink driving, overloading, seatbelt, driving licensing and speeding

Pillar 5: Post-crash care: the emergency medical services system, rehabilitation services

Pillar 6: Traffic legislation and enforcement: traffic laws, regulations, consistent enforcement, targeted key risk factors, capacity building and equipment

Pillar 7: Driver licensing: driving school quality, computerising driving licence procedure, data system on driving licensing and enforcement, merit point system

Pillar 8: Management and evaluation of passengers and goods transport services: quality and safety of transport services, trainings, monitoring and evaluation

The action plan clearly designates organisations responsible for its actions and timeframe. Additionally, similar to the National Disability Strategic Plan, this National Road Safety Action Plan introduces collaboration and cooperation among related ministries. Although the plan includes an estimated budget for each action, funding sources are not clearly mentioned with any commitment and overall the plan lacks a financial mechanism to support implementation. It was anticipated that the actions would be implemented by the responsible organisations mentioned in the action plan. However the implementation mechanism remains unclear and it requires further action to ensure that the actions are implemented by the responsible government ministries. In the 2013 and 2014 annual reports to the National Road Safety Committee, only outputs implemented by the General Secretariat team and its partner non-governmental organisations were mentioned. There might be some

actions implemented by other departments (such as Public Works, and provincial teams) and ministries, but without coordination or information sharing.

Although there is a good cooperation and collaboration in terms of action plan implementation among government and non-government institutions, there are still gaps in the overall implementation of the Action Plan. Most of the stakeholders tend to allocate their resources based on their interest in a particular Pillar. The majority of resources were allocated to Pillar 4, to activities which included public awareness campaigns, education programs in schools, and community based activities.

Similarly, most of the activities implemented by the General Secretariat team of the NRSC were training courses and public awareness campaigns under Pillar 4. This might be due to the fact that their lead role on awareness campaigns has been delegated by the government. Lack of coordination in other pillars, such as Pillar 2: Infrastructure, and Pillar 3: Safe Vehicles, has been observed. In particular, the implementation of Pillar 5: Post-crash Care is crucial to reducing the severity of injuries and long term impairments. Based on the NRSAP, MoH has been tasked with responsibility for this pillar. However, its implementation is not included in the annual activity reports of the NRSC. There might be some progress on these three pillars, but the General Secretariat teams have not been informed, and hence, information on progress has not been included in the NRSC reports.

In addition, the NRSC reports provide a description of their activities and output, but limited information on outcome and impacts. This might reflect the lack of monitoring and research to measure outcomes and impacts. Based on the analysis of the Road Crash and Victim Information System (RCVIS), the number of road traffic fatalities in the country has been increasing since 2006, which suggests that the desired impact of the Action Plan has not been achieved. Further analysis of the RCVIS is shown in Chapter 5.

4.3.2 Governmental Institutions

In 2006, the National Road Safety Committee (NRSC) was officially established. It is the first inter-ministerial body for the road safety sector. It was chaired by the Minister of Public Works and Transport between 2006 and 2014. Since early 2015, following a new traffic law revision, the Minister of Interior has been the chair person for the committee. The committee has high level representation

from all government ministries, most notably Public Works and Transport (MPWT), Interior (MoI), Education, Youth and Sports, Rural Development (MRD) and Health (MoH).

The NRSC is tasked with overall coordination, monitoring and support for the implementation of the road safety action plan activities throughout Cambodia. To assist the NRSC in its tasks, a General Secretariat (discussed above) has been established. It is chaired by the Director General of Transport of the MPWT. The Secretariat currently has 14 staff and consists of four departments: Administration and Finance, Statistics, Public Awareness/Education/Training, and National and International Relations. The team includes representatives from only two ministries: MPWT and MoI. The General Secretariat team has the following responsibilities:

- Assist the NRSC in implementing the National Road Safety Action Plan
- Organise public awareness campaigns on the traffic law and key road safety targets, such as helmet promotion, drink driving and speeding
- Gather data on vehicle registration and road traffic injuries and crashes
- Provide relevant road safety training to national and community organisations to promote road safety and traffic law
- Identify the main causes of road crashes and propose relevant recommendations and priorities
- Build capacity of road safety professionals

Following the establishment of the NRSC and its General Secretariat, Provincial Road Safety Committees (PRSCs) have been set up in all provinces in the country. They are tasked to coordinate and support the implementation of their provincial road safety action plans. Similar to the NRSC structure at the national level, the PRSCs are composed of representatives from related provincial departments: Police, Public Works and Transport, Education and Health. They are assisted by their Provincial Road Safety Secretariat teams.

During the last five years, the capacity of the government counterparts has been strengthened, especially in the development of the 2011-2020 National Road Safety Action Plan and the coordination of the previous Road Safety Action Plan implementation. Although more funds were received, especially from the

government, they have not been sufficient to fully respond to the growing issue of road crashes and its negative impacts. The allocated resources were still insufficient to enable the responsible agency, the NRSC, to tackle this tremendous issue seriously. Based on RCVIS annual reports, the numbers of road fatalities have been increasing every year since 2006 in spite of their efforts.

Another issue is the limited human resources in the national team. By mid-2015, there were 14 staff in the General Secretariat, but most of them were not working full time on road safety. They were involved in other departmental tasks. At the same time, although the government has been working on the decentralisation of road safety tasks to its provincial teams, there was still only limited activity implemented by these provincial committees. Limited human and financial resources were also observed among the provincial teams.

Besides the General Secretariat team of the NRSC, there are also important ministries that have been involved in and contributing to the NRSAP implementation. They are MPWT, MoI, MoH, MoEYS and MRD. As summarised in Table A3.1 in Appendix 3, MoI has been involved in all pillars of the NRSAP, although their responsibility has been focused on Pillar 6: Traffic legislation and enforcement. At the same time, MPWT has also played important roles in almost all pillars, except Pillar 5: Post-crash care, which has been mostly tasked for MoH. It is also important to note that all of these main ministries have been included into Pillar 1: Road safety management, which consists of collaboration, data collection, research and capacity building activities for the government staff.

Based on email communications, the secondary participants from these five ministries confirmed that staff numbers increased during the last two years for the road safety component in their ministries. Each ministry has its own relevant department that is responsible for road safety. In each ministry, there are around 15 to 20 staff members, who are in the road safety related department of the ministry concerned and based in Phnom Penh. In addition, their provincial department teams have been also involved in this sector through their designated focal points. In general the provincial departments can independently decide their activities for their own provinces, but need to seek approval for financial support from their central administrations, which are based in Phnom Penh. Because of this financial dependence, limited activities have been implemented by these provincial teams.

4.3.3 Non-governmental Organisations

Non-governmental organisations (NGOs) have played very important roles in improving road safety in Cambodia, providing about 70% of the financial support for road safety activities. In 2014, 12 organisations implemented road safety projects or provided support to the National Road Safety Committee, as shown in Table A3.2 in Appendix 3. Half of them are local non-governmental organisations.

In 2013-2014, most of the organisations invested their resources into Pillar 6: Traffic legislation and enforcement, specifically the revision of the new traffic law, which was officially approved by the government in early 2015. Most of the organisations have also been involved in the implementation of Pillar 4: Safe road user behaviour. Helmet wearing and drink driving were the two main risk factors identified and prioritised for public education campaigns in national and community activities. Only one NGO has been contributing to Pillar 5: Post-crash care, in close collaboration with the Ministry of Health. They provide direct technical support to selected hospitals in several provinces, targeting emergency response services.

It is important to note that only two organisations have put their resources into Pillar 1: Road Safety Management, to provide capacity building to the National Road Safety Committee and its General Secretariat. The support was mainly to strengthen the General Secretariat in project management as well as the organisation of national and provincial training courses, on topics such as road safety management and traffic law. Other organisations have set up teams to implement their activities directly. However, good collaboration and cooperation in project implementation has been observed among government institutions and these NGOs. Key priorities such as the revision of the traffic law, identification of key risk factors (helmet wearing and drink driving) have been commonly accepted by all stakeholders.

4.4 HEALTH SYSTEM AND POLICIES

4.4.1 Health Related Policies

In 2002, the Ministry of Health introduced its first Health Strategic Plan 2003-2007. Based on the reviews of the implementation of the first strategic plan, it was recognised that the burden of non-communicable diseases had increased (Ministry of

Health, 2008b). In 2007, the second Health Strategic Plan 2008-2015 was developed and has been implemented. The plan aimed to *enhance sustainable development of the health sector for better health and well-being of all Cambodians, especially of the poor, women and children, thereby contributing to poverty alleviation and socio-economic development* (Ministry of Health, 2008b, p. 2). The plan prioritised three main essential services as noted below (Ministry of Health, 2008b):

- Increase reproductive health
- Reduce morbidity and mortality of communicable diseases, especially HIV/AIDS, Malaria, TB
- Reduce morbidity and mortality of non-communicable diseases and improve access to treatment and rehabilitation

The government was able to fund less than 50% of the overall health budget. More than half of health funding came from donors (WHO, 2012). Around 45% of the national budget was allocated for reproductive health, while 25% went to communicable diseases. Non-communicable diseases (including road traffic injuries) constituted only 15% of the overall fund, while the remaining 15% went towards the health service strengthening (WHO, 2012).

The 2008-2015 strategic plan set out 42 national indicators for 2015. Among them, only four indicators related to road safety and long term impairments. They are presented in Table 4.1 (Ministry of Health, 2008b, p. 25). It is important to note that half of all indicators in the strategic plan are for maternal health and child care, while indicators related to emergency response and rehabilitation services are not included. The two road safety indicators related to the reduction of road traffic fatality numbers and head injuries. This could also mean that other long term impairments and serious injuries due to road crashes are not included. At the same time, only blindness and mental health are targeted in the strategic plan. Therefore, the overall health strategic plan demonstrates a lack of focus on serious injuries, long term impairments (except blindness and mental health), emergency response and rehabilitation.

Table 4.1: Indicators for road safety and disability in 2008-2015 Health Strategic Plan

Indicators	Baseline 2008	Target 2010	Target 2015
% of deaths due to road traffic accidents	3.5	3	2.8
% of injured population with head trauma due to road traffic accident received treatment	41	38	35
Blindness rate	1.2	0.5	<0.3
# of mental health cases reported in public sector	10,000	19,000	28,000

In addition to the strategic plan, the MoH also developed two policies that related to road safety and disability:

- National Policy on the Emergency Medical Services System in Cambodia
- National Policy for Pre-Hospital and Hospital Trauma Care in Cambodia

Although the national policy for pre-hospital and hospital trauma care included 12 actions to cover the capacity strengthening and creation of a national committee, there is no clear implementing agency, budget and schedule for each action plan. Additionally, the National Policy on the Emergency Medical Services System introduced its first action by establishing the National Committee for Emergency Services System. Similarly, the first action of the National Policy for Pre-Hospital and Hospital Trauma Care is to establish the National Sub-Committee for Trauma Care. This means that both national policies depended on the sub-committees for their implementation, without mentioning any responsibility for the existing structures, including the national and provincial departments. In the absence of clear financial mechanisms and responsible departments, the implementation mechanism of the policies is not effective.

It is important to note that both national policies clearly mentioned the need for a national injury surveillance system. Additionally, the National Policy for Pre-Hospital and Hospital Trauma Care also recognised the need for cooperation between the rehabilitation services and other ministries and non-governmental organisations. The policy also introduced the development of the national standard guideline for emergency and referral transportation and the identification of trauma hot zones as one of their priorities, to be covered by their national network of regional trauma centres. To start up the network, a maximum of five hospitals will be selected because the ministry has recognised the limitation in its capacity to offer adequate

care to severe trauma patients in all provincial referral hospitals (Ministry of Health, 2008c).

4.4.2 Overview of Health Services

In 2013, the National Institute of Statistics conducted the Cambodia Socio-Economic Survey throughout the country. According to the National Institute of Statistics (2014, p. 80), around 18% of the population in Cambodia reported having had an illness or injury during the previous 30 days. At the same time, around 17% of the population had sought health care one or more times. Their first health facilities are listed in Table 4.2 (National Institute of Statistics, 2014, p. 80). Around 16% of people who sought health care accessed public health facilities as their first health care providers, while more than 83% went to private or self-care facilities. Private health facilities play an important role in providing health care services, especially in Phnom Penh (76%) and urban areas (68%).

Table 4.2: Distribution of household members (who sought health care during the last 30 days), by types of health facility and geographical area

Types of Health Facilities	Cambodia	Phnom Penh	Other Urban	Other Rural
Public	15.7%	9.2%	11.4%	16.9%
Private	42.9%	75.8%	67.9%	36.5%
Self-care	40.2%	13.9%	19.1%	45.4%
Traditional care	1.2%	1.0%	1.7%	1.2%
Total	100.0%	100.0%	100.0%	100.0%

Source: National Institute of Statistics (2014), p. 80

In Table 4.2, “self-care” referred to seeking health care from home/office of trained health worker/nurse, visit of trained health worker/house, shop selling drugs/markets (National Institute of Statistics, 2014). In the report of the National Institute of Statistics (2014), the definition of the other types of health facilities was not provided. Following the interviews with the secondary participants and literature reviews, three types of health care facilities: public, private (including self-care) and traditional care are described in the next sections.

4.4.3 Public Health Facilities

Public health facilities are run by the Ministry of Health. The structure of the public health facilities (WHO, 2012) included:

- Health centres: provide minimum package of services

- Referral hospitals: provide complementary package of services
- National hospitals

Health Centres

There are 1,049 health centres in the country (WHO, 2012). They are set up under the supervision of the provincial health departments in the Ministry of Health. It is intended that each health centre covers a population of 8,000 to 12,000 (Ministry of Health, 2008a). They provide a minimum package of services, which include initial consultations and primary diagnosis, emergency first aid, chronic disease care, maternal and child care (including normal delivery), birth spacing advice, immunisation, health education and referral (WHO, 2012).

The health centres have limited capacity (human resources and equipment) in providing treatment, especially for serious injuries. In 2010, only 43% of health centres provided the full minimum package of services (WHO, 2012). In 2014, most health centres were equipped with an ambulance through a donation from China. They then consequently played a larger role in providing transportation and referring casualties to the nearest provincial hospitals.

Limited medication and emergency equipment were observed in one health centre in Kampong Cham, during the trip for an interview. The health centre was considered as a larger one, as it has 13 staff, compared to others in surrounding areas, which have only four to five staff.

Referral Hospitals

According to the 2008-2015 Health Strategic Plan, each referral hospital serves a population of 60,000 to 200,000 or more. There are three classifications for referral hospitals, based on numbers of staff, beds, medicines, equipment and clinical activities (WHO, 2012, p. 2) as described below:

- Complementary package activity (CPA) 1 hospitals: have no large-scale surgery (no general anaesthesia). There were 33 hospitals at this level in 2011
- Complementary package activity 2 hospitals: CPA1 plus emergency care services and large-scale surgery, including ICU. There were 31 hospitals at this level in 2011

- Complementary package activity 3 hospitals: have large-scale surgery (with general anaesthesia) and more activities including various specialised services. In 2011 there were 26 hospitals at this level. Only 21 out of 24 provincial hospitals (located in provincial towns) are at this level

National Hospitals

In Phnom Penh, there are six national hospitals that provide tertiary services and are semi-autonomous (WHO, 2012). Because of their semi-autonomous status, the national hospitals need to identify financial resources to cover their on-going expenses. They have been considered as the highest national capacity public hospitals and as the final destination among public health facilities in the country. Patients in provinces are referred by health centres or referral hospitals to hospitals in Phnom Penh, for various reasons. In some referral cases, health facilities in provinces recognise their limitation in providing treatment on serious injuries, such as multiple fractures and head injuries that required intensive operations. Staff in provincial health facilities usually hesitate to take responsibility in these serious cases and prefer to transfer such responsibility to the national hospitals. In other cases, patients request referrals to hospitals in Phnom Penh as they anticipate better capacities and services. Provincial teams therefore arrange relevant documents and transportation to send them to the national hospitals. A study conducted in two referral hospitals in Cambodia highlighted an issue of limited information on discharged diagnosis and to track discharged patients, with a lack of coordination system in terms of referring and transferring patients (Yan et al., 2015).

Referrals are based on certain criteria for Phnom Penh hospitals. Poor patients who are unable to pay for services are mostly referred to Preah Bat Norodom Sihanouk Hospital, where the Health Equity Funds will cover the costs of their treatments. Patients with broken bone injuries are mostly referred to Preah Kossamak Hospital, while head injuries are mostly referred to Calmette Hospital. Although there is a lack of accurate information, it has been observed that there are many cases of patients being transferred to Vietnam for treatment. It is believed that the service there is better than in Cambodia. At the same time, costs of treatment are similar to the costs of in-country treatment. Distance of travel is also a reason, as people in provinces next to Vietnam can more quickly and easily access the services rather than travelling to Phnom Penh.

Emergency System

There is a national emergency number, 119, which has been set up in Calmette Hospital, which is the biggest national hospital in Cambodia in terms of capacity and equipment. This central station is supposed to dispatch emergency services throughout the country. However, due to a limited capacity, the centre can provide emergency services in Phnom Penh only. Once there is a phone call, the centre staff informs other relevant hospitals in Phnom Penh with an ambulance service, based on location of the crash. It has also been suggested that centre staff may contact private clinics for ambulance service in return for partial payment from the service fee charged by the private clinics.

Emergency numbers are different from province to province. People mostly access the emergency services through local authorities or their friends and families. The numbers are not standardised and not widely distributed. There are around 10 ambulances in the country that were sponsored by Japanese organisations. They were fully equipped with adequate facilities. In 2014, there was a donation of 200 ambulances from China. They were distributed to national and referral hospitals and health centres throughout the country. However, these ambulances were not well equipped. Based on interviews with hospital staff, the ambulances are considered good for transporting people from one health facility to another, but are not sufficient to provide emergency service during the transportation of road crash casualties from crash scenes yet. On the other hand, the ambulances have complemented existing services, as there are sufficient numbers of ambulances in every province.

Through the in-depth interviews, the secondary participants who worked in hospitals and health centres recognised that the emergency system is an important issue. Improving such a system requires full development of all health structures and facilities, which include pre-hospital services, in-hospital services and rehabilitation.

Payment System

Payment systems in hospitals present a major issue, especially for poor people. Although there is an official letter, issued by the Minister of Health to advise all hospitals to provide services before asking for payment, in practice, payment systems are still upfront at the emergency rooms. The ministry also issued a regulation to exempt poor people from public health facility fees. However, the exemption scheme

and rate are set by each operational district and eligible patients vary from 2% to 25% of all patients (Levine & Gardner, 2008).

In 2000, Médecins Sans Frontières introduced “Health Equity Funds”. It has since been recognised as an effective way to complement financing schemes in public health facilities (Poverty Alleviation Cambodia, 2008). The scheme has contributed to increasing health service utilisation and reducing health-related debt (WHO, 2012). The Health Equity Funds program is usually sponsored by international donors. In late 2006, 26 hospitals operated Health Equity Funds (Levine & Gardner, 2008). By 2011, the scheme covered public health facilities in 58 operational districts (out of 77) (WHO, 2012). In 2013, it has extended its coverage areas to cover one-third of health centres and two-thirds of referral hospitals in Cambodia (Yoeung & Kleinitz, 2013). Where the Health Equity Funds scheme has been available, costs of treatment for poor people are covered, though sometimes a small contribution from the patients is requested. In this case, patients who were interviewed and considered as poor based on selection criteria would be covered by the funding scheme for their treatment.

In some hospitals, where the equity fund is not available, poor patients might need to wait for approvals from hospital managements to receive services free of charge. This also means treatments are delayed until the approval. The issue of advance payment was raised by primary participants (I), as described in Section 6.7.2. On the other hand, all hospital staff members, who were interviewed, still claimed that their hospitals provide emergency treatment to all patients, whether they are able to pay for the services beforehand or not, in spite of their description of the payment assessment and process. According to WHO (2012), cost of health care can contribute to increasing poverty, as people need to cover the cost using savings (51%), wages/earnings (45%), borrowing money (18%) and selling assets (8%).

4.4.4 Private Health Facilities

Private health facilities have played a very important role in providing health services in Cambodia. As shown in Table 4.2, around 83% of people who need health care services go to private health facilities. Most of health service expenditures (73%) are out of pocket payments, of which 68% go to private health services (WHO, 2012). They are operated in the form of private clinics, pharmacies

or drug stalls. They can be as big as the public hospitals in Phnom Penh and can be just as small as a stall/room/flat for only outpatient services, without a legal licence.

As regulated by the Ministry of Health in 2000, all private health facilities must be registered. Additionally, Cambodian doctors and medical assistants are also required to register to be eligible to open private practice (WHO, 2012). In 2008, about half of pharmacies and drug stalls (1,371) and 40% of private clinics (1,513) were licensed (WHO, 2012). Numbers of unlicensed facilities remained huge (1,239 pharmacies and 2,177 clinics), especially those that are operated from private houses without business names. Many health care professionals who earn a low salary from their governmental institutions, boost their income through operating these private health facilities (Levine & Gardner, 2008; WHO, 2012). Conflict of interest and poaching of patients might become an issue due to this practice (WHO, 2012).

There are several reasons for seeking private health facilities rather than public services. One of them is the services that are based on customer desires but not the needs of treatment. Although the private services are more expensive than the public ones, patients come to the private health facilities to receive more attentive services from the private practitioners, who also understand customer preferences in receiving unnecessary drugs and injections. These practices often result in inappropriate health care, improper drug prescription and over-dispensing of antibiotics, which increase disease resistance to antibiotics (Levine & Gardner, 2008). Levine and Gardner (2008) highlight an issue of inadequate knowledge, improper practices and incentive to please customers as common factors among licensed and unlicensed private health facilities.

Second, people do not believe in the capacity of public services, as there are either too many patients in the national and provincial hospitals, or too few, due to lack of equipment and medicine. Perceptions of capacity are also linked to the availability of qualified staff and the service quality provided, including hygiene standards. Another reason is the accessibility of the services. Private health facilities, especially pharmacies and drug shops, are set up everywhere in urban areas, such as at the local markets, commune centres, or village centres. These pharmacists or drug dispensers are willing to provide any medicine requested by customers without prescription and are usually the first place rural people seek treatment (Levine &

Gardner, 2008). Many private practitioners are available to provide their services at clients' houses.

PH03: If people have money, they prefer to go to private services, if they do not have money they come to public hospitals/health centres.

Some private clinics that have their own ambulances have been active in transporting road crash casualties from crash scenes to their clinics. These private clinics can quickly access crash scenes as they are contacted by traffic police officers, who then share some benefit from the services. Whether injured people are satisfied with the service or not, they have to pay for the services of the ambulance, which might not be equipped with proper facilities.

There are several issues in terms of this private operation. Although it has been recognised that private services could complement public services, their quality is still a big issue. There is no standard procedure in place to qualify ambulance services and no enforcement procedures to ensure the standards are maintained. In 2003, the Ministry of Health issued a formal letter to prohibit an ambulance service operated by private clinics in Cambodia. However, there was no proper enforcement mechanism in place to enable action on the prohibition.

In addition, as part of their private operation, pharmacists and drug sellers are available in local markets and more willing than public health centres to provide treatment and medicine (Levine & Gardner, 2008). Although lower costs, availability and convenience are the benefits of these pharmacies, many issues were raised by Levine and Gardner (2008). These included over-prescribing, over-dispensing and mis-prescribing of drugs, and fake or watered-down versions of drugs (Levine & Gardner, 2008).

4.4.5 Traditional Healers

The detail of “traditional healers” is presented in 0, including the treatment description, services accessibilities and quality. In Cambodia, traditional healers (*Krou Khmer*) provide their treatment services for various types of diseases and injuries. Although only 1.2% of the population seek traditional health care services, as estimated in a recent national survey, conducted by the National Institute of Statistics (2014), the Ministry of Health estimated that 40% to 50% of the population still access traditional medicine (WHO, 2012).

There are two main types of traditional healers for injuries and long term impairments due to road crashes, based on their particular skills. This includes visible and invisible treatments. Both practices (visible and invisible treatments) might also include various activities such as using incense to burn the skin, especially on the injured part of the body, or organising a heated platform to put patients on to heal the injuries or to discharge any spirit possession.

Visible traditional healing provides treatment mostly for broken bones and dislocation of legs or arms. Invisible treatment involves the practice of praying to protect or help people from spirits/ghosts, possession or evil spells. From the point of view of this traditional healer type, road crashes are caused by the bad luck of individuals that is linked to:

- their birthday and the current year, which brings fortunate or misfortunate things to the persons during the whole year
- actions of individuals that make evil spirits, ghosts or spiritual authorities (who spiritually take care of the area) angry
- being spelled/cursed by someone (an enemy of the individual)

People in Cambodia, especially in rural villages, still believe in the influence of spirits in their lives (Globinmed, 2010). They believe that those spirits might have an ability to possess accidents and prolong their long term impairments.

According to the Cambodian-Australian Welfare Council Inc. (2010), traditional practices and medicine are mostly chosen because of the cost factor and limited health care facilities in Cambodia (especially in rural areas). Additionally, based on interviews with health professionals and traditional healers, it is generally agreed that open-wound injuries would be transferred firstly to hospitals. Traditional healers accept patients after open-wound injuries are treated at hospitals. The services of traditional healers are provided to all kinds of patients and clients, not specifically for road crash casualties.

The quality of the services from traditional healers is not documented well, because they operate informally without any official registration. There is no documented guideline to control the quality of traditional medicine products (WHO, 2012). Although traditional healers might provide a good service on broken bones

with no open-wounds, there are still some issues related to their treatments. Bones might be reconnected, but might not be as straight as normal.

It is important to note the role of traditional healers in healing people via psychological procedures. Following interviews with health professionals in hospitals, health centres, physical rehabilitation centres and other non-governmental organisations, and persons with disabilities, it has been observed that people still have a belief in traditional healers, especially their invisible treatment procedure. They tend to respect and follow advice from the healers. This more or less has affected their perception and motivation to recover from their disappointment and hopelessness. For example, after the spiritual event, they believe that they are free of spirit possession, and they have refreshed their living activities by going back to work and doing their daily tasks. Some traditional healers advise their clients to do more exercises (physiotherapy) as part of their treatment procedure. This also helps a patient to be able to recover from their long term impairments.

More findings related to traditional practices from interviews with persons with disabilities, primary participants (I), are shown in Chapter 6: Lived Experiences and Impacts of Disabilities. Those primary participants (I) and their families knew the traditional treatment and some of them received the services and had different points of view on the quality of the services.

4.5 SERVICES AFTER DISCHARGE

After a discharge from a health facility, there are various services for persons with disabilities provided by institutions, such as physical rehabilitation centres or in communities. Some of the services are under the government institution's supervision, while some are provided by NGOs. In general, services for persons with disabilities include:

- Education programs in school, mostly for children with disabilities
- Vocational training for adults with disabilities
- Community based support: small grants, rehabilitation, capacity building training/workshops

- Advocacy for the rights of persons with disabilities, mostly in Phnom Penh, at the national levels
- Physical rehabilitation services
- Social support scheme: poverty cards

4.5.1 National Disability Strategic Plan

In Cambodia, the UN Convention on the Rights of Persons with Disabilities (UNCRPD) has played a very important role to lead the process of developing important legal documents, including the Law on the Protection and the Promotion of the Rights of Persons with Disabilities, which was approved in 2009. At the same time, the National Plan of Action for Persons with Disabilities, including Landmine/ERW Survivor was developed and adopted to guide the disability sector (Am & Nguon, 2014). Then, in early 2014, the government approved the National Disability Strategic Plan 2014-2018 (NDSP). The plan (Disability Action Council, 2014) aims to:

- Provide social protection, education, vocational training, employment and support services to persons with disabilities
- Empower persons with disabilities and ensure their participation in political life
- Improve physical environment, public transport system, knowledge, information and communication

The Disability Action Council led the process of the strategic plan development. The plan was officially launched by the Prime Minister in June 2014. Similar to the National Road Safety Action Plan, this NDSP introduces a collaboration and cooperation from around 15 governmental institutions, such as MoSVY, MoEYS, MoH, MoI, MRD, MPWT. The strategic plan (Disability Action Council, 2014) consists of 10 actions as below:

- Action 1: Poverty reduction through increasing employment opportunity, improving living standards and empowerment for persons with disabilities
- Action 2: Provision of health and rehabilitation services
- Action 3: Access to justice, reduction of discrimination and exploitation

- Action 4: Liberty, security, risk and humanitarian emergency management
- Action 5: Education, vocational training
- Action 6: Expression of opinion, access to information, participation in political life
- Action 7: Participation in cultural and religious life, sports, leisure, recreation
- Action 8: Accessibility: physical environment, transport, knowledge, information, communication
- Action 9: Rights and empowerment of women and children with disability
- Action 10: Cooperation in the country, regional, international

It is important to note that during the last three years, the disability advocacy has been conducted by many non-governmental organisations at the national level to promote better support for persons with disabilities. Specific topics included improving accessibility in public buildings, transports and participating in the national election. Although an involvement of persons with disabilities in the development of the national disability action plan was observed, there was still a complaint from local NGOs that their voices and full participation have not been considered yet.

Although the NDSP mentions responsible organisations, budgeting and its mechanism are not included. It has been anticipated that on-going financial contribution from donors and international non-governmental organisations would be provided (Am & Nguon, 2014). By mid 2015, an annual report on the progress of the strategic plan implementation is still unavailable.

There is also another national strategy in relation to the disability sector. In April 2011, the government developed and approved the National Social Protection Strategy for the Poor and Vulnerable 2011-2015. The strategy aimed to protect the poor, mitigate risks and support human capital, opportunities; and providing access to health, nutrition and education (Council of Ministers, 2011). The Council of Ministers (2011) summarised a list of programs under the current government social

protection interventions. There were two programs that clearly mentioned persons with disabilities as its direct beneficiaries. One of them is physical rehabilitation centres / community based rehabilitation services, under the MoSVY. Another one is the benefits for survivors (parents or dependants) of armed forces, spouses of disabled people, retirees or disabled persons, under the Ministry of Labour and Vocational Training (Council of Ministers, 2011). In addition, since persons with disabilities were identified as among the poor in the national social protection strategy, they also benefit from other supporting schemes, including access to basic needs (food, sanitation, water, etc.), human capital (nutrition, maternal and child health, education), work opportunities and other in-kind support such as grant schemes (Council of Ministers, 2011).

It is clear that the disability issue has been recognised by the government, especially receiving high political support from the Prime Minister, through those policies. On the other hand, Am and Nguon (2014) revealed that sub-national authorities in provincial levels have not prioritised the implementation of the NDSP, in addition to limited human and financial resources.

4.5.2 Governmental Disability Support Structure

In Cambodia, the Ministry of Social Affairs, Veterans and Youth Rehabilitation (MoSVY) is a leading governmental agency to ensure the welfare and well-being of persons with disabilities and other vulnerable groups (Yoeung & Kleinitz, 2013). Under the ministry structure, there is a Department of Welfare for Persons with Disabilities (DWPwD) and 25 Provincial Departments for Social Affairs, Veterans and Youth Rehabilitation (PoSVY) (Yoeung & Kleinitz, 2013). The DWPwD is directly under the supervision of the General Department in the MoSVY. It is the implementing body of the ministry for the National Disability Action Plan.

There are two other governmental institutions under the supervision of MoSVY that have been playing important roles in the disability sector. The first one is the Disability Action Council (DAC), which was set up in 1999 and has extended its scope and responsibility since 2009, based on the Cambodian law on the protection and the promotion of the rights of persons with disabilities (Yoeung & Kleinitz, 2013). Another one is the Persons with Disability Foundation, which was created in 2010.

DAC is composed of 58 members and is chaired by the Prime Minister. Among them, 18 members represent governmental agencies (Am & Nguon, 2014). The committee also has its own provincial structures in all provinces. It has been tasked to (Royal Government of Cambodia, 2009):

- Provide technical advice on disability and rehabilitation issues
- Assist the relevant ministries, institutions and organisations in developing policies, national plans and strategies related to disability and rehabilitation
- Promote the implementation of policies, laws and other regulations related to disability and rehabilitation issues
- Propose revisions, additional completion or amendment of policies, laws or other regulations related to disability issues
- Monitor and evaluate the implementation of policies, national plans, laws and regulations related to disability issues
- Communicate with national and international communities in order to exchange experiences and mobilise resources from both internal and external sources

The Persons with Disabilities Foundation (PWDF) has been set up to supervise all 11 physical rehabilitation centres in Cambodia and coordinate the social support fund to poor persons with disabilities. The foundation is a newly created body with limited number and capacity of staff. So far, there are some challenges for the foundation to implement its role. First, although the foundation has been tasked to supervise all PRCs, appointments of staff members in the PRCs are so far under other governmental structure, the provincial department of social affairs, veterans and youth rehabilitation. The government regulation is not clear to authorise the foundation in recruiting their PRC staff. Second, financial management and resources are another challenge. So far, two PRCs have been transferred from a non-governmental organisation to the foundation. The handover is anticipated by other non-governmental organisations, which are currently supporting the remaining nine PRCs. Because of the low salary scale in the government sector, staff turnover is observed after the handover. Experiences from the two PRCs in Siem Reap and Takeo, which were handed over to the foundation in 2011-2012, showed that there is

huge staff turnover, and the PRC services have been reduced because of limited funding resources. Additionally, because of the ASEAN integration, qualified staff members in physiotherapy and prosthesis and orthotist have moved to work in other countries, such as Malaysia. Third, the implementation of the social support fund for poor persons with disabilities has been delayed. So, the support to cover meals and transportation costs for PRC clients has been reduced.

There is another semi-governmental organisation, the National Centre of Disabled Persons (NCDP), supported by the MoSVY, which aims to provide services and opportunities to persons with disabilities to enable them to fully participate and develop their capacity in social, economic and political activities (National Centre of Disabled Persons, 2012).

There are many national authorities (DAC, PWDF, DWPwD) and sub-national authorities working in the disability sector. Although there are regulations in place to appoint and present roles and responsibilities of each authority, in practice, their implementations have been mixed up in some aspects. At the same time, all of them have a similar issue of unclear financial mechanisms to implement the national strategic plan. They tend to rely on donors and NGOs as their financial sources.

The government has presented their focus on the support of persons with disabilities. In 2013-2014, the prioritised topic was on the rights of persons with disabilities. Several important milestones have been achieved, involving collaboration with various partners and donors. One of the important milestones is the recruiting procedure in the government ministries. It was a barrier for persons with disabilities to apply for a job in the government sector since full physical strength (without any long term impairments) was one of the selection criteria. Since early 2014, this selection criterion has been eliminated from the recruiting procedure. Instead, a quota has been formally approved by the government to ensure a proportion of persons with disabilities of 1% to 2% in all institutions which employ more than 50 staff members. At least two ministries, Education Youth and Sports and Rural Development, have encouraged persons with disabilities to apply in their 2014 annual recruitment announcements. Another important milestone is the strengthening capacity of the government institutions, including DAC and PWDF, to take more responsibilities in disability interventions. Their provincial teams have also been set up progressively. In addition, following the official approval of the NDSP, several

ministries have set up their own disability working groups to implement the NDSP in their respective ministries.

4.5.3 Physical Rehabilitation Centres

There are 11 physical rehabilitation centres, located in nine provinces and the capital city of Cambodia. Although the centres are officially under the MoSVY, all of them have been financially and technically supported by five international organisations (Cambodia Trust, International Committee of Red Cross, Handicap International Belgium, Handicap International France, and Veteran International Cambodia). As shown in Table A3.25 in Appendix 3, most of the PRCs were established around 1990s, except the ones in Siem Reap (in 1982) and Kratie (2000). Only Handicap International Belgium announced its handover to the ministry for the PRCs in Siem Reap and Takeo, but continued to provide technical and financial support to the PRCs until 2012 (Takeo) and 2013 (Siem Reap) (Mom et al., 2014). Following the handover, a study was conducted by Mom et al. (2014) to identify the impact of the handover. It found out that there were reductions in service provisions, numbers of patients and budget and staff turnover. Handicap International Belgium was the only organisation to hand over its management, while the other four have continued their support. By the end of 2014, the government institution Persons with Disabilities Foundation have supervised two out of the 11.

In general, the centres provided the following services:

- Rehabilitation devices: prosthesis, orthosis, wheelchairs, tricycles, seating systems, walking aid
- Physical therapy services in the centres and during follow up in communities
- Social support services: include counselling services, referral services to other health services, social-economic services, vocational training, jobs, and schools. The support services also provide some grants to support persons with disabilities to start up a business

Each client might receive different types of services and support, depending on the type of their long term impairments and results of poverty assessments at the beginning of the services. PRCs provide financial support to cover the cost of transport to and from PRCs to their houses. Based on interviews, conducted at the

registration, the financial support was provided to at least around 80-90% of clients. This means those 80%-90% are poor, below the average standard of living. The poverty assessment process and criteria are different from one PRC to another.

A study conducted by Powell et al. (2002) indicated that the PRC services improved the quality of life of persons with disabilities who received the services, compared to those who did not. In 2013, another study confirmed the finding and illustrated the improvement of the quality of life before and after receiving the PRC services in three PRCs, managed by VI (Song et al., 2013). The study measured the quality of life of amputees by using the ComQOL-A5 and classified it into material well-being, health, productivity, intimacy, safety, place in community and emotional well-being.

4.5.4 Non-governmental Disability Support Services

In addition to support from the government sector, persons with disabilities also receive assistance from non-governmental agencies and donors. The support services have been provided mostly in forms of:

- Provision of health and rehabilitation services
- Education and vocational training programs
- Poverty reduction scheme through employment opportunity and grant programs

The details of the support services above are presented in 0. Powell et al. (2002) found that the quality of life scores were the highest among persons with disabilities who received a combination of support, including rehabilitation services, vocational training programs and poverty reduction schemes, compared to others who received less or did not receive any of them. They emphasised the need for this type of combined support towards persons with disabilities to maximise interventions and their quality of life (Powell et al., 2002). However, the assistance and support services from NGOs are still very limited (Council of Ministers, 2011).

Yoeung and Kleinitz (2013) conducted a situational analysis of the rehabilitation sector in Cambodia in 2013. They provided a list of 53 non-governmental organisations working in the disability sector. The list included a summary of each organisation's service, coverage areas and target groups. Based on

the list, it could be concluded that around 60% of those organisations work in Phnom Penh, with or without provincial coverage (Yoeung & Kleinitz, 2013). As shown in Table A3.26, in Appendix 3, only five out of 10 action plans in the NDSP have been contributed by those NGOs. The majority of the NGOs are mostly working on Actions 1, 2 and 5 (Yoeung & Kleinitz, 2013).

At least 70% of those NGOs (38 out of 53) have implemented their disability related projects directly in communities with persons with disabilities, based on the report from Yoeung and Kleinitz (2013). The report did not include project descriptions of the other remaining NGOs. At the same time, six NGOs mentioned their involvement in advocacy towards the rights of persons with disabilities in different forms of activities, such as with the national government institutions or local authorities in communities. Working directly with children with disabilities was observed as project activities among 11 NGOs.

Most of the NGOs (38 out of 53) do not specify any types of long term impairments that they provide support to. On the other hand, physical impairments were mentioned by five NGOs as their main focus for their project implementation, while a further five NGOs target visual impairments. Intellectual impairments were supported by four NGOs (Yoeung & Kleinitz, 2013). Additionally, at least five NGOs are present nationwide, without any specific provincial coverage, while the majority (36 out of 53) work in five provinces or less. Only three organisations have a coverage area of more than 10 provinces (Yoeung & Kleinitz, 2013).

It is important to note that all of the interventions from the non-governmental organisations and the government institutions tend to focus on the individual based approach, where persons with disabilities are put in the centre of the intervention, such as provision of health and rehabilitation services, education, vocational training, grant schemes and so on. On the other hand, approaches towards improving social barriers, such as improving transportation system, education system, employment system in private sectors and so on have been very limited. It is good to provide such services to support persons with disabilities in Cambodia, since they have not yet been receiving adequate social protection. However, lack of environmental and social responsibility of the whole society is still a barrier to full participation from persons with disabilities.

During the interviews, the secondary participants suggested some priorities to tackle the issue related to disabilities. One of the suggestions was related to improving the living standard of persons with disability through grant/loan program, or self-help group programs. At the same time, the secondary participants also suggested improving knowledge of persons with disabilities on the concept of rights based approach, based on the UNCRPD. Improving accessibility of persons with disabilities along the roads, public transports and buildings (such as banks, markets, schools, health facilities) was also recommended as one of the priorities. They also emphasised the need to improve a nationwide data collection and registration system for persons with disabilities.

4.6 CHAPTER 4 DISCUSSION

As mentioned in the beginning of the chapter, the study contributed to RQs 6 to 8 as below:

RQ6: What potential changes to road safety policy would reduce the prevalence of long term impairments as an outcome?

RQ7: What potential changes to health policies would reduce the prevalence of long term impairments?

RQ8: What potential changes to disability policy would better meet the long term needs of persons with disabilities and their families?

This section discusses the findings from Study 1 based on the RQs above. The findings contributed to the RQs by exploring the gaps in policies and structures related to road safety, health and disability for better prevention and treatment efforts and supporting persons with disabilities and their families. Before going into each RQ discussion, it is important to have an overview of related policies. This overview section below presents the contributions from those policies on the stages of changes, starting from road crashes to the impacts of disabilities, as shown in Figure 4.1. The numbers in Figure 4.1 represent the pillars in the NRSAP and actions in the NDSP. The NRSAP is more likely to prevent road crashes, while the NDSP focuses more on the support towards persons with disabilities. This highlighted the loopholes of both

policies in term of long term impairment prevention and the importance of the health related policies in filling these loopholes.

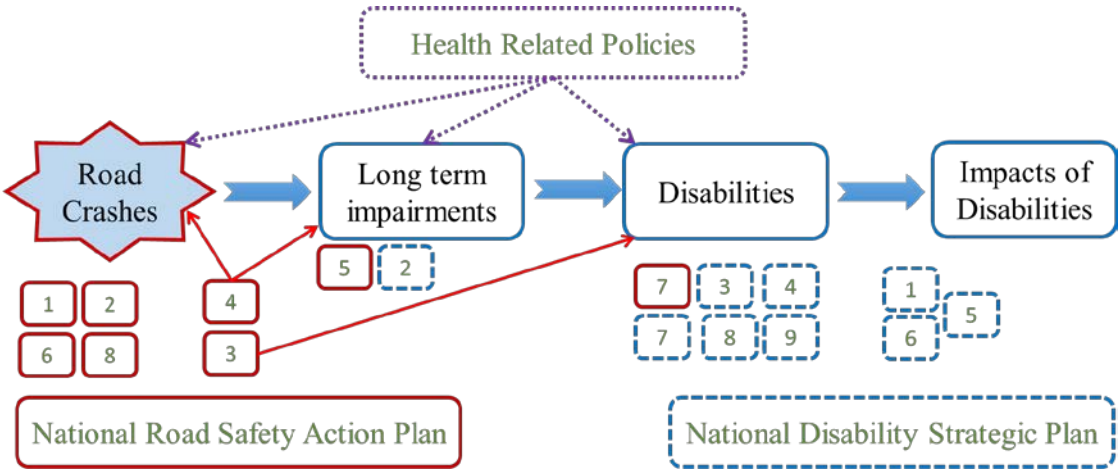


Figure 4.1: Contributions of National Road Safety Action Plan, National Disability Strategic Plan and Health Related Policies

The NRSAP and NDSP consist of some similar actions as presented in Table 4.3 below. These three pillars and two actions present coherent interventions to reduce long term impairments and support persons with disabilities. Pillar 5 and Action 2 propose the MoH as the main implementing organisation on health and rehabilitation services. Action 8 of the NDSP mentions MPWT as one of its implementing organisations to take responsibilities in driving licence and transportation system and services. Although the accessibility for persons with disabilities on public transports is included in Action 2, Pillar 8 only mentions about quality and safety of transport services, without specifically including it. It is important to revise and include this relevant accessibility into both national action plans.

Table 4.3: Similarity of the NRSAP and NDSP

Pillar in NRSAP	Action in NDSP	Content of the Pillar/Action
Pillar 5	Action 2	Health and rehabilitation services
Pillar 7	Action 8	Driving licence and participation in transport system
Pillar 8	Action 8	Accessibility and safety in transport service

4.6.1 Potential Changes to Road Safety Structures and Policy

The key structure for the road crash prevention efforts in Cambodia is the National Road Safety Committee (NRSC) and its NRSAP. To assist the NRSC in its tasks, a General Secretariat has been established, followed by Provincial Road Safety Committees (PRSCs) in all provinces in the country. Besides the General Secretariat team of the NRSC, there are also important ministries such as MPWT, MoI, MoH, MoEYS and MRD. The study findings indicated the need to strengthen ministry structures in most provinces through providing adequate financial resources and capacity building for their staff. Building expertise in road safety for key staff should also be prioritised, since none of the staff specialised in road safety. The support will contribute to having better decentralisation of its NRSAP implementation to their PRSCs.

Additionally, most of the stakeholders tended to allocate their resources based on their interest in a particular pillar. Lack of coordination in some pillars, such as infrastructure and vehicle safety, has been observed. To strengthen the coordination and maximise the result of the NRSAP implementation, road safety concepts should be mainstreamed into other sectors and ministries' action plans, such as public works, education, health and transport departments.

As presented in Section 4.3.1, the NRSAP consists of eight pillars and tends to support more on the prevention of road crashes and reduction of injury severities, than on the support to persons with disabilities. Only Pillar 3 (safe vehicles) and Pillar 7 (driver licensing) include vehicle modification and driving licence system for persons with disabilities. However, the implementation of these two actions is not in place yet. These present the needs for actions in addition to the policy that is already in existence.

Moreover, the NRSAP has been developed based on the Global Decade of Actions for Road Safety, and its long lists of activities in the pillars led to a loophole in term of prioritisations for Cambodia, where the human and financial resources are insufficient. At the same time, there was a sign of limited commitment from the top leaders when the national 10-year targets were proposed in the NRSAP, but were refused by them. The NRSAP finally has been approved without national targets and indicators. These findings indicate the need to prioritise the action plan

implementation in the context of limited financial and human resources in the country and to have better national targets and indicators.

4.6.2 Potential Changes to Health Structures and Policies

Study 1 aimed to explore the existing structures and policies related to road safety, health and disabilities. It did not attempt to conduct a comprehensive assessment on the quality and effectiveness of the systems. However, the study revealed loopholes among the health sector and its interventions.

Prevention efforts for long term impairments include mostly interventions for emergency responses, hospital treatment and rehabilitation. These are the national health related policies under the MoH, as presented in Section 4.4.1. Those policies are more likely to contribute to the prevention of long term impairments than to supporting persons with disabilities. The role of the MoH should be extended to supporting persons with disabilities. To do so, indicators for long term impairments, serious injuries, emergency response and rehabilitation services should be included into the MoH strategic plan.

In addition to the strategic plan, the MoH also developed another two national policies. In the absence of a clear financial mechanism and responsible departments in these two national policies, the implementation mechanism of the policies has become a challenging task for the ministry. It indicates the need to include implementing agency, budget, funding sources and schedule for each policy.

Moreover, there is a national emergency number, 119 and a central station, which is supposed to dispatch emergency services throughout the country. However, so far, within its limited capacity, the centre can only provide its emergency services in Phnom Penh. Emergency numbers are different from province to province and not widely publicised. At the same time, although there are a large number of ambulances (more than 200), they are not yet sufficient to provide emergency treatment for road crash casualties during transportation from crash scenes. The equipment in each ambulance might vary in terms of quantity and capacity. This illustrates the needs to prioritise the emergency services in the action plan implementation of the MoH.

Payment systems in hospitals are an important issue, especially for poor people. Although there is an official letter issued by the Minister of Health to advise all hospitals to provide services before asking for payment, in practice, payment systems must still be made upfront at the emergency rooms. “Health Equity Funds” were introduced to support poor people and are considered an effective way to complement financing schemes in public health facilities. However, the scheme is still not able to cover the whole country. This is another challenge requiring action in order to ensure appropriate emergency responses, especially for the poor communities.

In terms of implementing mechanisms for health care services, around 16% of people accessed public health facilities as their first choice health care providers. Private health facilities have played an important role in providing health services in Cambodia. The services covered 83% of people who need health care services and account for almost 50% of health service expenditures. They are operated in the forms of private clinics, pharmacies or drug stalls with a spectrum of size, capacity and quality. Reasons for seeking private health facilities rather than public services included customer desires, capacity of public services, availability of qualified staff and accessibility of the private services. At the same time, issues were mentioned such as no standard procedure in place to qualify private ambulance services, over-prescribing, over-dispensing and mis-prescribing of drugs, and fake or watered-down versions of drugs. In addition, people seek traditional practices mostly when they have broken bones or other injuries without any bleeding and because of the cost factor and limited health care facilities in Cambodia (especially in rural areas). The quality of the services from traditional healers is not documented well, because they operate informally without any official registration. The health policy reviews have not clearly mentioned any specific intervention to target ensuring qualities of those private services and traditional healers. This is another gap in the policies that needs to be strengthened in terms of inclusion into the policies and their implementation. Excluding the private services and traditional healers might be one of the factors leading to unstandardised services and inadequate qualities of the sectors.

4.6.3 Potential Changes to Disability Structures and Policies

After a health facility discharge, there are various services for persons with disabilities. The services are either in institutions, such as physical rehabilitation

centres or in communities. Some of the services are under the government institution's supervision, while some are provided by NGOs. In early 2014, the government approved the National Disability Strategic Plan 2014-2018 (NDSP) which aims to provide social protection, empower persons with disabilities and improve physical environments including the transport system. The NDSP introduces a collaboration and cooperation from around 15 governmental institutions, such as MoSVY, MoEYS, MoH, MoI, MRD, MPWT. Following the reviews, the plan should include responsible organisations, budgeting and its mechanism, national targets and indicators for its action. The inclusion will contribute to improving the monitoring and effective implementation.

Beside support from the government sector, persons with disabilities also receive assistance from non-governmental agencies and donors. The support services have been provided mostly in the form of provision of health and rehabilitation services, education and vocational training programs and poverty reduction schemes. However, the assistance from NGOs should be extended as it is still very limited in their intervention scope and coverage areas. The majority of the NGOs are mostly working on Actions 1, 2 and 5 of the NDSP.

It is important to note that all of the interventions from the non-governmental organisations and the government institutions tend to focus on individual based approach, where persons with disabilities are put in the centre of the intervention, such as provision of health and rehabilitation services, education, vocational training, grant schemes, and so on. On the other hand, approaches towards improving social barriers, such as improving transportation system, education system, employment system in private sectors, and so on have been very limited. It is good to provide such individual targeted services to support persons with disabilities in Cambodia, since they have not been receiving adequate social protection as yet. However, lack of environmental and social responsibility of the whole society is still a barrier to full participation from persons with disabilities.

4.7 CHAPTER 4 CONCLUSION

The findings from Study 1 indicated loopholes and potential changes in the systems and policies related to health, road safety and disability in terms of policy

contents and implementing mechanism. The NRSAP and NDSP clearly presented a concept of collaboration among different ministry departments and NGOs. It was a starting point to break down the organisational silos. On the other hand, the policies in the health sector were more in line with its own ministry structure, without involving other institutions.

As summarised in Figure 4.1, a gap in services and interventions was observed between long term impairments and disabilities. Both national action plans have less focus on reducing long term impairments, compared to preventing road crashes and supporting persons with disabilities. This presents a crucial complementary role of the health sector in terms of delivering proper health services. Additionally, all policies clearly mention organisations responsible for implementation of its actions and timeframe, but have not outlined a financial mechanism to implement them.

Further, both NRSAP and NDSP do not include national targets and indicators. Although the National Health Strategic Plan includes 42 indicators, only four related to road safety and long term impairments. The lack of indicator and target presentations in the policies might lead to insufficient measurement and lack of commitment from the political leaders.

Moreover, all policies presented good structures of the government ministries in the national and provincial levels, but limited capacity in terms of human resources and financial mechanisms are observed among ministry staff. This might lead to limited implementation of the policies by the responsible government institutions. Besides, it is important to notice the contribution from the NGO sectors towards road safety, health and disability. These became a good supplement to the limited capacity of the government in implementing those national policies. On the other hand, the involvement might also reflect the limitation in terms of knowledge transfer to the government counterparts, especially on the strategy development and project management. It might then affect the long term sustainability of the policy implementation.

Chapter 5: Analysis of Road Crash and Disability Databases

5.1 INTRODUCTION

There are four studies in this PhD research. Chapter 5 presents Study 2: Analysis of Road Crash and Disability Databases. The study aimed to provide descriptions and analysis of road crash and disability databases in Cambodia. It contributes to answering the research questions below:

- RQ1: How much do road crashes contribute to long term impairments?
- RQ2: What are the characteristics of road crashes that lead to long term impairments?
- RQ3: What role do emergency and post-crash care play in influencing the occurrence and severity of long term impairments?
- RQ6: What potential changes to road safety policy would reduce the prevalence of long term impairments as an outcome?
- RQ7: What potential changes to health policies would reduce the prevalence of long term impairments?
- RQ8: What potential changes to disability policy would better meet the long term needs of persons with disabilities and their families?

The main objective of the analysis was to understand the road crash context of those injured persons who have long term impairments due to road crashes and to have further information on general situations of persons with disabilities (due to road crashes) who come to receive the services from 11 physical rehabilitation centres in Cambodia. This analysis provided a general summary of the pattern of disability from road crashes and was used to compare the profile that emerged from the database with the data gathered from Study 3 through in-depth interviews with persons with disabilities to identify any similarities or differences. The analysis from the databases contributed to discussions in subsequent workshops in Study 4 to

inform those policy makers on the general situation and patterns of road crashes and disabilities in the country.

This chapter starts with descriptions and analysis of the Road Crash and Victim Information System (RCVIS). The analysis examines the characteristics of road crashes, especially those that led to long term impairments. The issue of poor data is presented in Section 5.3: The RCVIS description. It highlights the strengths and weakness of the system. Then, disability databases, including Physical Rehabilitation Centre (PRC) databases are also described and analysed. The chapter compares the findings from the RCVIS and PRC databases. It then ends with the discussion and conclusion sections.

There are various disability data sources in Cambodia including national surveys, national administrative databases and ad-hoc surveys. Among them, PRC databases provide more comprehensive information on persons with long term impairments, including causes, than other data sources. Additionally, they are the only available databases that include information on road crashes. Furthermore, the Cambodian RCVIS is considered to be the only system in Cambodia that provides good information on road crashes and casualties reported by traffic police and health facilities. RCVIS consists of comprehensive casualty (such as name, gender, type of road users, injuries, etc.) and crash information (location of crash, causes, collision type, etc.). PRC and RCVIS databases were selected for further analysis in this chapter.

5.2 STUDY 2 METHODOLOGY

5.2.1 Methods and Procedure

De-identified data from two databases were gathered in Cambodia from the RCVIS and PRC. This study was exempted from the QUT ethical review, because it related to a request to access an existing collection of data that was provided in a non-identifiable form to the researcher. Official approvals were granted from responsible organisations, who own the databases, in July 2013.

5.2.2 Analysis

Descriptive statistical analyses were performed on the RCVIS and PRC datasets, using SPSS software (Version 21). New variables were created and values were coded, where appropriate. Most of the data were presented in cross tabulation tables. *Pearson Chi-square* (χ^2) test was used to test for statistically significant differences at the .05 level. Additionally, *standardised residual tests* were also applied to measure how significant the figure in each cell of a table was to the Chi-square value.

A *Multinomial Logit Model* (MLM) approach was applied to the RCVIS dataset. The aim of the multinomial analysis was to examine the effects of selected variables (risk factors) on the injury outcome probabilities of “long term impairment”, “fatality” and “being transferred to other health facilities” relative to “being fully treated”. Washington, Karlaftis, and Mannering (2011) explained the concept of the model to estimate a function that determines outcome probabilities. This approach has been used in other studies to examine, for example, risk factors influencing road traffic injury severities, motorcycle crashes and effects of street pattern on the crash severities and pedestrian crossing behaviours at signalised intersection (Celik & Oktay, 2014; Geedipally, Turner, & Patil, 2011; Rifaat, Tay, & de Barros, 2011; Zhou, Liu, Wang, & Zhang, 2013). Those studies highlighted the importance of the MLM in identifying the effects of all risk factors influencing the injury severities. In this PhD study, the model enabled the researcher to quantify and control for effects of risk factors, which was not able to be done via the simple descriptive approach.

Additionally, to estimate the effects of a risk factor, the “*Relative Risk Ratio*” (RRR) was also calculated (Celik & Oktay, 2014; Rifaat et al., 2011). RRRs greater than 1 indicate that an increase in the risk factor is associated with an increased probability of fatalities, long term impairments and being transferred (to other health facilities), compared to fully treated, which was chosen as the reference category. Similarly, RRRs less than 1 indicate a decreased probability of the injury outcomes. The MLM and associated RRR were estimated using SPSS (version 21). The analysis of the long term impairment data was based on only the dataset from the “health facilities” (health, with/without traffic police) because the data recorded by “traffic police only” rarely coded the long term impairments.

The description of the RCVIS and PRC databases was informed by the guidelines to evaluate public health surveillance systems developed by the US Centers for Disease Control and Prevention (2001). 0 and 0 present the description of the databases in detail, following the main concepts of the guidelines as below:

- **Data management:** overview of the data system, history of the system, its legal authority, system structure, its flow charts for the data collection to report development
- **Completeness of coverage:** coverage areas of the systems and population under the system, participating teams in provinces and their contribution to the data collection
- **Information collected and its quality:** variables in the data set and information that could be disaggregated, proportions of recorded and non-recorded variables in the data collection forms, data timeliness: time intervals between the time of road crashes and data collection and reporting

5.3 THE RCVIS DESCRIPTION

RCVIS was initiated in 2004 by Handicap International, an international non-governmental organisation. It has been progressively transferred to the National Road Safety Committee since 2007, with a full completion of the handover in 2010. The system has been developed to “*provide government and civil society with accurate, continuous and comprehensive information for planning, legal norms, policy development, and evaluating impact of past, current and future initiatives*” (National Road Safety Committee, 2012, p. 1). Detail description of the RCVIS database is presented in APPENDIX 7: DESCRIPTION OF THE RCVIS DATABASE.

Since 2010, RCVIS has been managed by the general secretariat team of the National Road Safety Committee, in collaboration with the Ministry of Health (MoH) and Ministry of Interior (MoI). The two ministry teams generally play an important role to gather data through their provincial networks. The numbers of participating health facilities and police districts have varied from year to year. All

traffic police districts have participated in RCVIS since 2006. On the other hand, the numbers of participating health centres and hospitals have been different between 2008 and 2012.

Using data from several sources provides a more comprehensive picture and increases the reliability of the data. On the other hand, this means that particular data items may be missing for the many cases where data is only available from one source. For example, those records from traffic police units have not included information regarding the result of hospital discharge, especially the long term impairment information.

RCVIS is the only system in Cambodia that provides information based on individual cases. Although there are some limitations in the injury data (numbers of serious and slight injuries), the system identifies trends in fatalities helping to signal changes in mortality due to road crashes, with comprehensive disaggregated information on age, sex, province, mode of transport, causes of crashes and so on. The availability of disaggregated data permits effective assessments of road safety programs such as drink driving in specific locations and target groups. In addition, RCVIS findings have been referenced in many road safety documents, especially the National Road Safety Action Plan and policy. The findings from RCVIS have been recognised officially by the government ministries as well as by non-governmental organisations. However, the drop-off in data from health facilities means that non-fatal trends are likely to be misleading and therefore less useful for policy or evaluation.

While the crash date was available for almost all records, the date when the information was recorded was missing for half of the data supplied to the researcher. It may be that some variables were omitted in the process of copying and transferring the data from the database at the NRSC. These findings showed that the majority of the forms (91%) were filled on the same day or just one day after the crashes. This would help the data collectors to gather good information from casualties, since they might be able to describe the crashes in more details, compared to many days later. On the other hand, this also raised an issue of the data collection on long term impairments, which might need more time to be identified. This might lead to under-reporting of long term impairments. Another limitation of the system is the lack of information on how the patient was transported to hospital. RCVIS only provides

information on whether casualties were transported by ambulances, health centre transportation, or with family, relative, or alone. It does not include types of transport modes, such as motorbike, passenger car or truck, during emergency trips to health facilities. This information on transport mode to hospitals would be a valuable supplement to the pre-crash and crash information currently in RCVIS.

There were 151,420 records in the RCVIS in the period 2006-2012 inclusive. Around 45% of the records were collected by traffic police units only, without information from health facilities. Although traffic police units and health facilities were involved in the data collection, their participation significantly differed from year to year.

The Cambodia Demographic and Health Survey conducted by National Institute of Statistics et al. (2011) estimated that 1.8% of the population were injured or killed in accidents in 2010. Road traffic crashes constituted 67.5% of overall accidental injuries and deaths. This infers that 175,535 people were injured or killed in road crashes in 2010. However, RCVIS recorded only 10% of that number of those injuries and fatalities in the same year. In addition, while RCVIS presented 1,950 as a total number of fatalities in 2013, the WHO (2015b) provided an estimation of 2,635 road traffic fatalities in the same year.

A decrease in the level of motivation among health staff over time may have contributed to the drop-off in data completeness. There was an incentive for data collectors during the pilot phase of the RCVIS in 2004-2005. It was then discontinued when the project started to implement officially throughout the country at the end of 2006. The monetary incentive of the data collection was mentioned by the health staff who were interviewed in hospitals in Phnom Penh and Kampong Cham province. The staff in those health facilities considered filling the forms as a burden in addition to their daily tasks. They did not find any benefit besides overloading of work. Without the incentive, the system still continues to exist, but fewer forms are filled. The willingness of participating hospitals has reduced, as there is limited dedicated staff for the forms. This might reflect the commitment of the hospital management team to allocate resources for completing forms. It was observed that the quality of the data collection for RCVIS has reduced over time.

Another issue relates to the flow of the forms inside hospitals/health centres. At the beginning of the implementation of the system in 2004-2009, the forms were

filled in the emergency sections of hospitals/health centres and collected by the ministries. Then, in 2013, the forms were attached to in-patient documents during the hospital stays. They were supposed to be filled in at discharge to follow up the discharge results. However, many forms were lost during the process. So, from year to year, the total numbers of forms has reduced.

It is also important to identify some key factors that might lead to limited information on the long term impairments in RCVIS. The system does not include follow up information on those casualties discharged from hospitals, as the data collection forms were filled and completed in the emergency rooms only. This gap in information has led to a limited understanding of the nature and extent of the long term impairments after hospital discharge.

Further, RCVIS was not mentioned and integrated into the Health Information System Strategic Plan, 2008-2015. This strategic plan was developed by the Department of Planning and Health Information. The plan aims to strengthen and invest in a health information system and health research for evidence-based policy-making, planning, monitoring performance and evaluation. (Ministry of Health, 2008a, p. 11). There is a specific strategic action in the Health Information System Strategic Plan, 2008-2015 to develop the reporting of non-communicable diseases in the overall surveillance and case reporting and response system, including accidents and injuries. Although the strategy mentioned briefly about the reporting mechanism for non-communicable diseases being excluded from the Health Information System Strategic Plan, 2008-2015 and managed by another department, rather than the Health Information Department may affect the sustainability of RCVIS under the health structure.

Additionally, in the RCVIS form, there is a question for health staff to evaluate the severity of injuries and long term impairments. The identification of long term impairments of patients (coded as sent home but disabled for life) was made by hospital staff who completed the forms during the first week of hospitalisation. On the other hand, long term impairments generally required a longer time to be identified. Therefore, the consistency and accuracy of the information regarding long term impairments might be compromised.

At the same time, health staff were very hesitant to tick the long term impairments option. Although they mostly were able to estimate the probability of

their patient having long term impairments, they did not fill in the question in the forms. Hospital staff were worried that they could be sued based on their answers. In some cases, patients might be happy to be classified as “having long term impairments” as they might be able to receive a benefit from a pension fund. On the other hand, some patients might find it difficult to apply for a job because of being classified as disabled. This has led to fewer persons being coded as having long term impairments due to road crashes in RCVIS.

During interviews with hospital staff, a solution to increase the numbers of RCVIS forms to be completed by health staff was discussed. The researcher asked whether the long term impairments question could be replaced by: “How long patients might need to have to fully recover from their impairment”. The options for answers could be “less than three months”, “between three to six months”, “less than a year”, or “more”. The hospital staff welcomed this solution, which would potentially increase the willingness of health staff to answer the question. Additionally, financial compensation was proposed by some participants to motivate their staff to complete the forms.

5.4 ANALYSIS OF RCVIS DATABASE

In this section, findings from the analysis of RCVIS are presented. The section starts with an overview of the general characteristics of road crashes and casualties in the RCVIS database from 2006 to 2012. Then, it provides more comprehensive descriptions on crashes and casualties with long term impairments. It was shown earlier that reporting by health facilities decreased over the period 2006 to 2012, with the result that simple analyses of the total RCVIS data underestimate road trauma trends and are biased in terms of severity. Therefore, the traffic police only and health with/without police data are presented separately where necessary throughout this section.

5.4.1 2006-2012 Trends and Severities

The RCVIS database contains details of 151,420 casualties from 2006 to 2012, including 11,879 fatalities (7.8%), 45,305 severe injuries (29.9%), 87,672 slight injuries (57.0%) and other 6,564 records (4.3%) as unknown injuries (see Table A3.4 in Appendix 3). Table 5.1 presents the numbers of casualties by their injury severities

and year of crashes from traffic police and health facilities. “Health with/without Traffic Police” refers to cases where data was provided by health facilities that might or might not been reported by the traffic police. It is important to note the different trends of fatalities, serious injuries and slight injuries among the two different data sources over years. The data that was recorded by police only indicated increasing trends among fatalities and serious injuries, but a decrease in slight injuries. The health (with/without police) data showed large decreases since 2008 at each level of severity. As noted earlier, the trends in the police only data are likely to be more representative of the real trends in fatalities and serious injuries (although even the police data appears to be increasingly incomplete for slight injury).

Table 5.1: Number of casualties by injury severities and year of crashes from both data sources

Year of Crashes	Injury Severities						Unknown	Total
	Police Only			Health with/without Police				
	Fatal	Serious	Slight	Fatal	Serious	Slight		
2006 Count	994	2,437	5,012	298	3,596	12,824	985	26,146
%	9.60%	10.20%	15.20%	20.10%	16.70%	23.50%	15.01%	17.27%
2007 Count	1,268	2,892	5,576	277	4,258	12,079	1,053	27,403
%	12.20%	12.20%	16.90%	18.70%	19.80%	22.10%	16.04%	18.10%
2008 Count	1,378	3,220	5,775	260	4,006	10,210	947	25,796
%	13.30%	13.50%	17.50%	17.50%	18.60%	18.70%	14.43%	17.04%
2009 Count	1,471	3,531	5,006	246	3,491	7,111	663	21,519
%	14.10%	14.80%	15.20%	16.60%	16.20%	13.00%	10.10%	14.21%
2010 Count	1,669	4,140	4,775	147	2,578	4,395	583	18,287
%	16.10%	17.40%	14.50%	9.90%	12.00%	8.00%	8.88%	12.08%
2011 Count	1,747	3,924	3,605	158	1,883	4,056	1,281	16,654
%	16.80%	16.50%	10.90%	10.70%	8.70%	7.40%	19.52%	11.00%
2012 Count	1,869	3,637	3,260	97	1,712	3,988	1,052	15,615
%	18.00%	15.30%	9.90%	6.50%	8.00%	7.30%	16.03%	10.31%
Total Count	10,396	23,781	33,009	1,483	21,524	54,663	6,564	151,420
%	100%	100%	100%	100%	100%	100%	100%	100%

Only 50% of the records (75,154 out of 151,420) provide information on the injury severity and results after hospital discharge. Table 5.2 shows that most of the data that was recorded by traffic police only did not include information on the hospital discharge. The information on hospital discharge was available mostly in the data collection forms filled by health facilities only. Therefore, the analyses of long

term impairments will be based on cases recorded by health (with/without police) only.

The health (with/without police) data indicates that 76% of casualties, whose injury severities and discharge results were recorded (59,173 out of 77,670), were fully treated and sent home without requiring further referrals to any other health facility (Table 5.2). The figures highlighted in white boxes in Table 5.2 may present evidence of miscoding on fatalities in the system. Additionally, the ones highlighted in grey boxes should not be coded in the police data, as there was no question on hospital discharge results in police data collection forms. It is also important to note that 422 casualties were coded as having long term impairments. Injury severity was missing for 24 persons coded as having long term impairments.

Table 5.2: Severities of injuries and results after hospital discharge from 2006 to 2012

Results after hospital discharge		Injury Severities								Total	
		Police Only				Health with/without Police					Unknown
		Fatal	Serious	Slight	Total	Fatal	Serious	Slight	Total		
Died	Count	3,716	3		3,719	1,372	2		1,374		5,093
	%	35.7%	.0%		5.5%	92.5%	.0%		1.8%		3.4%
Long Term	Count		1	2	3		235	160	395	24	422
Impairments	%		.0%	.0%	.0%		1.1%	.3%	.5%	.4%	.3%
Referrals	Count					28	4,935	2,748	7,711	638	8,349
	%					1.9%	22.9%	5.0%	9.9%	9.7%	5.5%
Fully treated	Count	1	1		2	42	13,028	46,103	59,173	2,115	61,290
	%	.0%	.0%			2.8%	60.5%	84.3%	76.2%	32.2%	40.5%
Unknown	Count	6,679	23,776	33,007	63,462	41	3,324	5,652	9,017	3,787	76,266
	%	64.2%	100%	100%	94%	2.8%	15.4%	10.3%	12%	57.7%	50.4%
Total	Count	10,396	23,781	33,009	67,186	1,483	21,524	54,663	77,670	6,564	151,420
	%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

5.4.2 Road User Characteristics

Age Groups

The majority (86%) of casualties are in the economically active age groups (15-59 years old). As shown in Table 5.3 the 15-29 years old group is the largest group in both data sources. Around 95% of the data included values for age and injury severity variables. As shown in Table 5.3, the statistical differences are significant in injury severities by the age groups among both data sources [Police

Only: $\chi^2 (8) = 746.37$, $p < .001$, Health: $\chi^2 (8) = 522.21$, $p < .001$]. Based on the examination of the standardised residuals, the degree of severities was generally higher for the older age groups (60+) in both data sources. For example, the proportions of older than 60-year old groups in both data sources (6.7% and 9%) were fatalities, compared to lower proportions among serious and slight injuries. On the other hand, both data sources show different proportions of injury severities among 0-14 age group. In the police only data, fatality proportion is the highest, while the slight injury proportion is the lowest. The hospital (with/without police) presents the opposite results.

Table 5.3: Severities of injuries by age groups and both data sources

Age Group		Injury Severities						Total
		Police Only			Health with/without Police			
		Fatal	Serious	Slight	Fatal	Serious	Slight	
0 - 14	Count	878	1,842	2,422	98	2,081	7,235	14,556
	%	8.6%	7.8%	7.4%	6.7%	9.7%	13.3%	10.1%
	St.Re	3.0	0.5	-2.1	-6.0	-10.3	7.5	
15-29	Count	4,896	12,948	19,492	682	10,833	28,233	77,084
	%	47.7%	55.0%	59.6%	46.6%	50.7%	52.1%	53.7%
	St.Re	-11.3	-2.3	8.3	-2.7	-1.8	1.5	
30-44	Count	2,381	5,060	6,830	314	4,722	11,412	30,719
	%	23.2%	21.5%	20.9%	21.5%	22.1%	21.0%	21.4%
	St.Re	3.9	.1	-2.3	0.1	2.4	-1.5	
45-59	Count	1,413	2,709	3,140	238	2,700	5,520	15,720
	%	13.8%	11.5%	9.6%	16.3%	12.6%	10.2%	10.9%
	St.Re	8.8	2.7	-7.2	6.1	7.3	-5.6	
60+	Count	689	987	839	131	1,017	1,820	5,483
	%	6.7%	4.2%	2.6%	9.0%	4.8%	3.4%	3.8%
	St.Re	15.3	3.2	-11.3	9.9	6.8	-5.9	
Total	Count	10,257	23,546	32,723	1,463	21,353	54,220	143,562
	%	100%	100%	100%	100%	100%	100%	100%
		$\chi^2 (8) = 746.37, p < .001$			$\chi^2 (8) = 522.21, p < .001$			

Table 5.4 presents the numbers of road crash injuries and fatalities by age groups. The numbers of injuries include slight and serious injuries. The statistical differences are significant in injuries and fatalities by different age groups [$\chi^2 (4) = 596.99$, $p < .001$]. The fatality rate is the highest for people aged 15-29 and 30-44.

Examination of the standardised residuals showed that the injury and fatality rates are higher among 15-44 age groups, compared to other injuries and fatality groups. Both the injury and fatality rates are lowest for children aged under 15. Given the increasing under-reporting of injuries in RCVIS over the 2006-2012 period, it is likely that these injury rates are underestimated. The 15-44 group is more likely to over-represent in road crashes since its prevalence rate among the population in 2010 was only 49%, compared to 75% among the injuries and 71% among the fatalities.

Table 5.4: Comparison of the percentages of injuries and fatalities by age groups

Items		Age Groups					Total
		0-14	15-29	30-44	45-59	60+	
Injuries	Count	13,580	71,506	28,024	14,069	4,663	131,842
2006-2012	%	10.3%	54.2%	21.3%	10.7%	3.5%	100%
	St.Re	1.8	2.7	-1.1	-3.1	-5.2	
Fatalities	Count	976	5,578	2,695	1,651	820	11,720
2006-2012	%	8.3%	47.6%	23.0%	14.1%	7.0%	100%
	St.Re	-6.2	-9.0	3.7	10.3	17.6	

$\chi^2(4) = 596.99, p < .001$

Gender

The majority of casualties were male (73.5%) in the combined data sources. As shown in Table A3.6 in Appendix 3, there were statistically significant differences in gender by both data sources [$\chi^2(1) = 355.8, p < .001$]. The proportion of males in the police data is higher than in the health facility data (75.8% compared to 71.5%). Additionally, males comprise the highest proportions among fatalities in both data sources. Females account for higher proportions among slight injuries, compared to fatalities and serious injuries. The differences were statistically significant, as shown in Table 5.5 [Police Only: $\chi^2(2) = 147.24, p < .001$, Health: $\chi^2(2) = 100.05, p < .001$].

Table 5.5: Numbers of casualties by injury severities and gender from 2006 to 2012

Gender		Injury Severities						Total
		Police Only			Health with/without Police			
		Fatal	Serious	Slight	Fatal	Serious	Slight	
Male	Count	8,306	17,826	24,533	1,130	15,803	38,331	105,929
	%	80.3%	75.2%	74.4%	76.5%	73.8%	70.5%	73.4%
	St.Re	5.4	-0.7	-2.4	2.3	3.9	-2.8	
Female	Count	2,044	5,875	8,422	347	5,617	16,049	38,354
	%	19.7%	24.8%	25.6%	23.5%	26.2%	29.5%	26.6%
	St.Re	-9.6	1.2	4.3	-3.6	-6.2	4.5	
Total	Count	10,350	23,701	32,955	1,477	21,420	54,380	144,283
	%	100%	100%	100%	100%	100%	100%	100%
		$\chi^2 (2) = 147.24, p < .001$			$\chi^2 (2) = 100.05, p < .001$			

While there are similar proportions of males and females in the Cambodian population in 2010 (49% vs 51%), Table 5.6 shows that males are over-represented among injured persons (73%) and fatalities (80%). The results highlight that males have higher risk of being involved in a crash and are more likely to be killed in road crashes than females.

Table 5.6: Comparison of the proportion of gender in RCVIS and among population

Items		Gender		Total
		Male	Female	
RCVIS-Injuries	Count	96,493	35,963	132,456
	%	72.8%	27.2%	100%
RCVIS-Fatalities	Count	9,436	2,391	11,827
	%	79.8%	20.2%	100%

Additionally, Table A3.7 in Appendix 3 shows that lower proportions of females were observed among 15-44 age group, compared to the other age groups. The differences are statistically significant [$\chi^2 (4) = 2,968.11, p < .001$].

Occupation

Around 90% of the data included information on the occupational status of casualties. Farmers comprise the largest group of casualties in both data sources. Students, workers and farmers constituted 70% of the overall road crash casualties. As shown in Table A3.8 in Appendix 3, there were statistically significant

differences in occupations by both data sources from traffic police and health facilities [χ^2 (5) = 1,703.46, $p < .001$]. Health facilities were more likely to report child and student casualties, while more proportions of motorbike/car/truck drivers and farmers were recorded by traffic police.

The pattern of severity by occupation appears to be complex. As shown in Table 5.7, farmers comprise the highest proportion of fatalities compared to other occupations in both data sources. The statistical differences were significant in occupation by injury severities among both data sources [Police Only: χ^2 (10) = 156.03, $p < .001$, Health: χ^2 (10) = 351.96, $p < .001$]. Health facilities were more likely to record children and students with slight injuries, while traffic police were more likely to report slight injuries of only students.

Table 5.7: Numbers of casualties by occupations and injury severities in both data sources

Occupation		Injury Severities						Total
		Police Only			Health with/without Police			
		Fatal	Serious	Slight	Fatal	Serious	Slight	
Child	Count	281	489	758	40	534	2,565	4,667
	%	2.9%	2.2%	2.4%	3.0%	2.6%	5.0%	3.4%
	St.Re	3.1	-2.1	0.1	-2.4	-11.5	7.7	
Student	Count	1,469	4,148	6,224	215	4,573	12,502	29,131
	%	14.9%	18.3%	19.5%	15.9%	22.6%	24.6%	21.3%
	St.Re	-7.9	-0.4	4.7	-6.0	-3.5	3.2	
Worker	Count	1,896	4,256	5,651	255	3,856	9,861	25,775
	%	19.3%	18.7%	17.7%	18.9%	19.1%	19.4%	18.8%
	St.Re	2.2	1.5	-2.5	-0.3	-0.6	0.4	
Motorbike/ Car/Truck Driver	Count	471	1,060	1,765	58	876	1,802	6,032
	%	4.8%	4.7%	5.5%	4.3%	4.3%	3.5%	4.4%
	St.Re	-1.4	-3.0	3.3	1.0	4.1	-2.7	
Farmer	Count	3,489	7,850	10,962	410	5,773	13,353	41,837
	%	35.5%	34.5%	34.3%	30.4%	28.6%	26.2%	30.5%
	St.Re	1.5	-0.1	-0.8	2.4	4.4	-3.2	
Others	Count	2,234	4,921	6,575	372	4,588	10,838	29,528
	%	22.7%	21.7%	20.6%	27.6%	22.7%	21.3%	21.6%
	St.Re	3.0	1.2	-2.7	4.5	2.8	-2.5	
Total	Count	9,840	22,724	31,935	1,350	20,200	50,921	136,970
	%	100%	100%	100%	100%	100%	100%	100%
		χ^2 (10) = 156.03, p < .001			χ^2 (10) = 351.96, p < .001			

5.4.3 Transport Modes

Vehicle controllers (including car, truck, bus drivers, motorbike driver and bicycle riders, but not passengers) comprise 56% of overall casualties, followed by passengers (36%). The majority of controllers and passengers were travelling by motorbike (88% of vehicle controllers and 72% of passengers).

The injury severities by road user types are presented in Table 5.8. More than 97% of the police data and 90% among the hospital data coded the road user types. There are statistically significant differences of road user types by the injury severities in both data sources [Police Only: $\chi^2(4) = 1,523.59$, $p < .001$, Health: $\chi^2(4) = 400.05$, $p < .001$]. The proportions of pedestrian fatalities are higher than among the serious and slight injuries in both data sources. On the other hand, passengers are likely to have lower severity, as they account for higher proportions among slight injuries than serious injuries and fatalities.

Table 5.8: Numbers of casualties by injury severities and road user types from 2006 to 2012

Road User Type		Injury Severities						Total
		Police Only			Health with/without Police			
		Fatal	Serious	Slight	Fatal	Serious	Slight	
Pedestrian	Count	1,363	2,105	1,307	139	1,612	4,682	11,208
	%	13.10%	8.90%	4.00%	10.10%	7.80%	9.00%	8%
	St.Re	23	10.1	-21.4	1.7	-4.2	2.3	
Vehicle Controller	Count	5,949	13,162	17,591	762	13,000	28,703	79,167
	%	57.30%	55.40%	53.40%	55.20%	63.20%	55.20%	56%
	St.Re	3.6	1.4	-3.2	-1.1	11	-6.7	
Passenger	Count	3,073	8,496	14,059	480	5,953	18,646	50,707
	%	29.60%	35.80%	42.70%	34.80%	28.90%	35.80%	36%
	St.Re	-14.2	-6.1	13.1	0.5	-12.2	7.6	
Total	Count	10,385	23,763	32,957	1,381	20,565	52,031	141,082
	%	100%	100%	100%	100%	100%	100%	100%
		$\chi^2(4) = 1,523.59, p < .001$			$\chi^2(4) = 400.05, p < .001$			

More disaggregated results on road user types are shown in Table 5.9. Motorbike controllers constituted the highest proportions among all road user types. At the same time, they are more likely to be killed or have serious injuries than motorbike passengers in both data sources. It is interesting to note that the proportions of car/bus/truck passengers with slight injuries are higher than among

fatalities and serious injuries in the police only data, but is the lowest in the hospital data. The differences are statistically significant [Police Only: χ^2 (14) = 1,658.8, $p < .001$, Health: χ^2 (4) = 688.69, $p < .001$]

Table 5.9: Numbers of casualties by type of road users and injury severities

Road User Type		Injury Severities						Total
		Police Only			Health with/without Police			
		Fatal	Serious	Slight	Fatal	Serious	Slight	
Pedestrian	Count	1,363	2,105	1,307	139	1,594	4,617	11,125
	%	13.20%	8.90%	4.00%	10.10%	7.90%	9.00%	7.9%
	St.Re	23	10.1	-21.4	1.8	-4	2.2	
Bicycle controller	Count	385	823	869	45	638	1,780	4,540
	%	3.70%	3.50%	2.60%	3.30%	3.10%	3.50%	3.2%
	St.Re	3.6	3.2	-4.7	-0.2	-1.7	1.1	
Bicycle passenger	Count	36	109	162	6	194	722	1,229
	%	0.30%	0.50%	0.50%	0.40%	1.00%	1.40%	0.9%
	St.Re	-1.7	0	0.9	-2.7	-3.9	2.9	
Motorbike controller	Count	4,987	11,241	14,892	666	11,696	25,824	69,306
	%	48.30%	47.50%	45.40%	48.50%	57.60%	50.10%	49.5%
	St.Re	2.5	2.1	-3.2	-1.9	10.8	-6.5	
Motorbike passenger	Count	1,838	5,612	8,948	303	4,174	14,299	35,174
	%	17.80%	23.70%	27.30%	22.10%	20.60%	27.70%	25.1%
	St.Re	-13.9	-2.6	10	-2.6	-14.3	9.4	
Car/Bus/Truck driver	Count	515	960	1,571	41	442	687	4,216
	%	5.00%	4.10%	4.80%	3.00%	2.20%	1.30%	3.0%
	St.Re	2	-3.6	1.9	4.1	6.5	-4.8	
Car/Bus/Truck passenger	Count	1,135	2,607	4,574	154	1,345	2,944	12,759
	%	11.00%	11.00%	13.90%	11.20%	6.60%	5.70%	9.1%
	St.Re	-4.2	-6.2	7.7	7.7	3.2	-3.3	
Other	Count	69	197	470	19	217	666	1,638
	%	0.70%	0.80%	1.40%	1.40%	1.10%	1.30%	1.2%
	St.Re	-4.2	-3.9	5.7	0.5	-2.1	1.2	
Total	Count	10,328	23,654	32,793	1,373	20,300	51,539	139,987
	%	100%	100%	100%	100%	100%	100%	100%
		χ ² (14) = 1,658.80, p < .001			χ ² (14) = 688.69, p < .001			

As shown in Table 5.10, there were statistically significant differences in age groups by type of road users [χ^2 (28) = 34,417.54, $p < .001$]. Children (0-14) account for almost half of the injured pedestrians and almost 60% of bicycle passengers, with the highest standardised residuals. Although 0-14 bicycle controllers and 30-44

car/bus/truck drivers have lower proportions, they constituted higher standardised residuals, among other age groups in the same road user types. More than 60% of motorbike controllers and 55% of motorbike passengers were aged 15-29 years old.

Table 5.10: Numbers of casualties by road user types and age groups from 2006 to 2012

Type of road users		Age Groups					Total
		0 - 14	15-29	30-44	45-59	60+	
Pedestrian	Count	5,365	2,338	1,365	1,306	1,060	11,434
	%	46.9%	20.4%	11.9%	11.4%	9.3%	100%
	St.Re	124.1	-48.6	-21.9	1.6	29.5	
Bicycle controller	Count	1,280	1,648	620	624	494	4,666
	%	27.4%	35.3%	13.3%	13.4%	10.6%	100%
	St.Re	37.3	-17.2	-12.0	5.1	23.5	
Bicycle passenger	Count	749	321	78	80	56	1,284
	%	58.3%	25.0%	6.1%	6.2%	4.4%	100%
	St.Re	54.5	-14.0	-11.9	-5.1	.9	
Motorbike controller	Count	687	43,810	17,363	7,597	1,729	71,186
	%	1.0%	61.5%	24.4%	10.7%	2.4%	100%
	St.Re	-76.6	28.4	17.2	-2.1	-19.3	
Motorbike passenger	Count	4,915	20,116	6,116	3,516	1,414	36,077
	%	13.6%	55.8%	17.0%	9.7%	3.9%	100%
	St.Re	21.2	5.2	-18.3	-6.8	.7	
Car/Bus/Truck driver	Count	23	2,111	1,728	689	112	4,663
	%	.5%	45.3%	37.1%	14.8%	2.4%	100%
	St.Re	-20.6	-7.9	23.1	7.9	-5.0	
Car/Bus/Truck passenger	Count	1,324	6,222	3,063	1,675	587	12,871
	%	10.3%	48.3%	23.8%	13.0%	4.6%	100%
	St.Re	.7	-8.4	5.9	7.2	4.1	
Other	Count	153	736	452	232	86	1,659
	%	9.2%	44.4%	27.2%	14.0%	5.2%	100%
	St.Re	-1.1	-5.2	5.1	3.8	2.8	
Total	Count	14,496	77,302	30,785	15,719	5,538	143,840
	%	10.1%	53.7%	21.4%	10.9%	3.9%	100%

$\chi^2 (28) = 34,417.54, p < .001$

There were statistically significant differences in types of road users by gender [Police Only: $\chi^2 (7) = 8,955.22, p < .001$, Health: $\chi^2 (7) = 6,228.99, p < .001$]. The proportions of males and females constituted the same patterns among all road user

types in both data sources. Female casualties were less likely among vehicle controllers (motorbike, car, bus, truck) than pedestrians, bicyclists and passengers, as shown in Table 5.11.

Table 5.11: Numbers of casualties by road user types and gender from 2006 to 2012

Road User Type		Gender				Total
		Police Only		Health with/without Police		
		Male	Female	Male	Female	
Pedestrian	Count	2,789	2,021	3,814	2,861	11,485
	%	5.4%	12.3%	7.0%	13.0%	7.9%
	St.Re	-14.2	25.1	-13.7	21.6	
Bicycle controller	Count	1,215	885	1,483	1,113	4,696
	%	2.4%	5.4%	2.7%	5.0%	3.2%
	St.Re	-9.4	16.7	-8.6	13.5	
Bicycle passenger	Count	176	132	547	431	1,286
	%	.3%	.8%	1.0%	2.0%	0.9%
	St.Re	-3.8	6.7	-5.7	9.0	
Motorbike controller	Count	28,369	3,104	33,239	6,796	71,508
	%	55.2%	18.9%	60.7%	30.8%	49.4%
	St.Re	29.2	-51.7	27.8	-43.8	
Motorbike passenger	Count	10,273	6,294	11,311	8,404	36,282
	%	20.0%	38.4%	20.7%	38.1%	25.1%
	St.Re	-20.4	36.1	-23.2	36.5	
Car/Bus/Truck driver	Count	3,360	126	1,102	126	4,714
	%	6.5%	.8%	2.0%	.6%	3.3%
	St.Re	14.0	-24.7	7.7	-12.1	
Car/Bus/Truck passenger	Count	4,768	3,573	2,719	1,911	12,971
	%	9.3%	21.8%	5.0%	8.7%	9.0%
	St.Re	-19.6	34.6	-10.1	16.0	
Other	Count	475	276	539	398	1,688
	%	.9%	1.7%	1.0%	1.8%	1.2%
	St.Re	-4.0	7.0	-5.0	7.9	
Total	Count	51,425	16,411	54,754	22,040	144,630
	%	100%	100%	100%	100%	100%
		$\chi^2 (7) = 8,955.22, p < .001$		$\chi^2 (7) = 6,228.99, p < .001$		

Among the vehicles, in which casualties were travelling at the time of the crash, motorbikes (75%) were the largest group. Table 5.12 shows proportions of injury severities by types of vehicles. They were statistically significant differences [Police Only: $\chi^2 (12) = 1,358.04, p < .001$, Health: $\chi^2 (12) = 213.58, p < .001$]. Both data sources present different patterns of injury severities among vehicle types,

except motorbikes, which constitute lower proportions among fatalities, compared to serious and slight injuries. In the health data sources, passenger vehicles, goods vehicles and agricultural vehicles comprise lower proportions of slight injuries, compared to fatalities and serious injuries, while police only data source indicate the opposite results.

Table 5.12: Numbers of casualties by injury severities and transport modes from 2006 to 2012

Vehicle Type		Injury Severities						Total
		Police Only			Health with/without Police			
		Fatal	Serious	Slight	Fatal	Serious	Slight	
Motorbike	Count	6,827	16,856	23,847	1,029	16,442	41,731	106,732
	%	66.1%	71.2%	72.7%	71.2%	78.4%	78.1%	74.8%
	St.Re	-6.1	.2	3.3	-3.0	.5	.2	
Bicycle	Count	421	932	1,035	55	853	2,599	5,895
	%	4.1%	3.9%	3.2%	3.8%	4.1%	4.9%	4.1%
	St.Re	2.7	3.0	-4.0	-1.4	-3.8	2.6	
Passenger vehicle	Count	863	1,943	3,250	99	1,021	1,941	9,117
	%	8.4%	8.2%	9.9%	6.8%	4.9%	3.6%	6.4%
	St.Re	-2.4	-4.4	5.1	5.3	6.0	-4.6	
Goods vehicle	Count	546	1,108	2,018	70	553	1,140	5,435
	%	5.3%	4.7%	6.1%	4.8%	2.6%	2.1%	3.8%
	St.Re	-.9	-5.3	5.1	6.3	3.0	-2.9	
Agriculture vehicle	Count	241	517	886	34	285	697	2,660
	%	2.3%	2.2%	2.7%	2.4%	1.4%	1.3%	1.9%
	St.Re	-.8	-2.7	2.8	3.3	.2	-.7	
Other	Count	69	197	470	20	222	678	1,656
	%	.7%	.8%	1.4%	1.4%	1.1%	1.3%	1.2%
	St.Re	-4.2	-3.9	5.7	.6	-2.0	1.2	
Pedestrian	Count	1,365	2,114	1,310	139	1,606	4,647	11,181
	%	13.2%	8.9%	4.0%	9.6%	7.7%	8.7%	7.8%
	St.Re	22.9	10.1	-21.5	1.6	-3.9	2.2	
Total	Count	10,332	23,667	32,816	1,446	20,982	53,433	142,676
	%	100%	100%	100%	100%	100%	100%	100%
		χ2 (12) = 1,358.04, p < .001			χ2 (12) = 213.58, p < .001			

5.4.4 Crash Characteristics

Description of Road Crash Characteristics

Information on causes of road crashes was collected by hospital facilities in 2006, 2007 and 2008 only. A question related to road crash characteristics has been excluded in the data collection forms of the health facilities since 2009. Therefore, the analysis on road crash characteristics was conducted only among 68,535 casualties that were reported by traffic police only. The description in this section is based on the assessments for traffic police, who are more likely to focus on the legislation compliance and violation. It complements the findings from interviews with persons with disabilities, who also expressed their perceptions on road crash attributions based on their lived experiences (as shown in Sections 6.3 and 6.4).

As shown in Table 5.13, human errors were coded by traffic police officers as being involved in road crashes among at least 95% of casualties, while vehicle condition, road condition and weather condition constituted 4%, 3% and 1% respectively.

Table 5.13: Road crash causes based on police data, 2006-2012

Road Crash Causes	Number	Percentage*
Human error	65,093	95%
Vehicle condition	2,688	4%
Road condition	1,808	3%
Weather condition	600	1%

Note: percentage out of 68,535

As illustrated in Table 5.14, speeding was reported as the cause of more than half (51%) of the injuries, followed by drink driving (14%), failure to give way (12%) and dangerous overtaking (10%). There were statistically significant differences in injury severities by human error factors [$\chi^2(8) = 328.09, p < .001$]. Drink driving and speeding were more likely to be coded in fatal cases and severe injuries than other human error factors.

Table 5.14: Numbers of casualties by injury severities and human error factors from 2006 to 2012

Human Errors		Injury Severities			Total
		Fatal	Serious	Slight	
Speed-related	Count	5,251	11,838	15,374	32,463
	%	53.4%	51.9%	49.1%	51%
	St.Re	3.67	2.42	-4.12	
Drink driving	Count	1,648	3,172	4,292	9,112
	%	16.8%	13.9%	13.7%	14%
	St.Re	6.60	-1.36	-2.53	
Failure to give way	Count	768	2,875	4,101	7,744
	%	7.8%	12.6%	13.1%	12%
	St.Re	-12.25	2.15	5.03	
Dangerous overtaking	Count	1,021	2,096	3,146	6,263
	%	10.4%	9.2%	10.1%	10%
	St.Re	1.87	-2.91	1.44	
Other	Count	1,139	2,812	4,376	8,327
	%	11.6%	12.3%	14.0%	13%
	St.Re	-3.95	-2.90	4.69	
Total	Count	9,827	22,793	31,289	63,909
	%	100%	100%	100%	100%
$\chi^2 (8) = 328.09, p < .001$					

Based on the traffic police data, 30% of the casualties were coded as likely at fault. They were considered by the traffic police as being provoking and responsible for the crashes. As illustrated in Table 5.15, there were statistically significant differences of road user types by being likely at fault [$\chi^2 (2) = 15,504.79, p < .001$]. The majorities of pedestrians (80%) and passengers (97%) were coded as being a victim of road crashes that were provoked by others. On the other hand, half of the drivers were considered by the traffic police as being likely at fault. It was not clear how passengers (610) provoked road crashes.

Table 5.15: Number of casualties by road user types and being at fault, based on police only data source

Road User Types		Is the person likely at fault		Total
		Yes	No	
Pedestrian	Count	881	3,644	4,525
	%	19.50%	80.50%	100%
	St.Re	-13.2	8.7	
Driver	Count	17,975	17,982	35,957
	%	50.00%	50.00%	100%
	St.Re	67.8	-44.7	
Passenger	Count	610	23,150	23,760
	%	2.60%	97.40%	100%
	St.Re	-77.7	51.2	
Total	Count	19,466	44,776	64,242
	%	30.30%	69.70%	100%
$\chi^2 (2) = 15,504.79, p < .001$				

Traffic police indicated 18,678 casualties as likely at fault during the crashes, including their age and human error factors. As shown in Table 5.16, there were statistically significant differences among their age groups by the human error factors [$\chi^2 (16) = 549.43, p < .001$]. The 15-29 age group was coded as being involved in more than half of main human error factors, including speed-related, drink driving, failure to give way and dangerous overtaking. Additionally, the 30-44 age group constituted the highest proportion among drink driving factor (29.5%), compared to other human error factors.

Table 5.16: Human errors by age groups among persons that are likely at fault, 2006-2012

Human Errors		Age groups					Total
		0-14	15-29	30-44	45-59	60+	
Speed-related	Count	348	5,764	1,944	790	226	9,072
	%	3.8%	63.5%	21.4%	8.7%	2.5%	100%
	St.Re	2.0	3.9	-3.7	-3.5	-2.9	
Drink driving	Count	12	1,931	977	349	45	3,314
	%	.4%	58.3%	29.5%	10.5%	1.4%	100%
	St.Re	-9.6	-1.5	7.4	1.2	-5.5	
Failure to give way	Count	102	1,256	573	263	105	2,299
	%	4.4%	54.6%	24.9%	11.4%	4.6%	100%
	St.Re	2.6	-3.5	1.6	2.4	4.2	
Dangerous overtaking	Count	18	1,031	302	126	30	1,507
	%	1.2%	68.4%	20.0%	8.4%	2.0%	100%
	St.Re	-4.7	4.0	-2.6	-1.9	-2.3	
Other	Count	163	1,290	557	316	160	2,486
	%	6.6%	51.9%	22.4%	12.7%	6.4%	100%
	St.Re	8.4	-5.4	-.9	4.5	9.8	
Total	Count	643	11,272	4,353	1,844	566	18,678
	%	3.4%	60.3%	23.3%	9.9%	3.0%	100%

$\chi^2 (16) = 549.43, p < .001$

Types of Roads

Similar to road crash causes, information on types of roads has been excluded from the health facility data collection forms since 2009. Therefore, only data reported by traffic police was analysed in this section.

Casualties along national roads are more likely to be killed, compared to other types of roads, as they comprise the highest proportion (17.5%) compared to other type of roads. Rural roads are more likely to have lower risk, as slight injuries contributed more along these roads, compared to other types of roads. The differences are statistically significant [$\chi^2 (6) = 1,065.69, p < .001$], as shown in Table A3.9 in Appendix 3.

The majority of casualties (80%) were injured along the paved roads. As shown in Table A3.10 in Appendix 3, there are statistically significant differences in injury severities by types of road surfaces [$\chi^2 (8) = 286.87, p < .001$]. Although construction sites constituted the lowest number of casualties, the fatality proportion

was the highest along these places compared to other road surface types. Paved roads comprised the second highest proportion of fatalities after the construction sites.

Straight roads accounted for the majority of the casualties (78%). Table A3.11 in Appendix 3 presents casualty numbers by injury severities and road layout types. The differences were statistically significant [$\chi^2(14) = 343.06, p < .001$]. Proportions of fatalities were the highest among casualties who were injured at slopes (21.1%) and bridges (19.3%). Higher proportions of slight injuries were observed at Y-junction, T-junction, X-junction and roundabout, compared to other types of road layout.

Collision Types

Information on collision types was included in the traffic police data collection forms only. So, only police data source was analysed. Among them, almost one-third of casualties (31%) were injured in head on collisions, followed by right-angle collisions (24%). As shown in Table A3.12, Appendix 3, there were statistically significant differences in injury severities by collision types [$\chi^2(10) = 1,285.1, p < .001$]. The proportion of fatalities in hit pedestrian collisions constituted the highest, compared to other collision types. On the other hand, the proportion of slight injuries was the highest among casualties in right-angle collisions (56%). Although overturned/fell alone collisions comprised only 9% of overall casualties, their fatality proportion is the second highest, compared to other collision types.

Traffic police indicated 18,746 casualties as likely at fault during the crashes, including their age and collision types. The differences are statistically significant [$\chi^2(11) = 2,063.08, p < .001$], as shown in Table A3.13, Appendix 3. The 15-29 year old casualties that were coded as likely at fault comprised the highest proportion in all collision types. It is important to note that among 0-14 casualties who were coded as likely at fault accounted for the highest proportion in hit pedestrian collisions and the majority of them (270 out of 278) were pedestrians.

Hit and Run Cases

Hit and run cases were defined in the RCVIS as a case when at least one driver continued driving their vehicle to escape from the crash scene. Only traffic police recorded hit and run cases in their data collection forms. Among all police records,

92% included this hit and run information. Of them, 23% of casualties were injured in hit and run crashes.

As shown in Table 5.17, there were statistically significant differences of hit and run cases by injury severities [$\chi^2 (2) = 2,666.91$, $p < .001$]. The proportion of fatalities in hit and run cases was higher than among non-hit and run cases.

Table 5.17: Number of casualties in hit and run cases by injury severities in police data source

Hit and Run		Injury Severities			Total
		Fatal	Serious	Slight	
Yes	Count	4,053	5,152	5,130	14,335
	%	28.3%	35.9%	35.8%	100%
	St.Re	39.17	0.96	-22.77	
No	Count	5,562	16,954	25,485	48,001
	%	11.6%	35.3%	53.1%	100%
	St.Re	-21.41	-0.52	12.44	
Total	Count	9,615	22,106	30,615	62,336
	%	15%	35%	49%	100%

$$\chi^2 (2) = 2,666.91, p < .001$$

Hit and run cases are more likely among speed-related and dangerous overtaking crashes, as shown in Table 5.18. The differences are statistically significant [$\chi^2 (4) = 340.18$, $p < .001$].

Table 5.18: Number of casualties in hit and run cases by crash causes in the police data

Hit and Run		Cause of crashes					Total
		Speed-related	Failure to give way	Dangerous overtaking	Drink driving	Other	
Yes	Count	7,169	1,527	1,843	1,592	1,711	13,842
	%	51.8%	11.0%	13.3%	11.5%	12.4%	100%
	St.Re	1.68	-4.09	13.13	-8.03	-2.40	
No	Count	23,465	5,863	4,080	6,890	6,191	46,489
	%	50.5%	12.6%	8.8%	14.8%	13.3%	100%
	St.Re	-0.91	2.23	-7.17	4.38	1.31	
Total	Count	30,634	7,390	5,923	8,482	7,902	60,331
	%	51%	12%	10%	14%	13%	100%

$$\chi^2 (4) = 340.18, p < .001$$

Additionally, hit and run cases are more likely to occur along the national roads, compared to other types of roads. They are less likely to happen along the

rural roads. There are statistically significant differences [$\chi^2 (3) = 790.08, p < .001$], as presented in Table 5.19.

Table 5.19: Number of casualties in hit and run cases by type of roads, based on police data

Hit and Run		Type of roads				Total
		National Road	Provincial Road	City Road	Rural Road	
Yes	Count	10,349	978	1,485	1,476	14,288
	%	72.4%	6.8%	10.4%	10.3%	100%
	St.Re	14.34	-12.71	-4.48	-14.82	
No	Count	28,467	5,346	5,718	7,876	47,407
	%	60.0%	11.3%	12.1%	16.6%	100%
	St.Re	-7.87	6.98	2.46	8.14	
Total	Count	38,816	6,324	7,203	9,352	61,695
	%	63%	10%	12%	15%	100%
$\chi^2 (3) = 790.084, p < .001$						

Helmet and Seatbelt Wearing

The data on helmet and seatbelt wearing might be recorded based on the perception of traffic police officers, health staff or self-reported by casualties, or their co-travellers. Only 81% of casualties travelling by motorbikes at the time of crashes were recorded on their helmet wearing and the injury severity in both datasets. Overall, 11% of motorbike controllers and passengers were recorded by the traffic police and health staff as wearing a helmet at the time of crashes. Table 5.20 presents the proportions of their injury severities by helmet wearing. The differences are statistically significant [Police Only: $\chi^2 (2) = 18.66, p < .001$, Health: $\chi^2 (2) = 15.44, p < .001$]. In the police data, the proportion of slight injuries was higher among non-helmet casualties, while health facilities indicated the opposite result. On the other hand, both data sources illustrated proportions of fatalities among helmet wearing casualties slightly lower than among non-helmet wearing ones.

Table 5.20: Number of motorbike controllers and passengers by helmet wearing, 2006-2012

Helmet Wearing		Injury Severities							
		Police Only				Health with/without Police			
		Fatal	Serious	Slight	Total	Fatal	Serious	Slight	Total
Yes	Count	545	1,506	1,980	4,031	68	1,663	4,312	6,043
	%	13.5%	37.4%	49.1%	100.0%	1.1%	27.5%	71.4%	100.0%
	St.Re	-0.5	3.3	-2.4		-3.1	-1.4	1.4	
No	Count	4,729	11,588	17,782	34,099	784	13,080	31,893	45,757
	%	13.9%	34.0%	52.1%	100.0%	1.7%	28.6%	69.7%	100.0%
	St.Re	0.2	-1.1	0.8		1.1	0.5	-0.5	
Total	Count	5,274	13,094	19,762	38,130	852	14,743	36,205	51,800
	%	14%	34%	52%	100%	2%	28%	70%	100%
		$\chi^2 (2) = 18.66, p < .001$				$\chi^2 (2) = 15.44, p < .001$			

It is also interesting to note that both data sources indicate a higher proportion of helmet wearing among motorbike controllers, compared to passengers, as presented in Table 5.21.

Table 5.21: Helmet wearing among motorbike controllers and passengers in both data sources

Helmet Wearing		Police Only			Health with/without Police		
		Motorbike controller	Motorbike Passenger	Total	Motorbike controller	Motorbike Passenger	Total
Yes	Count	3,722	331	4,053	5,213	989	6,202
	%	14.5%	2.6%	10.5%	14.5%	5.8%	11.7%
No	Count	21,976	12,533	34,509	30,768	16,087	46,855
	%	85.5%	97.4%	89.5%	85.5%	94.2%	88.3%
Total	Count	25,698	12,864	38,562	35,981	17,076	53,057
	%	100%	100%	100%	100%	100%	100%
		$\chi^2 (1) = 1,292.97, p < .001$			$\chi^2 (1) = 848.39, p < .001$		

Among 4,785 car/bus/truck drivers, only 47% were recorded on their seatbelt wearing and the severity of injury. As shown in Table 5.22, data from traffic police shows statistically significant differences of their injury severities by seatbelt wearing options [$\chi^2 (2) = 22.63, p < .001$], while the data from health facilities could not be tested, as the number of fatalities is too low. Based on the police data, around 27% of drivers were recorded as buckling their seatbelt at the time of crash. The proportion of seatbelt wearing among fatalities is lower than among non-seatbelt casualties.

Table 5.22: Number of car/bus/truck drivers by seatbelt wearing in both datasets

Seatbelt Wearing		Injury Severities							
		Police Only				Health with/without Police			
		Fatal	Serious	Slight	Total	Fatal	Serious	Slight	Total
Yes	Count	38	126	258	422	2	33	61	96
	%	9.0%	29.9%	61.1%	100.0%	2.1%	34.4%	63.5%	100.0%
	St.Re	-3.5	-0.1	2.0					
No	Count	212	349	592	1,153	22	242	337	601
	%	18.4%	30.3%	51.3%	100.0%	3.7%	40.3%	56.1%	100.0%
	St.Re	2.1	0.1	-1.2					
Total	Count	250	475	850	1,575	24	275	398	697
	%	16%	30%	54%	100%	3%	39%	57%	100%
		$\chi^2 (2) = 22.63, p < .001$							

5.4.5 Transport Modes to Health Facilities

More than half of the data (55%) was recorded on the transport mode to the first health facilities. Among them, 31% were reported as being transported by the health facility transport mode, while the other 69% were not.

Table 5.23 presents the proportions of casualties by severity of injury and transport modes to the first health facilities from both data sources. The differences are statistically significant [Police Only: $\chi^2 (2) = 247.17, p < .001$, Health: $\chi^2 (2) = 5,964.05, p < .001$]. Both data sources show similar patterns. Health facility transports are more likely to be involved in serious cases (fatalities and severe injuries) than slight cases. On the other hand, the police data indicated that around half of the casualties were transported by health transport mode, while hospital data represented only 27%.

Table 5.23: Number of casualties by severity of injuries and transport modes to health facilities, 2006-2012

Transport Modes to Health Facilities		Injury Severities							
		Police Only				Health with/without Police			
		Fatal	Serious	Slight	Total	Fatal	Serious	Slight	Total
Transported by health facilities	Count	523	3,602	1,578	5,703	700	8,898	9,188	18,786
	%	57.7%	57.9%	42.0%	52.4%	58.8%	47.1%	19.0%	27.5%
	St.Re	2.2	6.0	-8.8		20.7	51.4	-35.4	
Along/Family /Private transport	Count	384	2,624	2,179	5,187	490	10,013	39,139	49,642
	%	42.3%	42.1%	58.0%	47.6%	41.2%	52.9%	81.0%	72.5%
	St.Re	-2.3	-6.3	9.2		-12.7	-31.6	21.8	
Total	Count	907	6,226	3,757	10,890	1,190	18,911	48,327	68,428
	%	100%	100%	100%	100%	100%	100%	100%	100%
		$\chi^2 (2) = 247.17, p < .001$				$\chi^2 (2) = 5,964.05, p < .001$			

5.4.6 Long Term Impairments in RCVIS

According to RCVIS, long term impairments refer to injuries that continue for more than three months. As mentioned earlier, the justification of this kind of impairment was made by hospital staff who completed the forms during the first week of hospitalisation. As shown in Table 5.2, most of the data that was recorded by traffic police only did not include information on the hospital discharge. The information on hospital discharge was available mostly in the data collection forms filled by health facilities only. Therefore, the analyses of the long term impairments was based on cases recorded by health (with/without police) facilities only.

Although RCVIS reported a total of 422 casualties who were suspected of having long term impairments from 2006 to 2012, only 416 were recorded by health (with/without police) data. This data of 416 casualties was analysed in this section. The tables and figures in this section relate to those 416 persons with suspected long term impairments, as recorded by hospital facilities. Additionally, there will be some comparisons between long term impairments and fatalities that were recorded by both data sources.

Table 5.24 presents the casualty numbers by road crash years, based on data from health facilities (with/without police). There are statistically significant differences in the discharge results by the years of crashes [$\chi^2 (18) = 391.79, p =$

.054]. The proportion of long term impairments among the records with discharge results varied from year to year, with its highest ones in 2009 and 2010 (1%).

Table 5.24: Number of casualties by discharge results and year of crashes, based on health data source

Year of Crashes	Discharge Result					Unknown	Total
	Died	Long term impairments	Referrals	Full treated	Total		
2006 Count	298	67	1,498	14,041	15,904	1,479	17,397
%	1.90%	0.40%	9.40%	88.30%	100%		
St.Re	-0.5	-2.7	-8.4	3.4			
2007 Count	277	50	1,675	13,381	15,383	1,880	17,291
%	1.80%	0.30%	10.90%	87.00%	100%		
St.Re	-1.1	-4.2	-2.9	1.6			
2008 Count	262	93	1,403	11,288	13,046	2,110	15,159
%	2.00%	0.70%	10.80%	86.50%	100%		
St.Re	0.7	2	-3.1	0.9			
2009 Count	246	102	1,427	8,461	10,236	1,160	11,401
%	2.40%	1.00%	13.90%	82.70%	100%		
St.Re	3.5	5.5	6.7	-3.4			
2010 Count	115	66	791	5,643	6,615	867	7,550
%	1.70%	1.00%	12.00%	85.30%	100%		
St.Re	-1.1	4.4	0.6	-0.4			
2011 Count	114	29	883	4,703	5,729	1,518	7,275
%	2.00%	0.50%	15.40%	82.10%	100%		
St.Re	0.4	-0.8	8.2	-3			
2012 Count	62	9	672	3,771	4,514	2,280	6,812
%	1.40%	0.20%	14.90%	83.50%	100%		
St.Re	-2.7	-3.4	6.3	-1.6			
Total Count	1,374	416	8,349	61,288	71,427	11,294	82,885
%	1.90%	0.60%	11.70%	85.80%	100%		
$\chi^2 (18) = 391.79, p < .001$							

Around 70% of persons with long term impairments are male. The majority (91%) of the persons with long term impairments were injured when they were at the economically active ages (15-59 years old), as shown in the Table 5.25 below. The data was analysed on different age groups by gender and showed that there were not statistically significant differences [$\chi^2 (4) = 9.30, p = .054$].

Table 5.25: Numbers of persons with long term impairments (by gender and age group) from 2006 to 2012

Gender		Age groups					Total
		0-14	15-29	30-44	45-59	60+	
Male	Count	8	168	67	32	12	287
	%	2.8%	58.5%	23.3%	11.1%	4.2%	100%
Female	Count	10	58	26	17	8	119
	%	8.4%	48.7%	21.8%	14.3%	6.7%	100%
Total	Count	18	226	93	49	20	406
	%	4.4%	55.7%	22.9%	12.1%	4.9%	100%
$\chi^2 (4) = 9.30, p = .054$							

The age distributions of Cambodian population, persons killed and with long term impairments differed significantly [$\chi^2 (12) = 3,351.34, p < 0.001$]. Table 5.26 below shows that although the 0-14 age group constitute more than 30% among the country population, they are only 8.6%, 6.7% and 4.4% among fatalities in police data, hospital data and long term impairments respectively. On the other hand, the 15 to 29 age group comprise a lower proportion among the population (33%), compared to fatalities in both data sets and long term impairments.

Table 5.26: Population, numbers of persons with long term impairments and fatalities by age groups, from 2006 to 2012

Items		Age Groups					Total
		0-14	15-29	30-44	45-59	60+	
Population in 2010	Count	4,573,253	4,767,332	2,310,251	1,676,027	1,038,068	14,364,931
	%	31.8%	33.2%	16.1%	11.7%	7.2%	100%
	St.Re	1.3	-0.8	-0.6	-0.2	0.04	
Fatalities Police Data 2006-2012	Count	878	4896	2381	1413	689	10,257
	%	8.6%	47.7%	23.2%	13.8%	6.7%	100%
	St.Re	-41.8	25.5	18.0	6.2	-1.9	
Fatalities Health Data 2006-2012	Count	98	682	314	238	131	1,463
	%	6.7%	46.6%	21.5%	16.3%	9.0%	100%
	St.Re	-17.0	8.9	5.1	5.1	2.5	
Long Term Impairments 2006-2012	Count	18	227	94	50	20	409
	%	4.4%	55.5%	23.0%	12.2%	4.9%	100%
	St.Re	-9.8	7.8	3.5	0.3	-1.8	
$\chi^2 (12) = 3,366.76, p < .001$							

The proportions of gender are analysed to compare among long term impairments and fatalities (in both data sources). There are statistically significant differences in gender by the four categories [$\chi^2 (2) = 30.496, p < .001$]. Although the proportions of males and females are almost equal in the 2010 population (49% vs 51%), males comprise much higher proportions among long term impairments and fatalities (in both data sources). Additionally, the female proportion among long term impairments is higher than among fatalities in both data sources (Table 5.27).

Table 5.27: Numbers of persons with long term impairments and fatalities by gender, from 2006 to 2012

Comparison Items		Gender		Total
		Male	Female	
Fatalities	Count	8,306	2,044	10,350
Police Data	%	80.3%	19.7%	100%
2006-2012	St.Re	45.90	-44.77	
Fatalities	Count	1,130	347	1,477
Health Data	%	76.5%	23.5%	100%
2006-2012	St.Re	15.28	-14.90	
Long Term	Count	292	120	412
Impairments	%	70.9%	29.1%	100%
2006-2012	St.Re	6.43	-6.27	
$\chi^2 (2) = 30.496, p < .001$				

As shown in Table 5.28, almost 70% of persons with long term impairments are students (N=72), workers (N=77) and farmers (N=113). There were statistically significant differences in occupations of fatalities and persons with long term impairments [$\chi^2 (10) = 33.88, p < .001$]. It is interesting to note that students accounted for a higher proportion among long term impairment casualties than fatalities in both data sources.

Table 5.28: Occupations of long term impairments and fatalities

Fatalities / Long term impairments		Occupations						Total
		Child	Student	Worker	Driver	Farmer	Others	
Fatalities - Police Data	Count	281	1,469	1,896	471	3,489	2,234	9,840
	%	2.9%	14.9%	19.3%	4.8%	35.5%	22.7%	100.0%
	St.Re	.2	-.6	.0	.4	1.3	-1.4	
Fatalities - Hospital Data	Count	40	215	255	58	410	372	1350
	%	3.0%	15.9%	18.9%	4.3%	30.4%	27.6%	100.0%
	St.Re	0.3	0.7	-.3	-.7	-2.7	3.2	
Long term impairments	Count	5	72	77	16	113	101	384
	%	1.3%	18.8%	20.1%	4.2%	29.4%	26.3%	100.0%
	St.Re	-1.8	1.8	.4	-.5	-1.7	1.2	
Total	Count	326	1,756	2,228	545	4,012	2,707	11,574
	%	2.8%	15.2%	19.3%	4.7%	34.7%	23.4%	100.0%

$\chi^2 (10) = 33.88, p < .001$

The data indicates that 62% of persons with long term impairments are vehicle controllers, 30% are passengers and 8% are pedestrians (Table 5.29). There are statistically significant differences in the proportions of fatalities and long term impairments by road user types [$\chi^2 (4) = 27.96, p < .001$]. Pedestrians constitute a higher proportion among fatalities (in both data sources), while the proportion of vehicle controllers is higher among long term impairments.

Table 5.29: Numbers of persons with long term impairments and fatalities by road user types, from 2006 to 2012

Comparison Items		Road user type			Total
		Pedestrian	Vehicle Controller	Passenger	
Fatalities - Police Data	Count	1,363	5,949	3,073	10,385
	%	13.1%	57.3%	29.6%	100%
	St.Re	1.4	.1	-1.1	
Fatalities - Hospital Data	Count	139	762	480	1,381
	%	10.1%	55.2%	34.8%	100%
	St.Re	-2.7	-1.0	3.1	
Long term impairments	Count	33	242	116	391
	%	8.4%	61.9%	29.7%	100%
	St.Re	-2.3	1.2	-.2	

$\chi^2 (4) = 27.96, p < .001$

Proportions of fatalities and persons with long term impairments by transport modes are shown in Table 5.30. There are statistically significant differences [χ^2 (10) = 47.39, $p < .001$]. The majority of fatalities and persons with long term impairments were travelling by motorbike at the time of the crash. Additionally, the motorbike proportions among fatalities in both data sources are less than among long term impairments.

Table 5.30: Numbers of persons with long term impairments and fatalities by modes of transport, from 2006 to 2012

Comparison Items		Transport modes						Total
		Motorbike	Bicycle	Passenger vehicle	Goods vehicle	Agricultural vehicle	Pedestrian	
Fatalities - Police Data	Count	6,827	421	863	546	241	1,365	10,263
	%	66.5%	4.1%	8.4%	5.3%	2.3%	13.3%	100.0%
	St.Re	-1.3	.2	1.1	.5	.1	1.6	
Fatalities - Hospital Data	Count	1,029	55	99	70	34	139	1,426
	%	72.2%	3.9%	6.9%	4.9%	2.4%	9.7%	100.0%
	St.Re	2.1	-.4	-1.5	-.5	.1	-3.2	
Long term impairments	Count	312	14	16	13	7	34	396
	%	78.8%	3.5%	4.0%	3.3%	1.8%	8.6%	100.0%
	St.Re	2.7	-.5	-2.8	-1.7	-.7	-2.3	

χ^2 (10) = 47.39, $p < .001$

Table 5.31 below indicates the proportions of fatalities and persons with long term impairments by the type of vehicle which collided with them (collision counterpart). The differences are statistically significant [χ^2 (8) = 253.95, $p < .001$]. More than half of the fatalities (53% in police data and 41% in hospital data) were hit by passenger and goods vehicles (such as cars, buses, trucks, vans). The proportion of casualties who were hit by motorbikes was the highest among long term impairments, compared to fatalities.

Table 5.31: Numbers of persons with long term impairments and fatalities by counterpart transport, from 2006 to 2012

Comparison Items		Counterparts					Total
		Motorbike	Passenger vehicle	Goods vehicle	Fell alone	Other	
Fatalities -	Count	2,373	2,925	2,532	1,273	1,233	10,336
Police Data	%	23.0%	28.3%	24.5%	12.3%	11.9%	100.0%
	St.Re	-4.0	1.1	3.3	-1.6	1.1	
Fatalities -	Count	474	349	198	210	115	1,346
Hospital Data	%	35.2%	25.9%	14.7%	15.6%	8.5%	100.0%
	St.Re	7.6	-1.2	-6.3	2.8	-3.3	
Long term	Count	154	62	29	66	43	354
impairments	%	43.5%	17.5%	8.2%	18.6%	12.1%	100.0%
	St.Re	7.0	-3.6	-5.8	3.0	.3	
$\chi^2 (8) = 253.95, p < .001$							

In terms of injury types, 42% of the injured persons with long term impairments had concussion/neck injuries (Table A3.14, Appendix 3). Around 85% of them were motorbike riders (either passengers or drivers). As shown in Table A3.14, more than 40% of persons with long term impairments sustained fractures. Importantly, around 35% of them sustained movement difficulties.

Only 35% of the records in RCVIS dataset provided information on the type of long term impairments. As shown in Table A3.15 in Appendix 3, 68% of them had movement difficulties, followed by learning difficulty.

Among persons with moving difficulty, 60% had fractures and 28% had concussion/neck injuries. Importantly, all of those injured persons who sustained learning difficulty had concussion/neck injury and were not wearing a helmet at the time of crashes.

Phnom Penh, Kandal, Siem Reap and Kampong Cham constituted the majority of crash locations (25%, 14%, 9% and 8% respectively) among persons with long term impairments. Around 80% (342 out of 416) of the records for persons with long term impairments provide valid information on the method of transportation to health facilities, which provided transport services to 42% of the persons with long term impairments due to road crashes. The remainder travelled by other means, such as private transportation.

5.4.7 Multinomial Logit Model

As explained in the previous section, the analysis of long term impairment data was based on only the dataset from the “health facilities” (Health, with/without traffic police) because the data recorded by “traffic police only” almost never coded the long term impairments. This hospital dataset was used for the estimation of the MLM and RRR. Table 5.32 summarises the numbers of casualties by injury severity level coded at hospital discharge. They comprise the discrete injury severity categories and the dependent variables in the MLM analysis.

Table 5.32: Summary of injury severities at the hospital discharge, based on the health dataset

Injury Severity	Frequency	Percent
Fatalities	1,374	2%
Long Term Impairments	416	1%
Transferred	8,349	10%
Fully Treated	61,288	74%
Unknown	11,458	14%
Total	82,885	100%

The “unknown” category was excluded from the MLM analysis because it did not contain sufficient information to explain characteristics of the data in this group. In the analysis, “Fully Treated” was used as the reference level for the dependent variables (“long term impairment”, “fatality” and “being transferred”). Table A3.16, Appendix 3, presents the summary of descriptive statistics of risk factors in the MLM.

The results of the MLM analyses are summarised in Table 5.33. Only the results that are significant for at least one injury severity (long term impairment, fatality or being transferred) are included. The grey cells indicate non-significant results in one or more injury categories for that risk factor. The full results are presented in Table A3.17, Appendix 3.

Since “fully treated” was used as the reference level, the results of the MLM analysis for the long term impairments are described here relative to the “fully treated”. Higher proportions of long term impairments were observed in the early years than in 2012 (with the exception of 2007). The proportions of long term impairments in 2009 and 2010 were five times higher than 2012. Children (0-14) were one-third less likely to sustain long term impairments than the 15-29 age group.

Additionally, there is a higher proportion (almost eight times) of long term impairments among pedestrians than motorbike riders. Those who were hit by passenger and goods vehicles or hit stationary objects constituted higher proportions (1.5, 2.4 and 2.2 times respectively) than being hit by motorbikes among long term impairments relative to fully treated. Moreover, the proportion of long term impairments among persons who were transported by ambulance to hospitals was twice that by other modes of transport relative to fully treated. Therefore, the risk factors that were associated with long term impairments included being pedestrians, being hit by passenger and goods vehicles or hitting a stationary object, while children (0-14) were less likely to sustain long term impairments than other age groups relative to being fully treated.

It is interesting to note the similar patterns of findings for long term impairments to fatalities and being transferred, although half of the risk factors that were significant among fatal and transferred data were not so for long term impairments, as shown in Table 5.33. The numbers for long term impairments were much smaller than for other injury outcomes. The low number of the long term impairments might lead to lack of statistical power and that some risk factors were not significant for the long term impairments. These might not represent the insignificant effects of the risk factors on this injury category, but rather illustrated the need for more and better data on long term impairments.

Compared to those injured in 2012, casualties who were injured before 2012 were more likely to sustain long term impairments or die relative to fully treated by a health facility but not be transferred. Notably, crashes in 2009 and 2010 were five times more likely to sustain long term impairments, compared to 2012. The different effects of years, especially among long term impairments, might reflect the lower quality of the data collection in 2012 among the health facilities in identifying those long term impairments, as described in Section 5.3: The RCVIS Description and Section 5.4.1: 2006-2012 Trends and Severities.

Table 5.33: Selected Results of MLM

Risk Factors	Long Term Impairments			Fatalities			Transferred (to other hospitals)		
	Coef.	Sig.	RRR	Coef.	Sig.	RRR	Coef.	Sig.	RRR
Intercept	-6.633	0.000		-5.47	0.000		-1.924	0.000	
Crashes in 2006 vs 2012	0.744	0.038	2.104 (1.04, 4.25)	0.284	0.052	1.328 (0.99, 1.17)	-0.571	0.000	0.565 (0.51, 0.62)
Crashes in 2007 vs 2012	0.615	0.093	1.850 (0.90, 3.79)	0.363	0.013	1.438 (1.08, 1.91)	-0.414	0.000	0.661 (0.59, 0.73)
Crashes in 2008 vs 2012	1.377	0.000	3.964 (1.98, 7.92)	0.474	0.001	1.607 (1.20, 2.14)	-0.428	0.000	0.652 (0.58, 0.72)
Crashes in 2009 vs 2012	1.723	0.000	5.605 (2.81, 11.16)	0.664	0.000	1.944 (1.45, 2.59)	-0.129	0.014	0.879 (0.79, 0.97)
Crashes in 2010 vs 2012	1.633	0.000	5.123 (2.54, 10.33)	0.307	0.058	1.36 (0.99, 1.86)	-0.293	0.000	0.746 (0.66, 0.83)
Crashes in 2011 vs 2012	0.913	0.017	2.492 (1.17, 5.28)	0.349	0.031	1.419 (1.03, 1.94)	0.004	0.946	1.004 (0.89, 1.12)
Weekend vs Weekday	-0.139	0.195	0.870 (0.70, 1.07)	0.165	0.004	1.18 (1.05, 1.32)	-0.014	0.574	0.986 (0.93, 1.03)
Female vs Male	0.077	0.502	1.080 (0.86, 1.35)	-0.34	0.000	0.709 (0.62, 0.81)	-0.06	0.031	0.942 (0.89, 0.99)
0-14 vs 15-29	-1.234	0.000	0.290 (0.17, 0.48)	-0.43	0.000	0.647 (0.50, 0.82)	-0.359	0.000	0.698 (0.63, 0.76)
30-44 vs 15-29	0.027	0.830	1.027 (0.80, 1.30)	0.143	0.047	1.154 (1.00, 1.33)	0.072	0.017	1.074 (0.01, 1.13)
45-59 vs 15-29	0.027	0.867	1.027 (0.75, 1.40)	0.539	0.000	1.715 (1.46, 2.01)	0.150	0.000	1.162 (0.07, 1.25)
60+ vs 15-29	0.200	0.404	1.221 (0.76, 1.95)	1.019	0.000	2.772 (2.24, 3.42)	0.366	0.000	1.443 (0.28, 1.61)
Passenger vehicle vs Motorbike	-0.156	0.562	0.856 (0.50, 1.44)	0.182	0.127	1.200 (0.94, 1.51)	0.443	0.000	1.557 (0.39, 1.73)
Goods vehicle vs Motorbike	0.360	0.231	1.433 (0.79, 2.58)	0.598	0.000	1.820 (1.37, 2.40)	0.526	0.000	1.692 (0.47, 1.94)
Agricultural vehicle vs Motorbike	0.342	0.386	1.407 (0.65, 3.04)	0.808	0.000	2.245 (1.54, 3.27)	0.470	0.000	1.601 (0.33, 1.92)
Pedestrian vs Motorbike	2.042	0.045	7.710 (1.04, 56.87)	0.097	0.919	1.102 (0.17, 7.06)	0.749	0.036	2.115 (0.05, 4.26)
Pedestrian vs Driver	-1.505	0.147	0.222 (0.02, 1.69)	0.633	0.505	1.884 (0.29, 12.10)	-0.703	0.050	0.495 (0.24, 1.00)
Counterpart passenger vehicle vs Counterpart motorbike	0.423	0.006	1.527 (1.13, 2.06)	0.964	0.000	2.623 (2.25, 3.04)	0.145	0.000	1.156 (0.07, 1.24)
Counterpart goods vehicle vs Counterpart motorbike	0.880	0.000	2.411 (1.59, 3.63)	1.519	0.000	4.566 (3.78, 5.51)	0.459	0.000	1.583 (0.42, 1.75)
Hit stationary vs Counterpart motorbike	0.811	0.006	2.251 (1.26, 4.01)	0.755	0.000	2.127 (1.48, 3.04)	0.311	0.000	1.364 (0.17, 1.59)
Hit animal vs Counterpart motorbike	0.296	0.311	1.344 (0.75, 2.38)	-0.7	0.014	0.498 (0.28, 0.86)	-0.186	0.012	0.830 (0.71, 0.96)
Single vehicle crash vs Counterpart motorbike	0.157	0.311	1.170 (0.86, 1.58)	0.219	0.017	1.245 (1.03, 1.49)	-0.039	0.263	0.962 (0.89, 1.03)
Transport to Hospitals by Ambulance vs Others	0.727	0.000	2.070 (1.65, 2.58)	1.346	0.000	3.843 (3.39, 4.35)	0.648	0.000	1.912 (0.81, 2.01)

Note: The grey cells indicate non-significant results
Numbers in brackets are lower and upper bounds of RRR

Although a result related to day of crash was significant for the fatality category, it was not significant for long term impairments and being transferred (casualties who were injured during the weekend were more likely to die but not sustain long term impairments or be transferred relative to being fully treated). Additionally, in term of gender and age groups, most of the results were not significant for long term impairment dependent variable, but for the other categories. This might be due to a smaller number of long term impairments. The results indicated that females were more likely to be fully treated relative to males who were more likely to die or be transferred to other health facilities. It is interesting to note that children were more likely to be fully treated, while older age groups (30-44, 45-59 and 60+) were more likely to die or be transferred, compared to 15-29 group, relative to being fully treated. The lower severity among children might represent the lower risk taking by vehicle drivers when they had children on board, such as less speeding or less alcohol consumption. On the other hand, the elderly group (60+ years old) had almost three times higher risk of being killed and 1.5 times of being transferred to other hospitals than other age groups. Although their absolute number was much lower than the reference group, 15-29 years old, they presented more severe cases in terms of injuries.

Moreover, transport modes of casualties and their counterpart drivers also influenced the injury severities. Although most of the risk factors related to transport modes were not significant among the long term impairment variable, they were among the fatality and being transferred categories. Casualties who were travelling by a passenger vehicle, goods vehicle or agricultural vehicle were more likely to die or be transferred than those travelling by motorbikes, relative to being fully treated. Particularly, drivers and passengers on goods vehicles and agricultural vehicles were around twice more likely to die than motorbike riders. Additionally, compared to those travelling by motorbikes, pedestrians were almost eight times more likely to sustain long time impairments and twice more likely to be transferred than to be fully treated.

It is also important to note that casualties who were hit by passenger vehicles, goods vehicles or hit a stationary object were more likely to have long term impairments, die or be transferred than those hit by a motorbike. On the other hand, those involved in collisions with animals were more likely to be fully treated. In

addition, for fatalities compared to fully treated, the crashes were more likely to be single vehicle than to hit a motorbike. This pattern was not found for the long term impairments or transferred category.

It is also important to note the association between transport mode to hospital and severity of injuries. The model indicated that casualties with long term impairments, fatalities or transfer were more likely to be transported by ambulance relative to fully treated.

5.5 DISABILITY DATA SOURCES IN CAMBODIA

The detail of the disability data sources is presented in Appendix 8. Among those sources, the PRC dataset has been identified as the most relevant source for this research study. Hasan (2014) concluded that Physical Rehabilitation Centre (PRC) databases provide more comprehensive information on persons with long term impairments, including causes. They are the only available databases that include information on road crashes. It is therefore decided that these PRC databases are useful for this PhD study.

The PRCs are located in nine provincial towns and the capital city. Although the databases are based in their centres in those 10 out of 24 provincial towns and in the capital city, the coverage areas of the services extend throughout the country. The databases in those PRCs include only those clients who visited their centres to access physical rehabilitation services. Persons with disabilities who have never accessed the services are not included in the PRC databases.

The PRC dataset recorded 97,650 clients from 1986 to 2011. Figure 5.1 shows that a quarter of the records (24%) did not include information on the causes of their impairments. Almost half of all clients (42%) had long term impairments due to injuries, while others had impairments due to diseases. Among those who were injured, 1,890 clients had injuries due to road crashes and the other 35,149 clients were injured in Mine/UXO accidents.

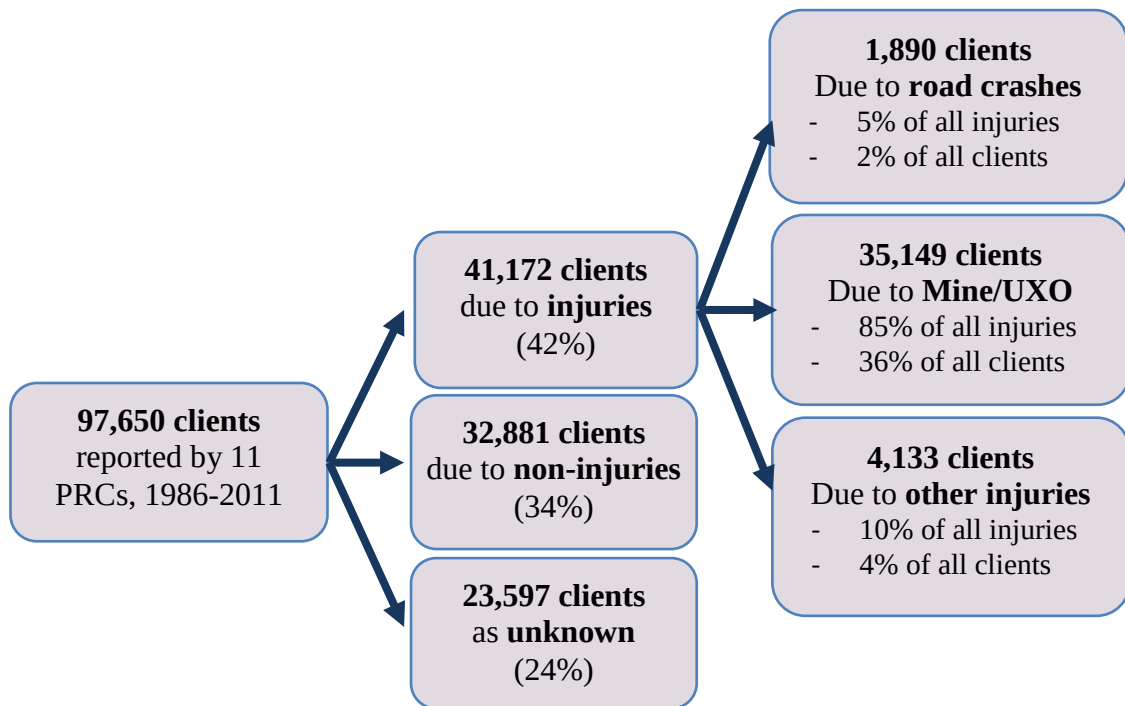


Figure 5.1: Summary of PRC dataset from 1986 to 2011

The PRC database helped to detect physical long term impairments with details of personal information of patients that could be disaggregated. Through an analysis, estimates of the magnitude due to long term impairments could be generated. The data also provided trends of those long term impairments since 1990 to the present as they are an ongoing registration system in each PRC. Within its details on types of long term impairments, causes, demography of patients, detailed comparisons could be analysed from the system, in addition to a longitude analysis. Additionally, the data gives an opportunity for further research on many other types of long term impairments and causes, not only limited to a study on road traffic injuries, which is included in the following section.

On the other hand, as its limitation, the PRC databases provide estimates of the magnitude, but lack contextual information. The PRC dataset provides a good overview of the physical description of persons with disabilities. However, information on social barriers or challenges is not included in the system. So, the data describe the long term impairments of their patients, but not the disability. Additionally, only physical impairments were included into the databases, because of the physical services provided by the PRCs. This also means persons with other types of disabilities than the physical ones did not come to the centres for their

services and hence were not included into the system. Additionally, the availability and coding of the variables differ among the PRCs. For example, only 45% of PRCs reported when their clients' impairments occurred (years of onset).

The time between having an incident (led to long term impairments) and registration into the PRC (time to receive a PRC service) was assessed. The findings revealed an issue of delays in receiving the PRC services. Reasons for the delays could not be generated from the data system. Only 45% of all PRC data included information on years of having long term impairments. So, only this 45% of the data was assessed. The findings included:

- 12.5% of patients accessed the PRC service in the same year of having injuries/diseases that led to long term impairments
- 9.5% accessed the PRC services one year after having injuries/diseases
- 5.4% accessed the services two years later
- 56.7% accessed after five years of having injuries/diseases

5.6 LONG TERM IMPAIRMENTS IN THE PRC DATABASE

5.6.1 Overview of the PRC Dataset

The PRC data consists of 97,650 records of clients that were registered in those 11 PRCs from 1991 to 2011 (with very few records in 1986 and 1990). This figure represented the prevalence rate of 0.7% of the overall Cambodian population in 2011 (National Institute of Statistics, 2008).

The numbers of client registrations increased from 1991 and dropped in 2004. During the last five years (2008 to 2011), the registration numbers continued to decrease. It is interesting to note that 43% of all clients attended treatment in provinces other than where they lived. Additionally, among clients living in all 11 PRC provinces, 20% attended treatment in other provinces.

Occupations of clients at the time of registration in all PRCs from 1986 to 2011 are presented in Table A3.20 in Appendix 3. Farmers/fishermen account for the highest proportion (30.5%), followed by children and students (16.4%). The proportion of clients who were unemployed (12.6%) was greater than the national unemployment rate (2.5%) (National Institute of Statistics, 2013).

As shown in Table A3.21, Appendix 3, Mine/UXO accidents account for 36% of causes of long term impairments, while 2% were due to road crashes. The majority of clients in the PRCs are male (72%). The differences of the impairment causes by gender are statistically significant [$\chi^2(14) = 9467.797$, $p < .001$]. Almost half of the males (45%) were injured by Mine/UXO, while higher proportions of congenital (11%) and infectious (8%) are found among females.

Only 42% of all data in the 11 PRCs have information on years of injuries (from 1980 to 2011) and causes of impairments. Table 5.34 summarises the main causes of long term impairments of clients, who were injured in 1980 to 2011. Based on this available information, road crashes constitute 3% of impairment causes from 1980 to 2011, but 15% during the latest period of the data set (2007 to 2011). Similarly, congenital disease accounts for 8% over the 32 years, but 30% during the last five years. On the other hand, Mine/UXO accidents apparently decrease during the last five years (68% of all years, but only 8% during the last five years).

Table 5.34: Causes of long term impairments of clients in the PRCs

Year of having injuries	Road crash	Mine/UXO	Gun shot	Other Accidents	Congenital	Illness	Others	Total
Total	1,154	27,683	544	1,942	3,311	4,982	1,889	41,505
1980 -2011	3%	67%	1%	5%	8%	12%	5%	100%
Total	365	186	4	300	699	612	229	2,395
2007-2011	15%	8%	0%	13%	29%	26%	10%	100%

5.6.2 Long Term Impairments due to Road Crashes in the PRC Dataset

In this section, only PRC clients due to road crashes are described. The 11 PRCs reported 1,890 clients with impairments due to road crashes (1.9% of all clients). As shown in Table 5.35, the number of clients in Phnom Penh PRC is the highest compared to the others, followed by Kien Khleang. The PRCs in Prey Veng and Kratie recorded very limited numbers of clients due to road crashes. Additionally, clients due to road crashes in Phnom Penh, Sihanouk Ville and Kampong Chhnang PRCs constituted higher percentages among all clients, compared to others PRCs (4.9%, 4.4% and 4.2% respectively).

Table 5.35: Numbers of clients due to road crashes in the 11 PRCs

Name of PRCs	Number of clients due to road crashes	Percentage among clients due to road crashes	Percentage of clients due to road crashes among all clients in the PRCs
Battambang	189	10.0%	1.0%
Kampong Cham	163	8.6%	3.1%
Kampong Chhnang	173	9.2%	4.2%
Kampong Speu	139	7.4%	0.8%
Kien Khleang	215	11.4%	1.2%
Kratie	10	0.5%	0.4%
Phnom Penh	388	20.5%	4.9%
Prey Veng	41	2.2%	0.7%
Siem Reap	192	10.2%	2.7%
Sihanouk Ville	185	9.8%	4.4%
Takeo	195	10.3%	3.3%
Total	1,890	100%	1.9%

Around 72% of clients in PRCs due to road crashes are male. Table 5.36 shows the proportions of males and females in the PRC dataset due to Mine/UXO, road crashes and other causes. The differences of the proportions among these three groups by gender are statistically significant [$\chi^2(2) = 8,374.291$, $p < .001$]. The National Institute of Statistics (2013) provided disaggregated data for persons with long term impairments by gender and living areas (rural/urban). This national data indicates that 52% of the persons with long term impairments are male (National Institute of Statistics, 2013). This might show the over-represented proportion of males among PRC clients, especially those due to Mine/UXO (89%) and road crashes.

Table 5.36: Numbers of physical impairments in the population and PRC dataset, by gender

Number of person with long term impairments		Gender		Total
		Male	Female	
Due to Road Crashes only	Count	1,368	522	1,890
	%	72.4%	27.6%	100%
	St.Re	0.3	-0.5	
Due to Mine/UXO	Count	31,373	3,776	35,149
	%	89.3%	10.7%	100%
	St.Re	38.6	-61.6	
Excluded Mine/UXO and Road Crashes	Count	37,366	23,245	60,611
	%	61.6%	38.4%	100%
	St.Re	-29.5	47.0	
$\chi^2 (2) = 8,374.291, p < .001$				

Only 61% of the data included information on ages of clients at the time of road crashes. Almost 85% of the road crash clients sustained long term injuries when they were 15 to 59 years old (Table 5.37). There are statistically significant differences of the age groups by gender [$\chi^2 (4) = 26.0, p < .001$]. Male clients aged 15-29 years old account for the highest proportion. There are relatively more females than males aged 0-14 years.

Table 5.37: Numbers of clients due to road crashes by gender and age group in the 11 PRCs

Gender		Age Groups					Total
		0-14	15-29	30-44	45-59	60+	
Male	Count	88	444	217	96	31	876
	%	10.0%	50.7%	24.8%	11.0%	3.5%	100%
	St.Re	-1.4	1.6	-.1	-1.1	-.9	
Female	Count	46	99	71	45	17	278
	%	16.5%	35.6%	25.5%	16.2%	6.1%	100%
	St.Re	2.4	-2.8	.2	1.9	1.6	
Total	Count	134	543	288	141	48	1,154
	%	11.6%	47.1%	25.0%	12.2%	4.2%	100%
$\chi^2 (4) = 26.0, p < .001$							

Additionally, Table 5.38 presents the numbers of clients in PRC due to Mine/UXO, road crashes and other causes by age groups. The differences of the proportions of these three categories by age groups are statistically significant [$\chi^2 (8)$

= 16,742.577, $p < .001$]. The 15-44 years old groups constitute much higher proportions among the clients due to Mine/UXO and road crashes than other causes, which consist of the highest proportion among children, aged 0-14 years old.

Table 5.38: Numbers of clients in PRCs by causes and age group

Number of person with long term impairments		Age Groups					Total
		0-14	15-29	30-44	45-59	60+	
Due to Road Crashes only	Count	134	543	288	141	48	1,154
	%	11.6%	47.1%	25.0%	12.2%	4.2%	100%
	St.Re	-7.2	-1.6	2.7	11.2	5.6	
Due to Mine/UXO	Count	1,177	18,124	7,271	999	112	27,683
	%	4.3%	65.5%	26.3%	3.6%	.4%	100%
	St.Re	-61.8	35.3	17.7	-9.7	-18.0	
Excluded Mine/UXO and Road Crashes	Count	8,146	3,547	1,844	1,017	674	15,228
	%	53.5%	23.3%	12.1%	6.7%	4.4%	100%
	St.Re	85.3	-47.1	-24.7	9.9	22.7	
Total		9,457	22,214	9,403	2,157	834	44,065
		21.5%	50.4%	21.3%	4.9%	1.9%	100%

$\chi^2 (8) = 16,742.577, p < .001$

Around 60% of the data related to road crashes included year injury (onset). By comparing the years of onset and registration, the time between onset and accessing the PRC services could be examined. As shown in Table 5.39, almost half of the road crash clients accessed the PRC services in the same year as their crash, while 27% came to the PRC about one year after their crash. More than a quarter of road crash clients did not receive PRC services until at least two years after their crash. Almost half of the male clients went to the PRCs for rehabilitation services at the same year of onset, compared to only 37% among females.

Table 5.39: Numbers of road crash clients by gender and time between years of onset and PRC registrations

Gender		Time between Year of Onset and Year of PRC Registration						Total
		Same year	1 year later	2 years later	3-5 years later	6-10 years later	Longer than 10 years	
Male	Count	427	220	39	75	40	71	872
	%	49.0%	25.2%	4.5%	8.6%	4.6%	8.1%	100%
	St.Re	1.3	-.8	-.2	-.4	-.7	-.4	
Female	Count	102	85	14	29	19	27	276
	%	37.0%	30.8%	5.1%	10.5%	6.9%	9.8%	100%
	St.Re	-2.2	1.4	.4	.8	1.3	.7	
Total	Count	529	305	53	104	59	98	1,148
	%	46.1%	26.6%	4.6%	9.1%	5.1%	8.5%	100%

$\chi^2 (5) = 12.82, p = .025$

Table 5.40 presents the number of clients in PRCs by type of long term impairments and causes. Others include various kind of long term impairments such as Tuberculosis, Spinal bifida, Scoliosis, Osteoporosis, Osteomyelitis, Muscular dystrophy, Kyphosis, Epilepsy, Contracture, Bone problems, Arthritis, Ageing. Some of them, including cerebral palsy and clubfoot, are not relevant types of impairments that are due to road crashes. So, either “road crashes” were not properly selected as a cause of the impairments, or the types of impairments were not correctly recorded. At the same time, other types of long term impairments might not be captured in the PRC dataset, as they might be out of the coverage services of the PRCs. Further information on those types of services is presented in Section 4.5.3: Physical Rehabilitation Centres. There are statistically significant differences by the type of long term impairments and causes (road crash, Mine/UXO and others) [$\chi^2 (12) = 68,589.958, p < .001$]. The majority (99%) of clients due to Mine/UXO had amputation, compared to 54% among road crash clients and 11% of other causes. Additionally, fracture due to road crashes constitutes the highest proportion, compared to other causes.

Table 5.40: Type of long term impairments in the 11 PRCs

Number of person with long term impairments		Type of long term impairments							Total
		Amputation	Cerebral Palsy	Clubfoot	Fracture	Para/Tetraplegia	Poliomyelitis	Others	
Due to Road Crashes only	Count	991	7	7	486	74	3	272	1,840
	%	53.9%	0.4%	0.4%	26.4%	4.0%	0.2%	14.8%	100%
	St.Re	6.5	-12.3	-8.1	38.6	1.9	-13.4	-8.3	
Due to Mine/UXO	Count	33,306	4	6	145	79	48	176	33,764
	%	98.6%	.0%	.0%	0.4%	0.2%	0.1%	0.5%	100%
	St.Re	152.4	-54.8	-38.0	-39.5	-30.6	-57.5	-88.6	
Excluded Mine/UXO and Road Crashes	Count	6,041	8,194	3,957	4,385	2,825	9,247	21,920	56,569
	%	10.7%	14.5%	7.0%	7.8%	5.0%	16.3%	38.7%	100%
	St.Re	-118.9	44.5	30.8	23.5	23.3	46.9	69.9	
Total		40,338	8,205	3,970	5,016	2,978	9,298	22,368	92,173
		43.8%	8.9%	4.3%	5.4%	3.2%	10.1%	24.3%	100%

$\chi^2 (12) = 68,589.958, p < .001$

Only 71% of the data in the PRC dataset recorded current occupation of the clients. Table 5.41 presents the numbers of the clients due to road crashes, Mine/UXO and other causes by the current occupation. There are statistically significant differences in occupation of these three groups [$\chi^2 (16) = 19,837.822, p < .001$]. The proportions of unemployment are higher among clients due to road crashes (20%) and other causes (24%), compared to among Mine/UXO clients, whose proportions are large for farmer/fisherman (70%) and technician/professional (14%).

Table 5.41: Occupation of clients due to road crashes in the 11 PRCs

Number of person with long term impairments		Current Occupation									Total
		Child	Child/Student	Student	Unemployed	Farmer/Fisherman	Technician/Professional	Small business	Worker	Others	
Due to Road Crashes only	Count	17	20	180	258	462	74	29	105	116	1,261
	%	1.3%	1.6%	14.3%	20.5%	36.6%	5.9%	2.3%	8.3%	9.2%	100%
	St.Re	-8.3	-4.1	3.0	2.3	-3.4	-1.3	3.6	9.5	7.4	
Due to Mine/UXO	Count	10	6	222	1,424	16,457	3,357	399	888	811	23,574
	%	.0%	.0%	.9%	6.0%	69.8%	14.2%	1.7%	3.8%	3.4%	100%
	St.Re	-42.9	-29.8	-47.7	-42.6	62.8	43.4	7.0	3.2	-8.9	
Excluded Mine/UXO and Road Crashes	Count	5,437	2,617	7,524	10,597	12,851	1,308	401	1,350	2,329	44,414
	%	12.2%	5.9%	16.9%	23.9%	28.9%	2.9%	.9%	3.0%	5.2%	100%
	St.Re	32.6	22.4	34.2	30.7	-45.2	-31.4	-5.7	-3.9	5.3	
Total		5,464	2,643	7,926	12,279	29,770	4,739	829	2,343	3,256	69,249
		7.9%	3.8%	11.4%	17.7%	43.0%	6.8%	1.2%	3.4%	4.7%	100%

$\chi^2 (16) = 19,837.822, p < .001$

Table A3.24 in Appendix 3 compares where the clients lived (at the time of registration) and where they were injured. There are statistically significant

differences in numbers of clients in the provinces, based on their provincial address and the provinces of having injuries [$\chi^2 (17) = 197.179, p < .001$]. Almost a quarter of clients (23%) were injured in Phnom Penh, but only 16% live in Phnom Penh. Banteay Meanchey and Battambang also have a larger proportion of clients, based on their injury locations (7%, 10%), compared to their provincial address (3%, 5%). This shows that clients are more likely to be injured in these two provinces and Phnom Penh, but they live somewhere else.

The province where the injury occurred was recorded for only 696 out of 1,890 clients (37%). As shown in Table A3.22 (Appendix 3), there are only three PRCs (Battambang, Kratie and Prey Veng) where the province where injury occurred is recorded. Clients who were injured in Banteay Meanchey, Battambang and Pursat mostly went to the PRC in Battambang for the rehabilitation services, while those who were injured in Kandal and Phnom Penh mostly went to Kien Khleang and Phnom Penh PRCs.

Only 62% of the data in PRC recorded living areas of the PRC clients. As shown in Table 5.42, there are statistically significant differences of clients due to road crashes, Mine/UXO and other causes [$\chi^2 (2) = 1,484.584, p < .001$]. Persons with long term impairments in the PRC datasets mostly came from rural areas. Especially, the highest rural proportion is among PRC clients due to Mine/UXO. Compared to the overall population, the National Institute of Statistics (2013) indicates that 86% of the persons with long term impairments in the country live in rural areas, though the definition of rural and urban might be different in the PRC dataset and the national survey conducted by National Institute of Statistics (2013).

Table 5.42: Numbers of long term impairments in the population and PRC datasets by living areas

Number of persons with long term impairments		Living areas		Total
		Urban	Rural	
Due to Road Crashes only	Count	105	734	839
	%	12.5%	87.5%	100%
	St.Re	3.1	-1.0	
Due to Mine/UXO	Count	533	19,114	19,647
	%	2.7%	97.3%	100%
	St.Re	-30.1	9.6	
Excluded Mine/UXO and Road Crashes	Count	4,915	34,668	39,583
	%	12.4%	87.6%	100%
	St.Re	20.8	-6.6	
$\chi^2 (2) = 1,484.584, p < .001$				

5.7 COMPARISON OF LONG TERM IMPAIRMENTS DUE TO ROAD CRASHES IN THE RCVIS AND PRC DATASETS

As shown in the previous sections, RCVIS and PRC databases recorded information on persons with long term impairments due to road crashes. Although the RCVIS provided information at the time of crashes and in hospitals, and PRC indicated context after the discharge, both databases included information on years of onset, occupation, gender and age of persons with long term impairments. This information could be compared to identify the difference and similarity of contexts of persons with long term impairments in both databases at the time of onset and accessing the physical rehabilitation services.

Numbers of clients with long term injuries due to road crashes, based on PRC and RCVIS datasets, by year of injury are presented in Figure 5.2. Two-thirds of clients due to road crashes were injured in 2003-2011 in PRC dataset. Both datasets show a reduction in 2010 and 2011. The reductions of numbers of road crash clients in the PRC dataset also occurred for other causes of long term impairments (such as Mine/UXO, gunshot, illness, congenital disease), as shown in Table A3.19 (Appendix 3). So the potential exists that resource constraints may have led to poorer data quality and completeness in the last two years.

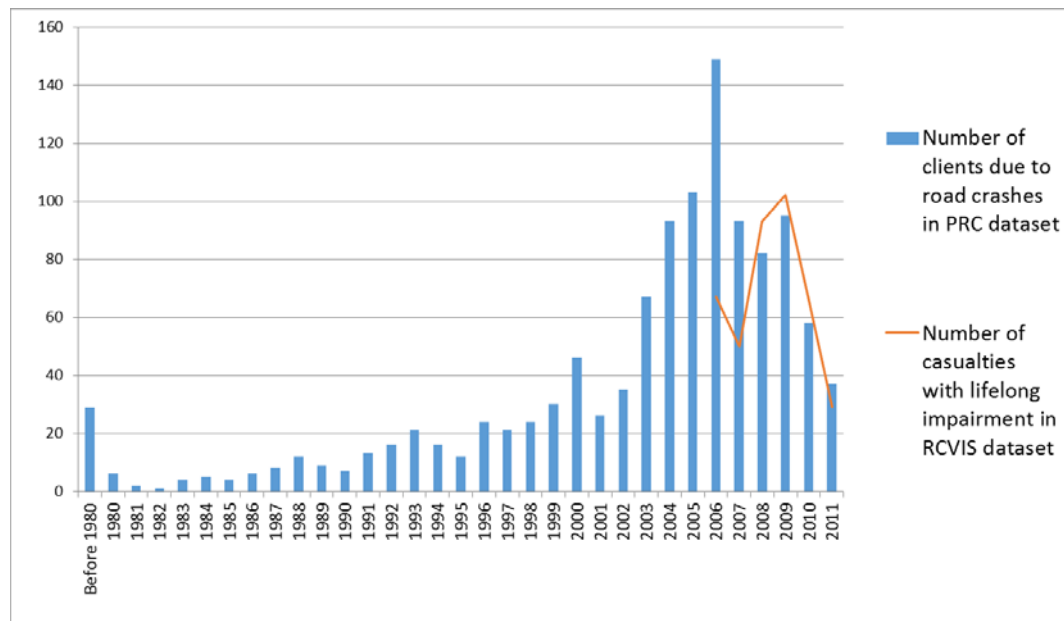


Figure 5.2: Numbers of clients due to road crashes in PRC and RCVIS datasets

Table 5.43 summarises the number of long term impairments due to road crashes in both RCVIS and PRC datasets from 2006 to 2011. The two datasets differ in both their absolute numbers and trends. Both datasets are statistically significant differences by years of onset [$\chi^2(5) = 30.51, p < .001$]. The difference in each year led to the total differences of 51 records from 2006 to 2011 (PRC data reported 558 clients, while RCVIS reported only 407 during the same years). Examination of the standardised residuals showed that the number of persons with long term impairments in RCVIS increased in 2008, while PRC dataset showed a decrease.

Table 5.43: Numbers of persons with long term impairments recoded by RCVIS and PRC, from 2006-2011

Datasets		Years of Onset						Total
		2006	2007	2008	2009	2010	2011	
RCVIS	Count	67	50	93	102	66	29	407
	%	16.5%	12.3%	22.9%	25.1%	16.2%	7.1%	100%
	St.Re	-2.6	-1.4	2.0	1.8	1.3	-1.3	
PRC	Count	150	95	86	101	68	58	558
	%	26.9%	17.0%	15.4%	18.1%	12.2%	10.4%	100%
	St.Re	2.2	1.2	-1.7	-1.5	-1.1	1.1	
$\chi^2(5) = 32.86, p < .001$								

Note:

- Only 41% of the data in PRC dataset provided detailed information on the years and causes of the long term impairments.

- In RCVIS dataset, 50% of the data included detailed information on the years and discharge results, which consist of long term impairments criteria (sent home, but disabled for life). Additionally, only data that was recorded by health facilities (with/without police) was analysed.

As shown in Table 5.44, there were statistically significant differences in the numbers of long term impairments due to road crashes in PRC and RCVIS datasets by occupations [$\chi^2(9) = 333.84, p < .001$]. Examination of the standardised residuals showed that there were higher levels of unemployment among clients in PRCs, compared to RCVIS dataset. On the other hand, the proportions of students, workers and housekeepers in RCVIS were higher than in PRC dataset.

Table 5.44: Numbers of persons with long term impairments due to road crashes in PRC and RCVIS datasets, by occupation

Long Term Impairments in:		Occupations										Total
		Child	Student	Farmer	Worker	House keepers	Police/ Soldier	Un- employed	Vendors	Others	Un- known	
PRC	Count	17	200	462	105	13	24	258	29	153	629	1,890
	%	0.9%	10.6%	24.4%	5.6%	0.7%	1.3%	13.7%	1.5%	8.1%	33.3%	100%
	St.Re	-0.23	-1.50	-0.45	-3.65	-3.44	-1.27	2.93	-2.86	-0.57	3.81	
RCVIS	Count	5	72	113	77	27	14	5.0	30	41	32	416
	%	1.2%	17.3%	27.2%	18.5%	6.5%	3.4%	1.2%	7.2%	9.9%	7.7%	100%
	St.Re	0.49	3.17	0.94	7.72	7.29	2.68	-6.21	6.06	1.21	-8.07	
$\chi^2(9) = 333.84, p < .001$												

According to the National Institute of Statistics (2013), there are 301,631 persons with long term impairments in Cambodia, of whom 52% are male. As shown in Table 5.45, the male proportions of long term impairments in the RCVIS and PRC datasets are 71% and 72% respectively. Males are more likely to be over-represented in the datasets, compared to the overall male long term impairment prevalence.

Table 5.45: Numbers of clients due to road crashes by gender in the 11 PRCs and RCVIS dataset

Long Term Impairments in:		Gender		Total
		Male	Female	
PRC-Due to	Count	1,368	522	1,890
Road Crashes	%	72.4%	27.6%	100%
RCVIS	Count	292	120	412
	%	70.9%	29.1%	100%

There are statistically significant differences between the datasets in the age groups of persons with long term impairments in the PRC dataset (due to road crashes only) and RCVIS [$\chi^2(8) = 21.37, p < .001$]. As shown in Table 5.46, the 15-29 age groups in PRC and RCVIS comprise the highest proportions. This age group is over-represented in the dataset, compared to its prevalence rate of 22% among the population with long term impairments (National Institute of Statistics, 2013).

Table 5.46: Numbers of persons with long term impairments in the population, PRC dataset and RCVIS by age groups

Long Term Impairments in:		Age Groups					Total
		0-14	15-29	30-44	45-59	60+	
PRC-Due to	Count	134	543	288	141	48	1,154
Road Crashes	%	11.6%	47.1%	25.0%	12.2%	4.2%	100%
	St.Re	2.1	-1.1	0.4	0.0	-0.3	
RCVIS	Count	18	227	94	50	20	409
	%	4.4%	55.5%	23.0%	12.2%	4.9%	100%
	St.Re	-3.5	1.8	-0.6	0.0	0.5	

$\chi^2(4) = 21.37, p < .001$

5.8 CHAPTER 5 DISCUSSION

Study 2 analysed the RCVIS and PRC datasets to answer the following research questions (RQ):

RQ1: How much do road crashes contribute to long term impairments?

RQ2: What are the characteristics of road crashes that lead to long term impairments?

RQ3: What role do emergency and post-crash care play in influencing the occurrence and severity of long term impairments?

RQ6: What potential changes to road safety policy would reduce the prevalence of long term impairments as an outcome?

RQ7: What potential changes to health policies would reduce the prevalence of long term impairments?

RQ8: What potential changes to disability policy would better meet the long term needs of persons with disabilities and their families?

5.8.1 Contribution of Road Crashes to Long Term Impairments

RCVIS and PRC databases recorded information on persons with long term impairments due to road crashes. The RCVIS provided information at the time of crashes and in hospitals, including casualty (such as name, gender, type of road users, injuries, etc.) and crash information (location of crash, causes, collision type, etc.). PRC indicated context after the discharge, such as type of long term impairments, years of onset, occupation, gender and age of persons with long term impairments.

From 1991 to 2011, 97,650 clients were registered in 11 PRCs. This figure represented 0.7% of the overall Cambodian population in 2011. Among them, 1,890 clients were due to road crashes, which constitute 3% of impairment causes from 1980 to 2011, but 15% during the last five years (2007 to 2011). In addition, the RCVIS database recorded 151,420 casualties from 2006 to 2012. During these seven years, the data indicated 11,879 fatalities, 45,305 severe injuries, 87,672 slight injuries. The number of fatalities has increased since 2006. Based on data reported by health facilities (with/without police), there were 416 persons with long term impairments due to road crashes in the period of 2006-2012. The proportion of long term impairments among the records with discharge results varied from year to year, with its highest ones in 2009 and 2010 (1%).

The extent of road crash contribution to long term impairments varied because different national disability surveys presented different figures on the overall prevalence of long term impairments in Cambodia. It might be due to the different classifications for long term impairments in those surveys. At the same time, the analysis of both datasets indicated underreporting issues that might lead to underestimating the road crash casualties, fatalities, injuries and long term impairments. At the same time, it is important to note that there might be duplicated

records among PRC databases, as a person with disability might access the services of more than one PRC.

Although the RCVIS and PRC datasets show a reduction of clients due to road crashes and casualties with long term impairments in 2010 and 2011, the two datasets differ in both their absolute numbers and trends. The reductions of numbers of road crash clients in the PRC dataset also occurred for other causes of long term impairments (such as Mine/UXO, gunshot, illness, congenital disease). Both datasets have statistically significant differences by years of onset. Difference in each year led to the total differences of 51 records from 2006 to 2011 (PRC data reported 558 clients, while RCVIS reported only 407 during the same years). The number of persons with long term impairments in RCVIS increased in 2008, while PRC dataset showed a decrease.

The data that were recorded by police only indicated increasing trends among fatalities and serious injuries, but a decrease in slight injuries. The health (with/without police) data showed large decreases since 2008 at each level of severity. The trends in the police only data are likely to be more representative of the real trends in fatalities and serious injuries (although even the police data appears to be increasingly incomplete for slight injury). Therefore, the numbers of reductions in RCVIS and PRC might not represent the trend of long term impairments due to road crashes in reality.

5.8.2 Characteristics of Casualties and Road Crashes that Lead to Long Term Impairments

Around 70% of persons with long term impairments in RCVIS are male (compared to 72% among PRC clients). Although the proportions of males and females are almost equal in the population, males comprise much higher proportions among long term impairments and fatalities in RCVIS and among clients in PRC datasets. At the same time, females were more likely to be fully treated relative to males who were more likely to die or be transferred to other health facilities.

The majority (91%) of the persons with long term impairments were injured when they were at the economically active ages (15-59 years old). The 15 to 29 age group comprise a lower proportion among the population (33%), compared to fatalities (around 48%) and long term impairments (55%). Although the 15-29 age group is over-represented, casualties in this group were less likely to die or be

transferred for further treatment, compared to older age groups (30-44, 45-59 and 60+). Children (0-14) were less likely to sustain long term impairments than other age groups relative to being fully treated.

Almost 70% of persons with long term impairments due to road crashes (in RCVIS) are students, workers and farmers. Especially, students accounted for a higher proportion among long term impairment casualties than fatalities. On the other hand, there was an over-represented proportion of unemployment among clients in PRCs (13.7%), compared to the RCVIS dataset (1.2%). This highlighted an unemployment issue among persons with disabilities and job loss after the road crashes.

The RCVIS data indicates that 62% of persons with long term impairments are vehicle controllers, 30% are passengers and 8% are pedestrians. Pedestrians constitute a higher proportion among fatalities, while the proportion of vehicle controllers is higher among long term impairments. The majority of fatalities and persons with long term impairments were travelling by motorbikes at the time of crashes. However, motorbike riders (passengers and drivers) were less likely to sustain long term impairments or be transferred for further treatment compared to pedestrians. There is a higher proportion (almost eight times) of long term impairments among pedestrians than motorbike riders.

More than half of the fatalities were hit by passenger and goods vehicles (such as cars, buses, trucks, vans). The proportion of casualties who were hit by motorbikes was the highest among long term impairments, compared to fatalities. On the other hand, casualties who were hit by passenger or goods vehicles were more likely to have long term impairments, die or be transferred for further treatment. In addition, the results of the MLM analysis also demonstrate the vulnerability of travelling by goods vehicles, agricultural vehicles and walking. These modes are commonly used by people of low socio-economic status because they cannot afford other alternatives. Therefore, road crashes tended to inflict more severe injuries on those people in poor communities who could not afford a safer mode of transport. At the same time, it is also important to note that casualties who were hit by passenger vehicles, goods vehicles or hit a stationary object were more likely to have long term impairments, die or be transferred than those hit by a motorbike. Although the study and analysis could not identify who was at fault, the findings highlight the

involvement of goods vehicles in road crashes and the severity of injury to their drivers, passengers and those hit by these vehicles. Further research should be conducted to analyse the causes, safety features and involvement of the goods vehicles in order to reduce the injury severities related to this transport mode.

While it is not possible to accurately identify the long term impairments in the RCVIS, the MLM helped to assess the similarity and differences between the long term impairments and fatalities. Unfortunately, it was not possible to estimate how often serious injuries were likely to result in disability from the MLM.

Based on the MLM analysis, the risk factors that were more associated with long term impairments included being pedestrians, being hit by passenger and goods vehicles or hitting a stationary object. Additionally, all of the risk factors that were significant for long term impairment and fatality categories presented the same effects for both categories. The model clearly illustrates that long term impairments and fatalities have similar characteristics and those risk factors influence both outcomes in the same way. Those risk factors included years of crashes (2008, 2009, 2011), age group (0-14), collision counterparts (passenger vehicle, goods vehicle, stationary) and ambulance services. These results suggest that the same interventions are likely to reduce both fatalities and long term impairments.

At the same time, some of the risk factors have the same effects on the long term impairment and transferred categories, such as 0-14 age group, pedestrian vs motorbike, collision counterparts (passenger vehicles, goods vehicles, stationary) and transport mode to health facilities (ambulance). This represents the similarity of these two categories. In addition to the low numbers of long term impairments (and reduced since 2009), this might indicate the lack of identification or coding practice of the long term impairments among the transferred data by hospital staff at the time of the data collection for RCVIS.

5.8.3 Roles of Emergency and Post-crash Treatment in Influencing the Severity of Long Term Impairments

The study on the RCVIS dataset provides information on how people were transported to hospital, without direct information about how this affected the outcome. The police data indicated that around half of the casualties were transported by health facility transports, while only 27% of the casualties were reported as having these transport modes in the hospital dataset. This meant the majority of road

crash casualties were not transported by health facilities. It is also important to note the relationship of transport modes to hospitals and the severity of injuries. The MLM indicated that casualties with long term impairments, fatalities or being transferred were more likely to be transported by ambulance relative to fully treated. This could result from the ambulance services prioritising more serious crashes because of limits to available services. However, this prioritisation may be contributing to poor outcomes for injuries that were not considered as serious. This data indicated an insufficient emergency response towards road crash casualties and might resulted in more severe cases because of improper transport modes.

Moreover, almost half of road crash clients accessed the PRC services at the same year of their crashes, while 27% came to the PRC around one year after their crashes. This also means that more than a quarter of road crash clients did not receive PRC services until at least two years after the crashes.

5.8.4 Potential Changes to the Road Safety Policy

This section discusses some potential changes to the NRSAP based on findings from Study 2. Those changes are proposed in regards to the pillars in the NRSAP.

Pillar 1: Road Safety Management

Although RCVIS has been considered to be the only system in Cambodia that provides good information on road crashes and casualties reported by traffic police and health facilities, the study identified major deficiencies in RCVIS. They related to the implementation of RCVIS which is included in the NRSAP under Pillar 1. An issue related to data merging between data from health facilities and traffic police was identified. Although a case was reported in both police and health forms, only information from the hospital was available in this database and the information from police was not merged into the database for this PhD study. Therefore, an improved merging procedure is needed.

At the same time, the study highlighted another issue related to the reducing quality and coverage of the RCVIS under the health facilities. It presents the need for improvement of the data system and motivation of the participating health facilities. This requires a stronger action of the NRSC in working with MoH to strengthen the system under the MoH structure.

Pillar 4: Road User Behaviours

The study identified the key risk factors: speeding, drink driving and helmet/seatbelt wearing that should be targeted to improve the road user behaviours. Additionally, it was very clear that males are more likely to be involved in crashes and sustain long term impairments, die or be transferred for further treatment. Priority should be put on males for all public awareness interventions to tackle their dangerous behaviours. At the same time, to reduce overall numbers of fatalities, long term impairments and injuries, motorbike riders and young road users (15-29 years old) should be targeted, while reducing the prevalence of long term impairments and being transferred to further health facilities, pedestrians should be prioritised for better protection.

Pillar 6: Law Enforcement

The key risk factors (speeding, drink driving, helmet/seatbelt wearing) that were identified in the study should be targeted by traffic law enforcement. Additionally, “Hit and Run” cases were involved in one-fourth of casualties. The proportion of fatalities in hit and run cases was higher among non-hit and run cases. They were more likely among speed-related and dangerous overtaking crashes and to occur along the national roads. This highlighted a loophole and the need to strengthen the traffic law enforcement interventions.

Pillar 8: Fleet Safety Management

More than half of the fatalities were hit by passenger and goods vehicles (such as cars, buses, trucks, vans). Casualties that were hit by those types of vehicles were more likely to have long term impairments, die or be transferred for further treatment. Particularly, the study findings highlight the involvement of goods vehicles in road crashes and the severity of injury to their drivers, passengers and those hit by these vehicles. This highlighted the need for better fleet management to ensure proper driving skills of those passenger and goods vehicles, including the vehicle standards.

5.8.5 Potential Changes to Health Policies

Although the RCVIS has been extended into the Injury Surveillance System (ISS) under the MoH structure, the ISS was not mentioned and integrated into the Health Information System Strategic Plan, 2008-2015. Being excluded from the

strategic plan and managed by another department, different from the Health Information Department, might affect the sustainability of the ISS.

Another key issue relates to the quality and coverage of the RCVIS, which should be strengthened and highlighted in the Health Action Plans and Policy. The system covers all provinces in Cambodia through the national and provincial traffic police network. On the other hand, the numbers of participating health centres and hospitals have varied since 2006. Only 66% of hospitals (49 out of 74) and 4% of health centres (38 out of 957) participated in the RCVIS data collection in 2012. It was observed that the quality of the data collection for RCVIS has reduced over time. The withdrawal of monetary incentives means that the system still continues to exist, but fewer forms are filled. This might reflect the commitment of the hospital management team to allocate resources for completing forms. Therefore, a commitment from the top management of the NRSC and especially MoH is crucial to ensure that the action for RCVIS implementation is integrated into the MoH national action plan and responsible departments and provincial teams are identified and appointed.

Additionally, although the RCVIS identifies trends in fatalities helping to signal changes in mortality due to road crashes, with comprehensive disaggregated information, the system does not include follow up information on those casualties discharged from hospitals, as the data collection forms are filled and completed in the emergency rooms only. Many data collection forms are lost during the process in the hospitals. Additionally, health staff members were very hesitant to tick the long term impairments option, leading to under-reporting of the long term impairments in the system and a limited understanding of the nature and extent of the long term impairments after hospital discharge. It is therefore important to ensure a relevant procedure of the data collection from inside health facilities to have better information on the follow up regarding the hospital discharge results. It needs better interventions from the MoH in revising its standard procedures for RCVIS / ISS inside each hospital and health centre.

Moreover, this study also indicated an insufficient emergency response towards road crash casualties which might result in more severe cases because of improper transport modes. The ambulance services were more likely available for serious injuries than slight injuries. While this represents the focus of the services on serious

injuries, it means that insufficient services are available for any other crash or any type of injury. Therefore, emergency response through ambulance services should be better extended to cover all areas, including rural ones.

5.8.6 Potential Changes to the Disability Policy

The analysis of PRC database indicates the similar patterns of persons with disabilities due to Mine/UXO and road crashes, although there were statistically significant differences. These include the over-represented proportions of males, 15-44 years old group, compared to the overall population, and the living context in rural areas. This presents the needs to target the same groups towards Mine/UXO and road crash preventions and support interventions.

The research findings revealed an issue of delays in receiving PRC services but could not identify reasons for the delays. More than a quarter of road crash clients did not receive PRC services until at least two years after the crashes. This highlights a need for referral systems after hospital discharge for those persons with long term impairments to access the rehabilitation services.

Additionally, only physical impairments were included into the current PRC databases, because of the physical services provided by the PRCs. These findings presented the needs to include database set up and management into the NDSP. The data system should be able to capture all kinds of long term impairments, with more comprehensive information of the societal barriers.

5.9 CHAPTER 5 CONCLUSION

The results from this study confirm the findings in the publications of WHO and WorldBank (2011) and Murray et al. (2012). Road crashes have become a major public health concern and a main contributor to disabilities in Cambodia, especially during the last five years. The findings from the data analysis also indicate that road crashes tend to impact on communities and people who were pedestrians or travelled by motorbikes and bicycles, and living in rural areas. This aligns with the fact that 80% of Cambodians live in rural areas (National Institute of Statistics, 2008).

Although there are statistically significant differences in fatalities and long term injuries by characteristics of crashes, both groups have common contexts that

lead to common priorities and interventions. The MLM confirmed the same effects of key risk factors, including years of crashes, age group, collision counterparts and ambulance services. Interventions targeting the reducing prevalence of long term impairments might also contribute to the prevention of fatalities.

In addition, the study also highlighted the loopholes in the data collection systems (RCVIS and PRCs) that indicated the issues of quality in data collection procedure, merging and lack of information. This requires better data system actions towards improving the policies (NRSAP, NDSP and Health) and their implementation. At the same time, it also illustrates the needs for further research to collect qualitative and contextual information on road crashes and persons with disabilities to ensure better road crash prevention and the relevant support.

Chapter 6: Lived Experiences and Impacts of Disabilities

6.1 INTRODUCTION

This chapter discusses the research findings in Study 3: Individual and family impacts of disabilities after a road crash. The main objective of Study 3 was to identify and explore the impacts of disabilities following a road crash on the casualties and their families. As summarised in Table 3.1, the study responded to all research questions 2 to 8 in this overall PhD research. It provided contextual information on road crash attributions and factors that increased the severity of long term impairments and disabilities. Additionally, the study illustrated the impacts of disabilities on those persons with disabilities and their families, based on their lived experiences. The research questions (RQ) for Study 3 are:

- RQ2: What are the characteristics of road crashes that lead to long term impairments?
- RQ3: What role do emergency and post-crash care play in influencing the occurrence and severity of long term impairments?
- RQ4: What are the impacts of disabilities resulting from road crashes on the persons themselves?
- RQ5: What are the impacts of disabilities resulting from road crashes on their families?
- RQ6: What potential changes to road safety policy would reduce the prevalence of long term impairments as an outcome?
- RQ7: What potential changes to health policies would reduce the prevalence of long term impairments?
- RQ8: What potential changes to disability policy would better meet the long term needs of persons with disabilities and their families?

Persons with disabilities due to road crashes, who participated in the study, are defined as “primary participants (I)”. Their family members, who were interviewed, are referred to as “primary participants (II)”. Following the introduction section, the

chapter presents and classifies the research findings into crash circumstance, ineffectiveness of the traffic law enforcement, crash attributions, and preventive measures, followed by the contextual information on emergency response, post-crash care, issues of insurance and impacts of disabilities. The chapter ends with a discussion on the findings of Study 3 and conclusion sections.

The detailed methodology of Study 3 is presented in Chapter 3: Research Design. A list of quotations from the primary participants (I) and (II) to support the research findings is attached in Appendix 9. The primary data collection for this qualitative study was conducted in two stages through the preliminary semi-structured and in-depth interviews with 46 primary participants (I) and 31 primary participants (II) and 44 observations.

6.2 SELF-DESCRIBED CRASH CIRCUMSTANCE

This section describes crash circumstance, based on information provided by the primary participants (I) and (II). Their descriptions cover basic information on when crashes occurred, their mode of transport at the time, other vehicles involved (if any), safety measures employed at the time, location information, and issues of police involvement in compensation and bargaining. The participants resided in eight of the 25 provinces in Cambodia, and most (36) were injured in their province of residence.

Almost half of the primary participants (I) (22) were injured between 2011 and 2013. Most of their crashes (42) happened when they were aged between 18 to 60 years old, which is an important time for studying and income generation. The crashes led to job losses, dropping out of school and/or a decrease in overall family income.

More than half (25) of the primary participants (I) were driving their vehicles at the time of the crashes, 16 were passengers and five were pedestrians. Motorbikes were the transport mode of most of the primary participants (I) at the time of their crash (34). Many crashes happened in rural areas (33), and agricultural vehicles were involved in three cases. Most of the primary participants (I) were using an inexpensive transport mode (motorbike, agricultural vehicle, as a passenger in the cargo compartment of a truck) or walking. This presented an important point on the

unaffordability for safer transport modes for people from low-socio economic backgrounds and this made them more vulnerable to potential injury in a crash.

In almost half of the crashes passenger and goods vehicles were involved and most of them resulted in participants requiring an amputation or acquiring a functional limitation. Another 13 primary participants (I) were involved in a single vehicle accident. Half of the participants (6) travelled by motorbikes, while another four were in passenger and goods vehicles and three were on agricultural vehicles. Eight of these accidents resulted in the participants becoming paraplegics or tetraplegics. Although the study could not identify how single vehicle crashes caused a larger proportion of the severe long term impairments, compared to those involving other transport modes, it did illustrate that long term impairments happened in all types of crashes, not only those involving heavy vehicles.

Most (38 out of 46) of the primary participants (I) were injured in the crashes that did not involve any fatalities, while another eight were in fatal crashes. Seventeen primary participants (I) were injured in crashes that involved only one person being injured. There were two cases which involved 10 and 18 people being injured. Some injuries sustained in the crashes led to long term impairment which can often have negative impact on the person who sustained the injury and their family. This will be described further in this chapter.

Almost half of the primary participants (18 out of 46) were injured at night-time, between 6pm to 6am. The majority of the crashes happened on straight roads (36), along national roads (25) and paved roads (33). More than half (33) of primary participants (I) had their crashes in rural areas.

6.3 INEFFECTIVENESS OF THE TRAFFIC LAW ENFORCEMENT

They gave me 20,000 baht¹ (Thai baht, around USD500) and they said if I was died they would give 30,000 baht. That was the rate of compensation at that time....the police organised us to do so. They said it was based on the law. [BTB04, 60 years old, rural area functional limitation]

¹ Thai baht was mentioned because the primary participant (I) lived in Battambang province, next to Thailand, and Thai currency was used in the province.

All of the crashes in this study happened before 2015, and therefore, the previous Cambodian Traffic Law, which was replaced by a new one in early 2015, should be applied in these cases. In the previous law, punishment and compensation for a fatality and disability are stated in the same clauses (Royal Government of Cambodia, 2006). A person who causes a road crash that leads to a fatality or disability shall be imprisoned from one to three years and/or pay compensation of two million riels² to six million riels³ (Royal Government of Cambodia, 2006). According to this law, being imprisoned must be applied to all cases of fatalities and disabilities. All cases that involved an injured person or a fatality must be filed and submitted to courts (Royal Government of Cambodia, 2006). However, based on the interviews with the primary participants (I), informal procedures were practised as described below.

6.3.1 Compensation and the Power of Bargaining

More than half (29) of the primary participants (I) received compensation after the road crashes, while four had to pay compensation to their counterparts through a process of negotiation. After the negotiation, none of the primary participants mentioned any further process that related to the courts. The amounts of compensation received by the primary participants (I) varied from USD700 to USD5,000. All of primary participants (I) who received compensation said that it was not enough to cover their treatment and especially to compensate their loss in terms of income generation during their treatment and the overall impact of long term impairment. In addition, two primary participants accepted the compensation without realising their injury would lead to a long term impairment.

Receiving compensation involved considerable negotiation with the counterpart. This could be a difficult process that sometimes involved the traffic police and sometimes not. Some primary participants (I) (5) accepted the compensation because the counterparts were poor and would not be able to offer more. Nine participants experienced the power of bargaining practices; this included the loss of the negotiation to their counterparts or needing assistance from their relatives to negotiate strongly on their behalf. They said the judgment on paying

² Around USD500

³ Around USD1,500

compensation was made by their district authorities based on the power of both parties that were supported by relatives or friends who have high positions or strong network in the government. They mentioned that the stronger the power, the better chance of winning the compensation negotiation. This included the loss of the negotiation to their counterparts or needing assistance from their relatives to negotiate strongly on their behalf. The over-power was also practised by traffic police and insurance companies. Some of the primary participants (I) were told by police or insurance companies about a fixed rate of compensation and that they could not negotiate for more.

It is important to note that once the compensation was paid, the crash cases were closed, as mentioned directly by three primary participants (I). At the same time, other primary participants (I) did not mention any other applications or process to the courts with their counterparts after receiving the compensation. This type of practice also included drink driving cases. No primary participant mentioned any case related to being imprisoned or any further submission to the courts.

Therefore, road crash compensation was offered and provided in different amounts, without a formal and standard procedure. The compensation was based on negotiation and bargaining powers among both parties involved in the crashes, mostly with the intervention of traffic police. Unfair compensation was raised as an issue and highlighted the lack of a legal system to facilitate a fair and equitable process. It may also imply that primary participants were not aware of the impact the amount of compensation would have on their lives, that is, the amount of compensation was not adequate.

Once the offenders paid compensation, they did not appear in front of a court or imprisoned which violates previous Cambodian traffic law. This illustrated two important issues. Firstly unstandardised negotiation and compensation and secondly weakness of the traffic law enforcement.

6.3.2 Experience of Hit and Run and its Impact

Issues of the compensation were also found among “hit and run” cases, which are defined as counterpart drivers continuing to drive away, after a crash. According to the new Cambodian Traffic Law, which has been approved since 2014, drivers must stop at crash scenes when they are involved or have caused a crash (Royal

Government of Cambodia, 2014). They must not leave the scene without agreement being made between all parties involved in the accident or having approval from local authorities (Royal Government of Cambodia, 2014). A more severe penalty or charge will be applied to those who caused the crash and left the scene (Royal Government of Cambodia, 2014). The traffic law refers these cases to the national criminal codes, without providing any further specific context (Royal Government of Cambodia, 2014). According to the previous Cambodian traffic law, traffic police shall submit the case to the courts to charge a person who causes a road crash and escapes from a crash scene. The maximum punishment for a hit and run driver was imprisonment for three years with monetary compensation of six million riels⁴ (Royal Government of Cambodia, 2006).

Hit and run cases were mentioned by 14 primary participants (I). There were five primary participants (I) who mentioned that their counterpart drivers drove away from the scenes and were not tracked down. All of these five primary participants (I) did not receive compensation which meant they and their families had to cover all treatment costs themselves. Another nine primary participants (I) reported that the counterpart drivers attempted to flee the scene of the accident, but were stopped by friends or relatives of the primary participants (I), other road users, or traffic and commune police who were at the scene. It is also important to note that four primary participants (I) mentioned about hit and run accidents and how they were dragged along the road by their counterpart drivers. They accused those drivers of trying to flee the scene.

Drivers who escaped the scene of the accident were able to avoid paying compensation. This led to the financial burden of the family who were left with no compensation and were left to cover costs, in addition to the loss of future income by the person left with a disability. These cases highlighted a loophole in the enforcement and investigation system that allowed drivers to escape being charged and paying compensation.

6.3.3 Behaviours of Traffic Police and Involvement in Compensation

Almost half of the primary participants (I) mentioned the involvement of traffic police officers (20 out of 46) in their crash. This involvement included collecting

⁴ Around USD1,500

information about the crashes, investigating crash scenes, confiscating vehicles involved and participating in the compensation process. In three cases the police were involved in the search for drivers who had left the scene of the accident, but only one of these cases was successful. One primary participant (I) stated that the police officer requested money to investigate the hit and run case, which produced no result. Three primary participants (I) reported that police involved wanted the compensation money to be shared with them. In one case, a primary participant (I) reported the police officer supported the counterpart driver and forced him to accept an unfair compensation.

One primary participant (I) from Battambang reported that the traffic police provided an ambulance service. This is the only example of this initiative in Cambodia. Interviews with policy makers indicated that the Battambang police team has its own ambulance and has received training in first aid and emergency response from a team in the Ministry of Health. This initiative warrants further investigation, as currently there is a lack of experienced and trained first responders in Cambodia.

6.4 CRASH ATTRIBUTIONS

Crash could not be prevented, it just can be reduced to lesser. According to the Buddha, things have been defined, and we could not escape. [KChh04, 64 years old, urban area, amputee]

This section describes crash attributions, based on perceptions of the primary participants (I) and (II) during the first and second interviews. While the purpose of this section is to explore the perceptions of participants, some background is first given on the kinds of crashes they were involved in. It should be noted that this is based on self-reporting rather than official records, and therefore is subjective. While the qualitative nature of the research means that the findings cannot be considered representative in a statistical sense, it is expected that they will be illustrative of the kinds of crashes that lead to disability in Cambodia, and the kinds of attributions made by Cambodians involved in such crashes.

Twenty-one primary participants (I) mentioned multiple causes. In addition to various types of human errors, vehicle defects and road condition, there were

different cultural/religious beliefs among primary participants (I) and their families around crash scenes and causes of crashes. The beliefs included an involvement of Karma, spirits/ghosts at black spots and other cultural/religious beliefs, such as a relationship to date of birth as described in the following section.

6.4.1 Road Crashes as Results of Human Errors, Vehicle Defects and Road Conditions

Twenty-five primary participants (I) were drivers. Only eight of them admitted they were at fault; their contribution could have included drink driving, carelessness and speeding. No primary participants (I) who were pedestrians or passengers expressed fault in their crashes. This means that more than half of the primary participants (I), 29 out of 46, attributed the crash causation to their driver or counterpart drivers, while nine reported they were uncertain about the cause of their crash.

Causes of road crashes were reported by the primary participants (I). Probing questions were also asked for further information on the causes, such as their activities before the crash, what they thought about speeds of vehicles involved, and whether drivers drank any alcohol before the crash. Although the primary participants (I) described their crash causes at first, more information on the causes were added through probing questions. This led to having complementary information on their first point of view. For example, only three primary participants (I) mentioned speed as an error factor responsible for their crashes, while their further description revealed 11 cases that might have involved speeding. Most of those speeding cases were described as being linked to dangerous overtaking, when inappropriate speed was mentioned, but without a clear figure of the speed and the speed limit in the areas.

In general, most of the primary participants (I) (40) tended to firstly put their attention on human factors, such as dangerous overtaking (10), carelessness of drivers (10), drink driving (8) and driving against flow of traffic (4); with limited focus on vehicle defects (2), road condition (2) and weather condition (1). Vehicle defects were raised by two primary participants (I) as their main causes. However, based on their replies to the probing questions, there might be an additional 10 cases that involved vehicle defects, such as flat tyres, broken parts of agricultural vehicles, mechanical issues and driving without proper headlights. These 10 vehicle cases

were not considered by the primary participants (I) as their main causes, since they highlighted the carelessness of vehicle drivers. Additionally, there were seven cases that might involve road conditions, and only two of them were mentioned as crash causes by the primary participants (I) in the first instance. Those road conditions included construction site, potholes, bumpy roads, traffic light issue, steep descent roads, and lack of signage. Weather conditions (raining) might have been a factor in two cases, as roads were slippery and foggy, leading to poor visual conditions. Only one participant reported weather as the main contributing factor to his accident. Therefore, this might illustrate how the primary participants (I) recalled their inconsistent story of road crashes and their perception towards human errors, without considering other risk factors. Additionally, since most of their crashes happened in 2012 and before, recalling such stories might be vague and could not allow a definitive conclusion on the crash causes. More accurate information is needed from traffic police for a more comprehensive conclusion and prevention intervention. This also highlights the importance of RCVIS which provides much more comprehensive information on road crashes, based on quantitative data from traffic police and health facilities.

Results and Different Perceptions of Drink Driving

According to the current Cambodian traffic law, the limit for blood alcohol concentration is 0.50g/l and breath alcohol concentration is 0.25mg/l (Royal Government of Cambodia, 2014). In Cambodia, the prevalence rate of alcohol use disorder is 4.4% (WHO, 2014b), but a higher rate of 25% was observed among rural communities (Yeung et al., 2015). Local alcohol is cheap and readily available (Yeung et al., 2015). Drink driving may have been a major contributing factor in the road crashes of 19 primary participants (I), but only eight primary participants (I) reported it without probing questions. Three of them admitted drink driving and expressed their regret. Five primary participants (I) accused their drivers or counterpart drivers of causing the crash through drink driving. They reported that their suspicion was raised by smelling alcohol, being told by villagers that the drivers just left nightclubs or parties and so on. However, this could not be substantiated. In addition, following probing questions, it became evident that an additional seven primary participants (I) had drunk alcohol right before the crash, but it is impossible to ascertain the level of alcohol in their systems. There were four cases where there

was suspicion of drink driving by the people driving the primary participants (I) at the time of the accident.

It is important to note the perceptions of the primary participants (I) on the issue of drink driving. There were 22 primary participants (I) who expressed their thoughts about drink driving in different ways. Among them, only four primary participants (I) clearly mentioned the need for no drink driving for safety. One of them referred to the Cambodian traffic law, without providing any knowledge on the limits of the blood and breath alcohol concentrations. Eight primary participants (I) accepted drink driving and explained that drinking a small amount of alcohol is still fine to drive safely, without impaired driving capacity, as long as they were not drunk. The term “drunk” was defined as being dizzy, losing sight and not being able to walk straight. The limit of “small amount” was defined as having one to three cans of beer or one to two glasses of wine. There was no explanation on the alcohol concentration at all, since only the amount of cans and glasses was mentioned. None of the primary participants expressed any concept related to a standard drink based on the alcohol concentration. Additionally, drink driving cases were more likely to happen among the primary participants (I) in rural areas. Among the 19 cases of drink driving, 13 were rural primary participants (I). This might link the drink driving intervention, such as public awareness and police check points, that were mostly implemented in urban areas only, according to the information from policy makers during the workshops in Study 4. It would be very interesting to investigate further how drink driving is more likely to happen in rural areas.

Although those primary participants (I) did not say clearly how much they drank, at least it raised an issue of people who were influenced by alcohol before their road crash. Therefore, there is a possibility that more crashes (11) had involved drink driving than initially reported (8). At the same time, the majority of them mentioned that it was safe to drink and drive and were unaware of the impact alcohol can have on driving. Drink driving was considered as significantly contributing to a higher risk of involvement in road crashes (WHO, 2007). It was estimated that alcohol was suspected in the blood of injured drivers between 4% and 69% in low and middle income countries (WHO, 2007). Moreover, drink driving enforcement was mentioned three times by the primary participants (I), but they were unaware of the articles in the current traffic law. This illustrated the low level of knowledge on

drink driving among the primary participants (I). At the same time, their drink driving related crashes illustrated the limited enforcement towards drink driving prevention.

6.4.2 Different Belief of Karma on Road Crash Causes

According to Cambodian-Australian Welfare Council Inc. (2010), 96.4% of the population in Cambodia believe in Buddhism. As a fundamental belief in this religion, people need to take full responsibility of their own actions and omissions (Eliezer, 2012). This concept is called Karma, which refers to receiving the effects of their own actions from the past, mostly in their previous life (Eliezer, 2012; J. King & King, 2011; Ly, 1965). There were different perceptions of the primary participants (I) and a spectrum of beliefs on Karma. Among the primary participants (I), 16 believed that Karma was a cause of their crashes and long term impairments, while another 16 expressed that Karma could be involved in their crash but also attributed their crash to other sources such as drink driving, carelessness of drivers and dangerous overtaking.

Karma as a Road Crash Cause and a Reason to Keep Calm

Those who believed Karma caused their road crash, mentioned about their bad activities (such as killing or hurting animals or people) in their previous life. These might have an impact on their current life. Additionally 12 primary participants (I) clearly referred to the Karma concept in Buddhism.

Based on expression from three primary participants (I), a belief in Karma helped them to gradually accept their long term impairments. It is the only kind of reason to calm down their feelings, to relax and reduce their anger against their counterpart drivers. Since they expressed their belief in Buddhism, this helped them to increase their forgiveness, meditation and non-selfish acts.

Rejection of Karma in Road Crash Cause and Disability

Eleven out of 16 primary participants (I) who expressed their belief in Karma also mentioned other causes of road crashes, in addition to those who said they believed to some extent Karma could be less of a factor. They referred their crash causes to human errors, such as drink driving and carelessness. At least six clearly

expressed their fault in drink driving and not paying enough attention during driving, in addition to their reported belief of Karma.

Additionally, three primary participants (I) rejected the concept of Karma. They believed they had done nothing wrong, therefore they had no Karma. They also did not believe that their long term impairment was a result of their Karma. However, they expressed their disquiet about people in their community saying that their crash and disability was a result of Karma. This highlights a view about crash causation within the Cambodian community, which is similar to the finding in a study conducted in Thailand by J. King and King (2011).

It was clear that the belief in Karma was still held by some of the persons with disabilities, although there was a spectrum of the belief. On the one hand, the belief helped some of the persons with disabilities to release their stress and accept their long term impairments. On the other hand, the belief made a few of the persons with disabilities judged as doing bad things and they were considered as bad persons. This caused them an uncomfortable feeling and affected how the people around them judged them. It also reflected the concept of the society on individual responsibility for long term impairments, which were due to their bad things (Karma) and did not consider the societal barriers that led to disabilities. The belief in Karma tended to put those primary participants (I) as a centre of the cause of their crashes, long term impairments and disability, without emphasising the societal context that led their long term impairments into disability, such as discrimination, transportation barriers, and inaccessibility in schools or workplaces. Those societal barriers are described more in Section 6.9.6: Experiencing Societal and Environmental Barriers.

6.4.3 Blackspots and Involvement of Spirits/Ghosts on Road Crash Causes

Identification of Road Crash Scenes as “Blackspot” by Spirits/Ghosts

Blackspot, (*Choeurng Kob*) was defined by the primary participants (I) as a place (a section of road), where many crashes happened. They believed that the locations engaged with spirits/ghosts who made the locations dangerous. It was explained by the primary participants (I) that when people were killed in that section, their souls could not go away, unless they could find their replacement, by causing road crashes and someone else to die. This belief was spread by word of mouth. Some of the primary participants (I) have a stronger belief than others that those

spirits/ghosts caused the crashes. J. King and King (2011) also found similar concepts of blackspot and ghost in their study in Thai communities, which practised the same Theravada Buddhism as in Cambodia.

Although 14 primary participants (I) said that they were told by villagers that their crash scenes were blackspot areas, only two of them provided an explanation on how those spirits affected them. One said something appeared to obstruct their view, making them lose their attention for a second and they fell down. Another said that after his relative offered foods through praying to the spirit at his crash scene, a medical doctor⁵ could find a way to treat him better. The other primary participants (I) did not provide any explanation on how ghosts at the blackspot affected them. On the other hand, although 12 out of the 14 primary participants (I) expressed their belief in blackspots, they also offered human factors such as drink driving and careless of drivers as their road crash causes.

Rejection of Involvement of Spirits/Ghosts

There were 13 primary participants (I) who said they did not believe in an involvement of spirits/ghosts at their crash locations. Among them, three primary participants (I) did not express their belief in praying as they proposed other interventions such as respecting road rules, no drink driving and road improvement to prevent road crashes.

Road Crashes due to “Reasey”

In addition to the belief in spirits/ghosts at a blackspot, there are also other types of cultural and religious beliefs, as mentioned by 32 primary participants (I). One of the beliefs is the relation between years of birth and the years of crashes. It was believed that there were fortunate and unfortunate periods of life that might bring them good luck and bad luck. It was referred to as *Reasey* (Khmer word), which is based on a horoscope reading and closely linked to their years of birth. People believed that their birthday led to a fortunate or unfortunate period in the current year. During an unfortunate period, bad things could happen to the people. Bad *Reasey* was mentioned by 12 participants. They said their crashes happened during their unfortunate period in the year. Horoscope reading was also mentioned as

⁵ Medical doctors in rural areas might not been certified, as people consider them without requesting for a formal registration or licensing.

a belief among veterans with disabilities in Sri Lanka that also respect Buddhist practice (Zoysa & Wickrama, 2011).

Four primary participants (I) and three primary participants (II) considered road crashes as “accidents” that just happened and could not be prevented. Those crashes are meant to occur to them and they could not foresee them or escape. This would have implications for road safety messages.

Road crashes were Spiritually Felt in Advance

Ten primary participants (I) claimed they were spiritually informed about their crashes in advance through different things, such as bad dream, animal crying/flying into their houses, a warning noise and spiritual reminding message. Transporting a turtle was mentioned by one primary participant and his wife as a spiritual cause of his crash. Another primary participant (I) mentioned about his fault in saying things that were considered as disrespectful to a spirit, who took care of his living area. Because of these words, the spirit was angry and his back injury could not be cured. He believed that this led to his long term impairment.

Fortune Tellers and Road Crash Predictions

Ten primary participants (I) reported that they believed fortune tellers could predict fortunate and unlucky periods and events that might happen within the next six or 12 months. They mentioned they had been warned by fortune tellers about the possibility of having bad luck. Then, they had a road crash which resulted in having long term impairments. This finding presents a traditional belief of the primary participants (I) in fortune tellers and their advice, which was regarded as a guidance among some of them to prevent bad luck, including road crashes. This also illustrated their perception on road crashes that could be prevented through the traditional belief.

It is interesting to note the cultural perception on causes of crashes among the rural and urban primary participants (I). The belief in blackspot was mentioned by 14 primary participants (I). Of them, nine were in a rural area. At the same time, 23 out of 29 primary participants (I) in a rural area mentioned Karma and spirits, compared to 10 out of 17 urban primary participants (I). This could mean that rural people are holding on to traditional beliefs and might have implications for road safety and

disability, in terms of convincing them on the concept of crash and long term impairment prevention messages.

6.5 PREVENTIVE MEASURES

During Khmer New Year, our local authority (a new police district chief) also invited monks to have blessing along the road in that area (blackspot). Since then, there is no accident. [Sister of KChhn02, 25 years old, urban area, amputee]

None of the primary participants (I) travelling by passenger/goods vehicle mentioned seatbelt availability and wearing them during their trips. The primary participants (I) were not fully aware of the benefits of wearing a seatbelt as they did not express any regret for not buckling their seatbelt. Among the primary participants (I) who travelled by motorbikes, only five wore a helmet when they drove their motorbikes at the time of the crashes. They expressed their thankfulness to the helmets in protecting their heads. On the other hand, head injuries were mentioned by five primary participants (I) who did not wear a helmet. Although they did not describe their head injuries in details, three of them expressed their difficulty, such as having a headache more often and losing some memories after the crashes. Travelling a short distance and at night were the reasons given for not wearing a helmet. Protecting heads was mentioned as a reason for wearing a helmet, in addition to avoiding a penalty by traffic police. However, many primary participants (I) tended to relate their risks of having road crashes and head injuries to the distance of travel. This indicates the lack of belief in having helmets to protect their heads, either for short or long distance travel. The findings illustrated the need for better education campaigns to promote helmet wearing for any time and any distance of travel. At the same time, promotion on the basic benefits of seatbelt is also important, since it was not recognised at all among people, especially in rural areas.

Among those 14 primary participants (I) who believed in blackspots, six suggested inviting monks to pray at the locations might help to reduce road crashes. The prayers by the monks at those locations would help to ask those souls (that stayed at the blackspots) to go away. This type of praying was called *Jayoun Tor*. As an example, one participant and his family members strongly believed in blackspot.

As they live in the area of the crash they believed that his crash location is a blackspot that involved a spirit/ghost. The family mentioned about an event, when the new district chief invited a group of monks to the blackspot and they prayed for a safer place, during the 2014 Khmer New Year. After the prayer, the family said that the number of crashes was reduced. Their description presented a belief among people in their communities and their preventive measure towards reducing road crashes at the blackspot.

Twelve primary participants mentioned “*Sroch Terk*” or “*Jack Terk*” as a prevention tool to reduce their bad luck and bring them good fortune. It is a process of having water sprinkled on them by fortune tellers, traditional healers or monks, who were praying while sprinkling the water. They believed that *Sroch Terk* would help to wash away their bad luck and any spirit possession. *Sroch Terk* were conducted before the crashes with an expectation to prevent or reduce severity of incidents and were also organised after the crashes to bring better luck. The praying was considered as an invisible protection for the participants, so that bad things or spirits could not harm them anymore. The monks, fortune tellers and traditional healers might also offer some food and fruit to those spirits (through praying) as an exchange of luck.

Moreover, although there is a spectrum of belief in blackspots, *Reasey*, and involvement of spirits, at least it shows how some of the primary participants (I) related them to their road crash causes. Some practices in those traditional beliefs were considered to prevent road crashes, such as praying or *Jack Terk*. This showed the important role of cultural and religious belief among primary participants (I). In addition to the belief in Karma, these might lead to a perception that road crashes were accidents and could not be prevented through direct interventions such as prevention of drink driving, speeding, dangerous overtaking or engineering treatments. Therefore, it might require a comprehensive explanation of road crash preventing concepts through community based programs, such as local focus group discussion or training sessions, in addition to short public awareness messages.

6.6 PERCEPTION OF INADEQUATE EMERGENCY RESPONSE

Around two hours after the crash, we managed to hire a remorque to transport us to K.Chhnang provincial hospital. [KChhn03, 32 years old, rural area, amputee]

As presented in Section 4.4: Health System and Policies, the Cambodian health facilities consist of public facilities (hospitals and health centres), private facilities (clinics, pharmacies) and traditional care (traditional healers). The primary participants (I) in this study experienced the different types of health facilities for their emergency responses, including the national emergency number and ambulance services. This section presents their perception on the emergency responses after their road crashes, such as first aid at the crash scenes and transportation to the health facilities. Most of them (39 out of 46) accessed multiple health facilities during their emergency responses and treatment. Issues were identified as inadequate emergency responses, such as inappropriate support at crash scenes, limited ambulance services and long waiting time to be transported to the first health facility, before being transferred further to the next health facility.

Although 31 primary participants (I) did not explain in detail their open wounds and limb fractures, 20 of them resulted in arm or leg amputation, while 11 sustained functional limitation. The other 15 described their spinal cord injuries, without highlighting any open wounds. Detailed description and severity of their injuries could not be assessed since most of the descriptions were based on their perception, such as how big their open wounds were and how much bleeding they had, but were not based on any medical certificates from their health facilities.

6.6.1 Limited Coverage of the National Emergency Number and First Aid

First contacts for the emergency support were made mostly through phone calls to their family members, or they were supported by their friends (passengers/drivers in the same vehicles). Half of the primary participants (I) were injured in their local areas, near their homes or place of work. After the crashes, their neighbours or villagers informed their family members. No primary participant mentioned any national or local emergency numbers to access their emergency responses. Thirty-one primary participants (I) were not alone at the time of crashes, as they were travelling with their relatives or friends. The findings illustrated a weakness of the

national emergency number that was not fully known by the public, including all of the primary participants (I). Different modes of communication for the emergency responses presented a lack of standardised procedure, either in urban or rural areas.

Furthermore, proper emergency support at crash scenes involved physical assessment, such as the evaluation of airway, breathing and circulation, immobilisation and transport (Buchanan & Nawoczinski, 1987). One of the most important things to do is to stabilise a patient's head and neck (Bergeron et al., 2005). Based on interviews, primary support at crash scenes, as mentioned by 29 primary participants (I), included helping the injured person to stop bleeding, moving them out of their vehicles or to the roadside, lifting them up to a vehicle to the first health facilities and contacted their families or ambulance services. Road crash was mentioned as one of the common causes of spinal cord injuries (Bergeron et al., 2005). The support that was provided by people around was limited without any proper first aid skills and equipment, compared to the concepts and management approaches, illustrated by Buchanan and Nawoczinski (1987) and Bergeron et al. (2005). It is crucial to ensure immobilisation of the primary participants (I) until the support of paramedical personnel arrived (Bergeron et al., 2005; Buchanan & Nawoczinski, 1987). This required supporting facilities such as cervical collar and spinal board to immobilise backs and heads of patients (Bergeron et al., 2005; Buchanan & Nawoczinski, 1987). However, none of the primary participants (I) with para/tetraplegia mentioned these facilities and procedures. The improper lifting up to a vehicle without applying a cervical collar and spinal board might be one of the factors that contributed to the severity of injury of persons with spinal cord injuries. This type of improper extrication was mentioned by nine out of 15 primary participants, who sustained spinal cord injuries. Right after the crashes, all of them were unable to move their hands and/or legs, but they said they did not have much pain at that time. However, once they were lifted up into a vehicle or pulled, they experienced considerable pain on either their necks or backs.

6.6.2 Limited Ambulance Services

Transport modes of the primary participants (I) to the first health facilities varied. Ambulance was mentioned by 16 (35%) primary participants (I) as their mode of transport to the first health facilities, while the rest were transported by other modes, such as motorbikes (one in urban area, eight in rural areas), and

goods/passengers vehicles (10). A study in Cambodia indicated that only 28% of severely injured patients were transported by ambulance services to their first health facilities in 2007 (Nakahara et al., 2010). Four out of 15 primary participants (I) with para/tetraplegia were transported by ambulance.

Only two primary participants (I) mentioned the involvement of the traffic police in providing first aid or supporting them to transfer to the first health facilities in Battambang. Detailed description of the first aid and facility in the police ambulance was not provided. Hence, the quality of the emergency responses provided by the traffic police unit was not assessed, although the two primary participants (I) expressed their thankfulness to the services. This finding highlights the limited role of the local traffic police in the emergency response, although their roles were mentioned in the compensation and negotiation processes by 20 primary participants (I).

Table A3.29 in Appendix 3 presents the transport modes after the crashes to the first health facilities. In the table, “local transports” include agricultural vehicles (*Kor Yorn*), remorque, and being carried on someone’s back. This local transport mode was mentioned by five primary participants (I) in rural areas, compared to only one in an urban area. It is important to note that 10 out of 17 primary participants (I) in urban areas were transported by an ambulance, compared to six out of 29 in rural areas.

Due to the lack of ambulances, those who travelled by motorbikes to their first health facility sat as a passenger behind their motorbike drivers with or without another passenger to support them on the back of the motorbikes. During the motorbike trips, without applying any cervical collar and spinal board to immobilise their backs and heads, difficulties and painfulness were mentioned by the primary participants (I) with spinal cord injuries. It is also important to note that only four out of 15 primary participants (I) with paraplegia/tetraplegia were transported by an ambulance to their first health facility, while four were transported by motorbikes.

Although no question was asked about facilities and support while transporting by an ambulance, two primary participants (I) mentioned about the lack of facilities in their ambulance. They said the ambulance was just a vehicle for transporting people and enabled them to lie down. However, there was no other facility. Other

primary participants (I) who were transported by vehicles other than ambulance did not have access to first aid treatment.

The findings illustrate the lack of ambulance services for such severe cases that led to those long term impairments among the primary participants (I). The limited services were more likely in rural areas. Because of this, other options were used and might have led to increasing the injury severity.

Only 18 out of all primary participants (I) believed they had been transported to their first health facilities in less than 30 minutes after their crashes. Among them, four were transported by an ambulance, while the others needed to access other transport modes such as motorbikes (5), cars or trucks (6) and local transport, available in their areas (2). It is also important to note that six primary participants (I) reported that they waited for over one hour for the ambulance service. One of them complained about having to negotiate with the ambulance driver about his ability to pay before the service was offered. Although there was no specific question about the amount to be paid for ambulance services, five primary participants (I) said they paid for the services.

Therefore, inadequate emergency responses reported or perceived by participants included lack of a published and dedicated emergency number, inappropriate first aid at the crash scenes and lack of proper emergency transport modes. The validity of these perceptions warrants further investigation. The primary participants (I) in rural areas were faced with a shortage of ambulance services. Because of this, many of them had to choose other transport modes such as motorbikes and agricultural vehicles for their emergency transportation to the health facilities, without cervical collars or spinal boards for spinal cord injured participants.

6.7 LACK OF ACCESS TO LONG TERM CARE

I was sent to Oudong hospital, then they referred me to Calmette Hospital. I spent around two months in all three hospitals, around one week in Calmette, one week with the traditional healer, and then at the Sihanouk hospital.
[KChhn01, 20 years old, rural area, amputee]

In this section, long term care refers to the stage of post-crash care after being transferred from the emergency section (i.e. up to six months after the crash). The primary participants (I) reported that post-crash care was provided through different types of care facilities, which included medical services (public health facilities in the provinces and Phnom Penh, private services) and traditional healers. According to the accounts of participants, these care providers had varying capacity and different quality of care.

6.7.1 A Mix of Accessing Medical Services and Traditional Healers

Most primary participants (I) sought treatment in at least two care facilities, with at least two-thirds visiting public hospitals in Phnom Penh or provincial hospitals (including the Emergency Hospital in Battambang Province which provided free service until 2012). Among other biomedical services, health centres, private health services and emergency hospitals were each visited by between one-fifth and one-third of participants. Traditional healers were visited by about one-third of participants, who also accessed biomedical services, either before or after visiting the healers. Two primary participants (I) with tetraplegia plus an amputee travelled to Vietnam for treatment. Some of these facilities would have been visited multiple times by the primary participants (I).

Different Types of the First Care Facilities

The care facilities include those visited for long term care as well as the participants' first point of contact with medical or traditional services. When asked about this first point of contact, more than half reported that they accessed provincial hospitals or health centres (11) as their first health facilities. Very few were transported firstly to public hospitals in Phnom Penh, though most visited these hospitals for later treatment. It is interesting to note that a small number of primary participants (I) in rural areas accessed traditional healers first.

Many Referrals and Re-admission before the Final Treatment

The primary participants (I) accessed and left their care facilities (medical services or traditional healer) through a mixture of different ways:

- being referred by health professionals to another hospital for an advanced health care service
- being discharged as advised by hospital staff

- re-admitted to a health facility without being referred
- requested to leave a health facility by themselves or family members (avoiding amputation, lower cost, better treatment quality)

As the pattern of care service usage suggests, most primary participants (I) visited more than one facility, with just over half receiving services from hospitals in Phnom Penh at some point. More than two-thirds of the primary participants (I) reported their visits directly from their first care facility to a second, while others returned home after initial treatment and went to other care facilities later. The general flow for participants who were transported to more than one care facility was an initial visit to a clinic/health centre in the area, followed by transfer to provincial hospitals in provincial towns or to Phnom Penh, with some having a third move from a provincial hospital to Phnom Penh. It is important to note that a study conducted in two referral hospitals in Cambodia highlighted an issue of limited information on discharged diagnosis and to track discharged patients, with a lack of a coordinated system in terms of referring and transferring patients (Yan et al., 2015).

Before the referrals, public hospitals and health centres in provinces provided basic first aid such as cleaning injuries, stopping bleeding and arranging ambulance services to transport to the second health facility. During their trips from one health facility to another, 16 primary participants (I) were transported by ambulance from their first health facility to the second one. Six primary participants (I) needed to arrange their own transportation, such as hiring passenger cars, motorbike and a local transport (a remorque: motorbike with a cart). The remaining participants did not access other health facilities or did not mention their transport mode during the interviews.

6.7.2 Issues Related to Medical Services

Changing Medical Care Facilities for Avoiding Amputation, Better Treatment Quality and Lower Cost

Medical services included health centres, hospitals (in provinces and Phnom Penh) and private clinics. At least 15 primary participants (I) reported that they decided to visit other medical facilities based on their discussion with their family members. There were various reasons for changing health facilities in Phnom Penh as well as in provinces. One of the main reasons was trying to keep their legs, as mentioned by 11 primary participants (I). They reported that they decided to transfer

to other health facilities because they did not want to have their legs amputated by their current health staff. They wanted to look for any other opportunity to keep them. In the end, only one of them was able to keep their leg, but it was not functioning well as a result of the accident. Additionally, being referred to many health facilities is an issue, mentioned by three primary participants (I), who believed that their injuries might be better treated if they had had access to a proper hospital right after the crash.

Another reason related to by 13 primary participants (I) was the limited capacity of the current hospitals. Among them, three said that the limited capacity was admitted by hospital staff, who suggested further referrals. Those staff expressed their inability to provide treatment as the cases were very severe. The other primary participants described their observation of limited equipment in hospitals, being left out without proper care, no progress on their treatment or receiving only basic first aid, such as stopping the bleeding or primarily cleaning open wounds, without further operations. Due to these observations, they decided to move out to other health facilities.

Limited financial resources and inability to pay for the treatment were also a reason among four primary participants (I), who decided to discharge themselves from hospital and looked for less expensive services, such as traditional healer or other hospitals. Nine primary participants (I) raised an issue about money, as they needed to pay for everything, such as medication, blood tests, operations, scans, room fee and for having better service from hospital staff to be well taken care. The hospital services cost them a lot of money and they considered them to be expensive. Service cost is different among public hospitals in Phnom Penh and provinces.

Length of Time Spent for Treatment

Almost half of the primary participants (I) spent one to three months in health facilities (hospitals or health centres). Most of this group were amputees and those with functional limitation. The majority of participants with paraplegia/tetraplegia reported spending six months up to more than a year in a spinal cord rehabilitation centre, though a small number had only short term treatment of less than three months.

Advanced Payment before Receiving Treatment

Requests for advance payment was one of complaints raised by 15 primary participants (I), almost half of whom experienced this issue in the emergency room in Calmette Hospital, a public hospital in Phnom Penh. Among the 15, six said they were left without any treatment until their relatives arrived and paid for the services. Another seven were able to pay before receiving the services. The findings highlighted an issue of having cash in hand in order to receive the treatment. Given the absence of a social protection scheme, all primary participants (I) needed to have a capacity to pay for the services, either themselves or from their family members. Although there is an official letter, issued by the Minister of Health to advise all hospitals to provide services before asking for payment, in practice, payment systems are still upfront in the emergency rooms. More information about the payment systems is presented in Section 4.4.3: Public Health Facilities.

Only one primary participant (I) mentioned the service in a provincial hospital that was free of charge because he had a poverty card⁶, which was recognised by the Health Equity Funds scheme⁷. Additionally, the Emergency Hospital in Battambang province was mentioned by 13 primary participants (I) as being provided free of charge to most of them. The hospital provided their services to nine primary participants (I) and refused treatment to another four. All participants who stayed in the hospital appraised the service as very high quality and they felt very comfortable to stay there. Reasons of refusals were given such as the patient was not severely injured enough to receive the treatment, the hospital did not specialise in spinal cord injury and the patient was already treated by other hospitals. Those four primary participants (I) needed to accessed a traditional healer service (1) and other provincial hospitals (3).

Therefore, there are different types of first health facilities and a mix of process in accessing and leaving health facilities. It is common that in developing countries, such as Cambodia, health facilities are set up in a different capacity and quality, including basic facilities (such as health centres), general practitioner hospitals (such as provincial hospitals) and specialist or tertiary hospitals, which are mostly in

⁶ A card that enables a holder to benefit from a subsidy of health care cost in some public hospitals

⁷ A scheme that provides a subsidy to cover health care cost of patients in some public hospitals. More information about the scheme is presented in Section 4.4.3: Public Health Facilities.

Phnom Penh (Ministry of Health, 2008b; WHO, 2004a). Patients can be transported firstly to the nearest health facilities for primary medical care, before being referred to another one for a higher level of care in a more advanced health care facility (WHO, 2005). However, the research findings highlight an important issue of the mixing procedure in changing from one health facility to another that is not only based on a formal referral system or proper discharge by a hospital staff. It includes a decision on leaving or readmission to the health facility by the primary participants (I) and (II), and the use of traditional healer services (as described in the section below). The study findings illustrated the limited capacity of the provincial health facilities, which referred most of the primary participants (I) to Phnom Penh and the lack of belief among the primary participants (I) and (II) in the capacity and quality of the health care services in Cambodia. Yan et al. (2015) also highlighted that there was a lack of central point of entry, inefficiencies, delays in care and inconsistencies in treatment at the emergency department in referral hospitals in Cambodia.

6.7.3 Traditional Healers

Description of the Traditional Treatment

In Khmer language, traditional healer was addressed as *Krou Khmer* by all primary participants (I) and their families. The description of the traditional healer services is presented in Section 4.4.5: Traditional Healers and in 0. The services were provided to 16 primary participants (I) in different forms, including an invisible treatment such as *Sdos/Phlom*, *Sroch Terk* or burned stick and visible one such as slight grill, using braces and physical therapy.

In addition to those services, traditional medicine was also used during the treatment process to four primary participants (I), who expressed that they did not know what those medicines were, but just took them by boiling them with water. The medicine included different types of leafs and roots. Traditional services were provided at traditional healers' places or at the primary participants' houses. Four primary participants (I) mentioned about having the traditional services in conjunction with formal health services. They visited or stayed at the traditional healers' places, followed traditional advice and practice, but also took medicine, following a prescription from doctors at formal hospitals and local private service.

Avoiding amputation and lower cost of treatment were the main reasons for seeking the traditional services, as mentioned by seven primary participants (I). Two of them could keep their legs, but currently are not functioning well. Two needed to come back to the public hospital services, after recognising that their legs were getting worse. Both of them were finally amputated.

A Mix of Perceptions and Experiences on the Traditional Healer Services

The primary participants (I) had different experiences and point of views on traditional healer services. As a positive point of view, four primary participants (I) accessed and were satisfied with the services, although they sustained functional limitation and became paraplegic and tetraplegic. On the other hand, 12 participants also received the services but were not satisfied. Among them six are persons with paraplegia and tetraplegia. They kept looking for traditional services in addition to the health services from hospitals because they were hoping for improvement in their condition. After receiving traditional services, they did not find any improvement. Two other primary participants (I) went back to seek health service from hospitals. Another one accepted the unsatisfactory service and did not go back to his hospital because he did not want to be blamed by hospital staff.

Seven primary participants (I) decided to access treatment services from formal health facilities because they considered that traditional healers would be able to provide treatment for less severe injuries, such as broken bones without open wound only. Additionally, three primary participants (I) gave examples of unsuccessful treatments to their relatives previously as a reason for not going to a traditional healer.

At the same time, another two primary participants (I) and their families expressed their regret at not having a chance to seek traditional services. Both of them needed to stay in formal health facilities because their costs were covered by an employer and an organisation, which implemented “poverty card” and “health equity fund scheme”. They thought that if they were treated by traditional healers, their legs would not have been amputated.

A physical therapy was also mentioned by six primary participants (I) with spinal cord injuries and another one with functional limitation. The therapy mostly involved massages on their bodies with different types of oil or locally produced

wine to release their pains. Only one primary participant (I) among those with spinal cord injuries mentioned a benefit of the service, as he could move his hand and was able to sit. The others did not observe any improvement and decided to terminate the services.

Therefore, accessing traditional services emphasised the traditional belief in such traditional medication practices, in addition to the cultural and religious belief related to road crash attributions. At the same time, it clearly illustrated that the primary participants (I) chose this service as an option, in the absence of proper and insufficient formal health system and unaffordable cost for the treatment, especially for poor communities. This is another factor that presented the impact of being poor, since they needed to access the lowest cost option, which might result in delaying proper treatment and having more severe long term impairments.

6.8 BENEFITS AND SIDE EFFECTS OF INSURANCE SERVICES

The company finally paid us USD2,000. They did not want to pay us this amount at all. It was because my relative, who had a very high position helped us. If we don't have a powerful relative, we might not get such compensation. They said that \$1,500 is already too much. [KCham01, 60 years old, urban area, amputee]

There were at least four insurance companies in Cambodia that provided insurance services related to road traffic crashes and injuries. The services included "motor vehicle insurance" and "personal accident" ("Asia Insurance (Cambodia) Plc," 2015; "Cambodian National Insurance Company ", 2012; "FORTE Insurance," 2011; "Infinity Insurance," 2007). The motor vehicle insurance provides different types of coverage, such as third party liability, passenger liability and own damage. Personal accident coverage includes financial compensation for a fatality, injury or disability due to accident. According to the Cambodian Traffic Law, only commercial vehicles have to have an insurance certificate (Royal Government of Cambodia, 2014). However, the law does not specify what type of insurance service this should be.

The third party insurance and personal accident coverage insurance were reported by six primary participants (I). The third party insurance service was

received by three primary participants (I). One specific insurance company was mentioned by two primary participants (I), who complained about the service. Both participants (one in Phnom Penh and the other in Kampong Cham) mentioned the same issues of unfair compensation and the bargaining power of the company over them. The compensation was not enough to cover the cost of the treatment. The remaining cost was paid by the participants' families. They said they finally accepted the compensation because they did not have other options. One of them strongly emphasised the aggressive attitude of the company staff.

On the other hand, the third party insurance was also received by another primary participant (I), who appreciated the service and was satisfied with the compensation. The insurance staff visited him at the hospital, covered the cost of the treatment and provided the final compensation after the hospital discharge.

Moreover, the other two primary participants (I) were insured by insurance companies at the time of crashes as a personal accident coverage. Both of them are amputees. Their employers purchased the insurance service to cover the cost of accidents among all employees. They were satisfied with the services and did not mention any issue with the insurance companies.

Although the insurance was provided and the cost was covered, only one primary participant (I) did not need to pay the hospital for his treatment, as the insurance company worked directly with the hospital. The others needed to pay for their treatment first during their hospitalisation. The reimbursement and financial benefits were arranged later with the insurance companies.

In the absence of a social protection scheme from the government, an insurance system played a good role in covering the treatment cost of some primary participants (I). On the one hand, it compensated the losses and reduced the impact on the individuals and families. On the other hand, bargaining power and unfair practices existed and led to unfair compensation. It was also one of the factors that showed the impact on the poor who had no bargaining power over the insurance industries, which were supported by the local authorities. It also presented a loophole in the insurance system management and the insufficient role of the government to manage the system properly. Therefore, it is necessary to have an insurance system in Cambodia, but better actions are also needed to ensure a proper delivery of the

services. At the same time, given such an important role, the insurance system was not mentioned in the health national policies, NRSAP and NDSP.

6.9 IMPACTS OF DISABILITIES ON THE INDIVIDUALS AND THEIR FAMILIES

In this section, the themes that emerged relating to the impacts of disabilities are described under the following headings:

- Physical well-being: description of their physical body, health status, function, impairments or state of being painful
- Psychological well-being (or emotional well-being): such as state of happiness/sadness, contentment, fulfilments, etc.
- Economic well-being: financial status, cost of road crashes, etc.
- Social well-being: includes their perception on their social status such as in education, career, roles in their families, etc.
- Societal barriers: description of social and environmental obstacles that hidden their full participation in societies

In Cambodia, families might involve more than two generations and include not only parents and children, but also grandparents and others based on marriage, adoption or ties of blood (Knight, 2000). As family members among Asian nations, they provide support, material and security to each other and require each of them to reciprocate, although the support and responsibility might be to a different extent among each family (Croll, 2010; Irwin, 1996). According to Cambodian-Australian Welfare Council Inc. (2010), as part of the Khmer cultural attitude, family members consult each other, especially the elders, such as grandparents, parents and older siblings to find solutions to problems affecting any family member. Almost 80% of households in Cambodia are headed by men (National Institute of Statistics, 2014). In this research, the primary participants (I) and their family members lived in the same households, most of the time, had meals together and they shared their income to cover overall family expenses. Therefore, once a family member is unable to generate any income or needs any assistance, including daily care, the other family members need to share responsibility to compensate for the loss. The impairments

and disabilities of a family member impact on expenses, income, time spent caring, and the lifestyle and living standard of the whole family (Narayan, Patel, Schafft, Rademacher, & Koch-Schulte, 2000; Palmer, 2011; Taksdal, 2011; WHO & WorldBank, 2011). The impacts of disabilities on families was reported by the primary participants (I) and (II) as a burden, as negative consequences for the well-being of the family as a whole.

The study did not attempt to measure the well-being based on international scales, but aimed to explore the contextual information, based on the perceptions of the primary participants (I) and (II). In brief, only one out of all primary participants (I) expressed his full satisfaction with what he has achieved, after becoming an amputee. Six primary participants (I) mentioned their living conditions as normal, compared to what they had before the crashes. Among them, three clearly emphasised their hard work in order to reach this normal condition. On the other hand, the remaining 39 primary participants (I) presented their dissatisfaction with their current situation, as a result of the road crashes. Their living condition was worse. They felt that if they had not had such crashes, they would have been in a better condition than they currently were.

6.9.1 Impairments Leading to a Decreased Sense of Physical Well-being

I am sick sometimes, but for my legs, I feel painful permanently, I feel so hot inside, and also contraction inside and it hurts. I feel painful permanently, just sometime a lot, sometime less. [BTB11, 38 years old, urban area, paraplegia]

Living with Pain

Having pain was mentioned by 28 primary participants (I). Different types of internal pain were reported, even years after the crashes. Five primary participants (I) complained about pain inside their bodies, especially their muscles, due to their long term impairments. One type of pain mentioned was in their backs, inside their chests and stomachs, or inside their injured legs when the temperature dropped. Additionally, at least six primary participants (I) reported painful contractions of muscles in their legs, arms or inside their organs. Such physical pains were described by 11 primary participants (I) who suffered so often after their crashes.

Another issue related to an unlocalised pain. They reported a painful feeling inside their bodies, but they could not identify exactly where the pain was. They could not point it out or physically touch it. Additionally, phantom pain was described as their perception of pain in missing parts of their limbs. They reported that both types of pain caused them agitation, anxiety or sometimes irritability. This type of psychological pain was mentioned by six primary participants (I).

Because of the pain, they needed to take medication, which they bought from pharmacies. Advice from SCRC staff not to take any medication and keep having regular physiotherapy was mentioned by five primary participants (I) who were discharged from the SCRC. They said they tried to overcome their pain and not take medication, but one of them still needed to take medication regularly, two did not take it at all and the remaining two took it intermittently. Medication was an issue as described in the following section.

There were seven primary participants (I) with para/tetraplegia who complained about their difficulty in defecating and urinating. They could not control their defecation and five of them needed assistance from their family members to help them. Another one primary participant (I) said he used a pill to defecate every two-three days. Because of such difficulty and hesitation to disturb others, one primary participant (I) said he decided to eat less food.

The impact on physical well-being was observed among the primary participants (I). Having different types of pain, including phantom limb pain and stump pain was mentioned by 28 primary participants. According to Song (2015) and Sinha, J.A., Heuvel, Arokiasamy, and Dijk (2014), phantom pain negatively influences the quality of life of people with disabilities, over and above their concurrent lack of hygiene and comfortable daily living. Such difficulties were observed among primary participants (I) of different socio-economic status. This might reflect an issue of family care for the primary participants (I), no matter whether the family was well-off or poor. WHO and WorldBank (2011) recognised pain as a common health condition among people with disabilities. A survey in 69 countries found that 55% of respondents experienced bodily aches and pains (WHO & WorldBank, 2011). WHO and WorldBank (2011) suggested rehabilitation services as a tool for pain management.

Medication Services and Lack of Physical Therapy Impacting Physical Well-being

Medication service and advice were an issue for the primary participants (I). Most of the primary participants (I) needed to pay for their medications, while only two mentioned receiving free services at health centres because of their poverty cards. After being discharged from hospital, six primary participants (I) reported that they had a medical prescription from their doctors to buy medication for one to three months. Additionally, 19 primary participants (I) accessed medical services at private pharmacies, without proper prescriptions. They or their family members went to the pharmacies and described their symptoms, such as pains in muscles, headache, fever, diarrhoea or a cold. Based on such a description, employees at the pharmacies selected some medications for them. Pharmacists or drug dispensers are willing to provide any medicine requested by customers without prescription and are usually the first place for rural people to seek treatment (Levine & Gardner, 2008).

There was a tendency to believe that a good medicine was the one that could cure them with a rapid effect. There were two cases where participants decided to go to pharmacies to have a rapid effect medication (to reduce their pain and fever) rather than accessing public health centre services, which provided them medication that was not considered as effective.

The quality of the services and over-prescribing were found as issues. Overdosing on medication which led to a further operation was mentioned by one primary participant (I). This finding is consistent with the report of Levine and Gardner (2008) on improper drug prescription and over dispensing. Most primary participants (I) complained about the private services and tended to appreciate the ones that could provide faster effects. The side effects of these medications might result in spending unnecessary money and having a worse health condition.

Positive results from physiotherapy were reported by five primary participants (I). They mentioned their regular exercises to keep walking with a crutch, moving around their houses or using their wheelchairs. Of these, two felt they had made progress in strengthening their legs by walking with a crutch, while another could manage simple daily tasks such as eating and sitting by himself. Among 15 primary participants (I) with para/tetraplegia, four received services at the PRC and eight

from the SCRC. However, two primary participants (I) said they were not advised about this when they went to PRCs for their wheelchairs.

In general, the primary participants (I) mentioned they were advised to stay in bed without moving for around two-three months with basic massage and passive movements of their hands and legs. Then, they were guided to do more physiotherapy as regular exercise two-three times a day in a room, equipped with basic facilities (as shown in Figure 6.1). Most of them said they had medication during their first two-three months in the centre, without describing what they were.



Figure 6.1: Physiotherapy hall in the SCRC

[Photo: Socheata Sann, 2014]

All primary participants (I) experienced very limited improvement, after staying in the SCRC for more than a year. Half of the eight (who accessed the SCRC services) were persons with paraplegia and another half with tetraplegia. They expected to have a full recovery, or at least be able to walk without using a wheelchair. Once they could not, they lost hope and thought that there was no progress, besides being able to move their hands and legs a little bit.

Additionally, at the beginning of their long term impairment, they believed taking medication was more effective than having physiotherapy. Three primary

participants (I) expressed hesitation in believing that physiotherapy would help them to cure their long term impairment without taking any medication. Eventually they realised that their impairment could not be cured by having medication. However, they did not believe physiotherapy would reduce the severity of their impairment or improve it. The lack of physiotherapy was observed among six primary participations (I) with para/tetraplegia. Although they did not acknowledge that the increasing severity of their impairment was due to their failure to do regular physiotherapy after their discharge, it was clear from their description that the physiotherapy they had undertaken was limited. For example, they did not have regular exercise, spent most of the time lying down on their bed and stayed only in their wheelchairs without exercising their legs. Additionally, four primary participants (I) claimed they felt hurt or dizzy when they tried to do exercise, and this became a reason for just stopping.

Moreover, exercising their legs by trying to stand up was seen to be much more relevant by three primary participants (I) with tetraplegia, compared with exercising their hands. They expressed that they wanted to be able to walk, without mentioning their ability to work with their hands. They displayed the bamboo poles they used to support themselves with when they exercised, as advised by SCRC staff, but did not talk about their hand exercises. All of them described how their hands have been less functional, compared to previously. For example, they could not raise them up and down as before and could not write as well as before.

Therefore, positive feedback on physiotherapy was mentioned by some primary participants (I), but lack of belief in its effectiveness was also observed among most primary participants (I), especially those with para/tetraplegia. A study in Thailand also presented the same issue of limited physical exercise among its research participants (J. King & King, 2011). Such physical inactivity might lead to the more critical condition of long term impairment (WHO & WorldBank, 2011). This suggests a need for better counselling services to persuade them to undertake physiotherapy and highlight the importance of the exercises and what will happen if they do not do it regularly. At the same time, the lack of proper physiotherapy services might contribute, and has been identified as an issue in low income countries more generally (WHO & WorldBank, 2011). Moreover, the aim of being able to walk is a more important focus for them. Since they lost this ability, they also

lost their concentration on their ability to use their hands. This might lead to more severe impairment of their hands and the loss of the ability to work with their hands.

Moving with difficulty

All of the primary participants (I) with amputation and paraplegia were able to move around, while two out of seven primary participants (I) with tetraplegia were not able to move their legs and hands at all. Both of them just lay on their bed all the time. Their life had changed from being active every day to being permanently bedridden. They could not express their feelings in words, but they showed their disappointment and sadness on their faces. Those who could move expressed their difficulty in carrying out day to day activities. For example, they could no longer walk around the house without a prosthesis or wheelchair unless they were kneeling on the ground, or handle things needed for bathing, toileting, eating, writing, drinking, and so on.

Lack of Hygiene and Comfortable Daily Living

An issue of hygiene and cleanliness was observed during the interviews. Initial contacts were made with only 33 primary participants (I), prior to the first interviews at their houses, while appointments were made in advance for all of the second interviews. Whether they were informed in advance or not, the status of their hygiene and cleanliness was much the same for both interviews. Among them, three primary participants (I) were in the worst conditions of hygiene such as an uneasy irritating sensation on his skin, insufficient bathing and cleaning, dilapidated wheelchair, unchanged catheter bag of urine, uncleaned bed sore and so on.

Twenty-one primary participants (I) were in a better condition, but still lived in an unclean environment, such as dirty clothes and fingernails, dusty beds and tables, unseparated living rooms, bedrooms and kitchens. Around half of them did not dress properly, as they just put on their underpants without trousers⁸. Six of them did not have access to proper toilets, either because the toilets were not accessible with their wheelchairs, or were difficult to use because of their amputation. Seventeen lived in small houses, and the family did not own a vehicle. The remaining 22 were in a

⁸ In Cambodia, some people just put on their underpants inside their houses and among their families, but they need to dress in trousers or other clothes when they have any guest at home to show their courtesy.

better condition, well dressed and clean. Many of them lived in concrete houses, with at least one vehicle.

Sanitation is an issue that was recognised by WHO and WorldBank (2011) as a factor that can cause poorer health condition of persons with disabilities, especially those living in a poor condition. Palmer (2011) included sanitation as a basic need and considered its lack as characteristic of poverty. The disability and poverty cycle is discussed more in Section 8.7: Disability and Poverty Cycle.

6.9.2 Impact on Physical Well-being of Family Members

Important Role of Family Members during Treatment

One of the impacts was the time consumed in taking care of the primary participants (I) during their treatment in hospitals, private clinics or at traditional healers' places. This represented the workload required of family members to cover the gaps not addressed by the treatment services that they paid for. The support included preparing food, assisting the primary participants (I) to have a bath or go to toilet. Most of the carers needed to leave their work or home and stay overnight with the primary participants (I) at the health facilities or traditional healers' places. This also involved additional expenses to cover their food, accommodation (if they stayed near the treatment places) and transportation cost. Although the study did not attempt to conduct an overall evaluation of the health system in Cambodia, the heavy responsibility borne by family members during treatment at least shows the need for strengthening the health system in order to reduce the burden on the families.

Increasing Responsibility for Family Members after Treatment

During the interviews and observations, almost all of the primary participants (II) mentioned their support and care responsibilities for the primary participants (I) in a good, supportive and loving way. Most of the primary participants (I) also clearly expressed their thankfulness for the support and care of their family members. All of the primary participants (II) emphasised their difficulties, especially during the first year of the long term impairment. These difficulties were mostly due to the time they needed to take care of the primary participants (I) at home after treatment, in addition to their normal work. Some primary participants (II) needed to go out to work to replace the role of the primary participants (I) as a breadwinner and be carers

after work. It became an ongoing burden, reported as a constant cycle of care from day to day, especially for persons with paraplegia and tetraplegia. J. King and King (2011) and WHO and WorldBank (2011) recognised the responsibilities of family members as caregivers and noted that caregivers often have limited knowledge and skills in providing appropriate care or identifying health problems of the persons with disabilities (WHO & WorldBank, 2011). They proposed actions to support family members such as training in health care and psychosocial services (WHO & WorldBank, 2011).

Greater Impact on Female Family Members

It is important to notice that most (39 out of 46) of the primary participants (I) were taken care of by their wives (23) or mothers (16). The primary participants (II) who are wives of the primary participants (I) perceived themselves as having a responsibility to take care of their husbands. None of them rejected or refused this responsibility, although some of them complained about the hard work and how it made them tired. Half of the mothers providing care were at least 60 years old at the time of the interviews and continued to provide care to their sons. This expressed how female family members perceived their roles and acted accordingly. Their work as a caregiver was added to their domestic responsibilities, and their work outside to generate income to compensate the loss of the family breadwinner's job. Palmer (2011) and J. King and King (2011) found the same burden on the female family members in taking more responsibility of care of the persons with disabilities. Additionally, Narayan et al. (2000) concluded that generally, female-headed household might be able to generate less income than male-headed ones. This also implies that the families are more vulnerable to poverty, compared to the income generated before the road crashes.

6.9.3 Impairments Impacting Psychological Well-being

Receiving Counselling Services with Limited Impact on Psychological Well-being

Counselling services from PRCs and SCRC were described by six primary participants (I), to get them used to their new life, to give them motivation to stand up for themselves, to encourage them by exposing them to the successful experiences of other persons with disabilities, to recommend vocational training courses, to encourage them to set up a new business, or to refer them to other organisations for

further support, if they wished. Besides referral for further support, few primary participants (I) could recall a benefit of the counselling services. Other primary participants (I) either did not mention benefits or said that they did not receive counselling, even though the service was claimed by staff in PRC and SCRC to always be part of their overall activities. WHO and WorldBank (2011) emphasised counselling as a factor to support persons with disabilities in identifying job opportunities and increase their chance in the labour market.

Expression of Depression

Symptoms of depression were captured and observed among most of the primary participants (I) to varying extents based on their description, such as crying, difficulties in sleeping, loss of weight, loss of interest in life. Most of them said they had experienced those depressive characteristics, especially during the first year after the crash. As time went by they gradually experience less depression by accepting the fact of losing their function and adjusting to their disability and life. One of the symptoms was suicidal ideation, which was mentioned by 13 primary participants (I). They said that there was at least one moment, after the crash, when they did not want to continue living; they just wanted to kill themselves. The moment of suicidal ideation happened soon after they recognised their impairment was long term. Ten of the 13 said they changed their mind fairly quickly and decided to continue living. They gave several reasons such as motivation from people around them, especially family members, examples of other persons with disabilities, and to be strong for their kids. On the other hand, the other three were still evidently depressed during the in-depth interviews without displaying any interest in living.

Besides an expression of suicidal ideation, there were other examples of depressive symptoms such as feeling low, stressfulness, worry, sadness, feeling miserable, feeling worthless, agitation, anxiety, irritability, sleep disturbance, loss of appetite and weight, poor concentration and memory. These varying examples of depression were given by 37 primary participants (I), and they were experienced to different extents. In addition, body language consistent with depression was observed during the interviews, such as sad faces, tears in their eyes, psychomotor retardation, lack of energy, lack of enjoyment and thinness of their bodies.

The primary participants (I) mentioned how their depression symptoms occurred at different times. Eighteen of them said they were much better and back to

normal, mostly after their first or second year. On the other hand, 10 primary participants still showed some of the symptoms during the interviews. Notable was one primary participant (I) with tetraplegia who decided to eat less and less and responded to the researcher in a much weaker voice in the second interview. WHO and WorldBank (2011) also clearly mentioned depression as a common secondary condition that may reduce functioning and quality of life, and increase health care costs among persons with disabilities. Additionally, persons with disabilities who experience depression may have a higher risk of premature death (WHO & WorldBank, 2011).

In addition, at least eight primary participants (II) reported their anxiety, tiredness and the demands of the hard work that they need to handle because of the disability of their family members. At the same time, two of them explicitly reported depression as a result of their husbands' disabilities. Although the others did not say so directly, their body language expressed their feelings about the burden of care, such as a deep breath, or an unhappy face. Additionally, because of the changes to their lives after the crash, most of the primary participants (II) expressed their uncertainty about the future. They were not sure what they were going to do and they mentioned their hopelessness.

Less Social Participation Because of Shame and Stigma

A feeling of "shame" was mentioned by 28 primary participants (I). There were two main reasons for being ashamed. One related to the changes in the body, such as amputation or an altered gait because of their functional limitation. The second reason was the reduction in their ability to earn income. The primary participants (I) used to be proud of themselves as breadwinners in their families. They said after the crashes, they could not earn as much as before, and most of them observed the lower status of their families in their communities, because of their relatively lower income. Additionally, shame and stigma were mentioned by six primary participants (II) who were wives.

The interesting point is that physical barriers were not mentioned as much as those related to shame and stigma. Their description of being ashamed shows that they compared themselves before and after the crashes and to the others in terms of body appearance and wealth. All of them mentioned that they decided to keep themselves at home to be away from other people. Narayan et al. (2000) presented

shame as a psychological dimension of poverty. Because of this, persons with disabilities might lose access to social networks (Narayan et al., 2000).

Because of such experiences and the times family members needed to take care of the primary participants (I), they decided to stay at home more often and have less communication with their communities. This kind of stigma issue, which leads to less opportunity for social interaction, is also recognised in the conceptual review of Palmer (2011). A study in Pakistan identified stigma as a cause of distress for family members (WHO & WorldBank, 2011). Reducing shame and stigma among the family members might help to increase interpersonal relationships, leisure, employment and social activities (WHO & WorldBank, 2011).

Psychological support from families

Psychological support in the form of encouragement and motivation from their families was mentioned by 13 primary participants (I). As an example, there was a positive perception of the primary participants (II) as supporting and encouraging the primary participants (I) to take chances for better opportunities, such as encouraging them to attend training courses. This was described by three primary participants (I) and five primary participants (II). Another example was given by 10 primary participants (I) who mentioned how their families kept motivating them to continue living with their long term impairments. Because of the support, six of them said they decided not to suicide. A respectful manner from family members was also mentioned by two primary participants (I) and their daughters during the interviews. Although they were both injured and sustained functional limitation, they were both respected and regarded as the family leaders, and continued to provide advice to their wives and children in conducting their business. This illustrated the important role of the family members in psychologically support and motivated the primary participants (I) in living.

However, the other 33 primary participants (I) did not mention such support and encouragement. Follow-up questions were not asked to confirm whether they had received such support or not. Four wives had left their now-impaired husbands after the crashes. They could not be contacted for further information, but according to other family members they could not handle the challenges of supporting their husbands and decided to start new lives without the primary participants (I).

Feelings of Pity among the Family Members and its Unintended Effect

Primary participants (II) often expressed feelings of pity for the primary participants (I) and their disabilities. During the interviews, it was observed that 13 primary participants (II) expressed their feeling of compassion and deep awareness of the suffering of the primary participants (I) through their sad faces and eyes, and their slow motions in describing the situation after the crash. The sadness and tears could be observed among eight primary participants (II) when they were asked about the difficulties of the primary participants (I). They could not say a word, but their faces evidenced their answers.

Although this was intended to express care, worry, love and concern, it had had an unintended negative effect on the primary participants (I). When the primary participants (II) expressed their worry about the future of the primary participants (I), they also expressed their concern about the limited ability of the primary participants (I) to get a job, earn a living or get married. When the primary participants (I) heard and saw this, they became quiet and sad, and their faces and eyes expressed their acceptance and hopelessness. This could become a discouragement for the primary participants (I) and lead them to focus more on their impairment and inability than their ability.

Differing Expressions of Ability and Disability

Various types of difficulties and inabilities due to their long term impairments were described. Based on their descriptions and the researcher's observations, the primary participants (I) are classified into three groups as below.

The first group described their difficulties such as in sitting, standing or walking for a period of time, which led to having discomfort in their legs, waist or back. These also included their difficulties in performing daily tasks such as accessing their toilets. Apart from this, they did not talk about other things they would be unable to do, instead, they emphasised what they wanted to do and their ability to do it. One primary participant (I) with tetraplegia provided his long list of difficulties, but expressed his willingness to participate in society. Another primary participant (I) with paraplegia gave an example of how he still managed his business and travelled around, including getting married and having two children after the crash. Most of the primary participants (I) in this group (15 out of 17) were amputees or with functional limitation.

Another group provided examples of their difficulties in daily living, then also expressed their inability to do other things, mostly attributed to their decreased physical strength. They described what they could not do, rather than what they could do, such as inability to take care of themselves for daily activities, including feeding, bathing, toileting, moving in and out of their wheelchairs and beds. They also mentioned a decline in their memory and physical strength. On the other hand, they still expressed their hope in living with their family, interest in attending vocational training, or continuing their work on the farm. The term “having good legs and strong shoulders” was mentioned by five primary participants (I) to compare their pre and post-crash situation. This group tended to consider their long term impairments as their inabilities. More than half of this group (14 out of 20) were persons with amputee or functional limitation.

The third group expressed their hopelessness, and could not provide any future plan or explain what they could do. Their hopelessness was evident in their faces and they did not answer questions related to their difficulties, just showed a sad face or tears. It appeared to be an expression of feeling worthless. Six out of nine primary participants (I) in this group were persons with paraplegia and tetraplegia.

Therefore, it is more likely that the primary participants (I) tended to relate their long term impairments to their ability to work or study. Losing their legs or inability to move because of their paraplegia and tetraplegia were considered as losing their full ability to perform. This expressed their perception of depending on their legs but not on their brains and hands. It also presented their lack of awareness of disability inclusiveness and a belief on their ability to study or work within their long term impairments.

Perceptions of the Future, Mix of Ambition and Hopelessness

The primary participants (I) had different perceptions of their future. It is important to note that 13 of them said that they did not want to do anything else. All of them stayed at home and did not have a job. Retirement was one reason for this, as five of them were older than 60 years old. Severity of disability might be another, because six out of seven persons with tetraplegia are among those 13 people.

Seven primary participants (I) expressed their willingness to learn a new skill, but were not yet sure what they are going to do and where. Three had clear ideas

about what they wanted; two of them intending to register for a training course and the other already attending a course. Thirteen primary participants (I) mentioned their ambitions to extend their current activities or wanted to pursue a new challenge. All of them already had a job and clear ambitions about what they wanted to do in future. The other 10 primary participants (I) did not mention any ambitions to do anything in addition to their current job. They just wanted to continue with what they were doing.

Moreover, hopelessness, expressions of inability, suicidal ideation, and being ashamed were more likely among the primary participants (I) in rural areas than in urban areas. Narayan et al. (2000) also presented the expression of hopelessness among poor people and this explains a characteristic of poverty. Such low psychological well-being might impact more on them than among urban primary participants (I).

The expression of difficulties and inabilities was more likely to be linked to the severity of long term impairment. Those with more severe impairment (paraplegia and tetraplegia) were more likely to express their inability and hopelessness, compared to those with less severe impairments (amputation and functional limitation). Most did not express any ambitions, but rather mentioned that they did not want to do anything due to their severe long term impairment.

6.9.4 Impairments Reducing Economic Well-being

He stayed in hospital for 18 days. It costed us USD2,000-3,000. Then, we did not have any money left and we needed to bring him back home. We collected this money from our relatives around and borrowed from others. Now, he cannot pay back the debt. [Mother of BTB13, 42 years old, rural area, tetraplegia]

One of the first difficulties mentioned by all primary participants was the cost to cover their treatment and the expenses incurred by the family to take care of them. In addition to their expenses for hospital fees and medication, they also had to spend money on food, transportation costs of family members to hospital and costs for their children while they were away from home for their treatment. During the interviews, rough cost estimates were provided by 31 primary participants, as presented in Table A3.30 in Appendix 3. Free services for treatment were mentioned by eight primary participants (I) during their stay in the emergency hospital and SCRC. Based on the

occupation of the primary participants (I), their average monthly salary or income would be between USD50 to USD100. This showed that most of the primary participants (I) needed to spend at least one year's income to cover the cost of a single crash.

As mentioned by the primary participants (I) and (II), in Khmer culture, income earned by husbands and wives is pooled and considered family income. In the same way, the expenses resulting from their road crash are considered as family expenses (for those who were married at the time of the road crash). Among the 15 single primary participants (I), seven were still dependent on their parents at the time of their crashes. They described their cost as family expenses, without differentiating between the income earned by them, their wives or their parents. This was clearly mentioned as a family burden by 33 primary participants (I). At least 20 primary participants (I) in this study stated that their family members were financially supporting them after the road crash to cover their daily living costs.

As an impact of expenses to cover treatment and living costs, there was pressure on the family to pay back the debt that was borrowed, as mentioned by 13 primary participants (I). Eight of them were still in debt at the time of the interviews. Of these, two were persons with severe disabilities (tetraplegia) and were not able to earn income any more. At the same time, three families of the primary participants (I) had been obliged to sell their land and house to pay back the debt. Two of them needed to move to live with their parents and grandparents after they sold their own houses. Selling family property was also mentioned by another primary participant (I), although he did not mention any debt.

The amount that was presented in Table A3.30 was considered as their direct cost, while their opportunity cost was not included. Such opportunity cost was their monthly income that they needed to sacrifice because they could not earn after they were injured. After the crashes, only 13 primary participants (I) have continued to be the breadwinner, 21 did not contribute income at all, and 12 still worked outside, but generated less income for the family than before. None of them quantified the reduction of their family income, although for the 12 that could no longer work it can be estimated that their families lost between USD100 and USD500 per month.

The decrease of the family economic well-being and debts were clearly highlighted by Palmer (2011), J. King and King (2011), WHO and WorldBank

(2011) and (Narayan et al., 2000). The expenses of treatment and daily care, in addition to the drop in family income and opportunity cost leads whole families into poorer conditions, and may lead to poverty (Narayan et al., 2000; Palmer, 2011). This is an element in the disability and poverty cycle, which is discussed in the report of Narayan et al. (2000) and the conceptual review of Palmer (2011).

6.9.5 Loss of Social Well-being

Impairments Impacting on Marital Status

Only 26 out of 46 primary participants (I) are married and live with their wives and families. Fifteen are single. Additionally, four primary participants (I) mentioned their ex-wives, who left them after the crashes. One of the wives left home one month after the crash and took all three children with her. Another one decided to leave her husband, right after her family realised that the primary participant (I) would not fully recover.

Losing Jobs after Road Crashes

Road crashes leading to long term impairments and disabilities have an impact on the careers of most of the primary participants (I). Before their road crashes, none of the primary participants (I) was unemployed or stayed at home. Forty primary participants (I) were bread winners of the families, as they earned the family income. Twenty-three primary participants (I) were employed by the government, non-governmental organisations or private companies. After the crashes, 20 primary participants (I) expressed that they could not generate any income for their family anymore.

Table A3.32 in Appendix 3 presents the career/education changes of the primary participants (I) after the road crashes. Only seven primary participants (I) could keep working, while the others changed. The primary participants (I) with amputation were more likely to keep their job or find a new job, compared to the primary participants (I) with para/tetraplegia who mostly lost their jobs and stayed at home. It is also important to note that losing their job happened among most of the rural primary participants (I) (17 out of 29), while it was mentioned by only two out of 17 urban primary participants (I). This finding presented the impact of impairments that is more likely among severe disabilities (para/tetraplegia) and in rural areas.

Unemployment was an issue for persons with disabilities because of a discrimination and reluctance from employers who tried to avoid the additional cost of hiring them (WHO & WorldBank, 2011). Palmer (2011) and WHO and WorldBank (2011) highlighted a gap of unemployment between persons with disabilities and without disabilities, and concluded it as a factor of poverty among families with disabilities. Persons with disabilities experience employment discrimination through having less job opportunities and being paid less than persons without disabilities (WHO & WorldBank, 2011). The more severe the disabilities, the more discrimination they may have (WHO & WorldBank, 2011).

Dropping out of School after Road Crashes

Among seven primary participants (I) who were students (part-time and full-time) before crashes, five dropped out of school and have not returned to continue their formal education. Two of them just stayed at home without having any job. Being ashamed, transportation issue and inaccessible classrooms were the reasons for dropping out of school. Additionally, at least two of them mentioned their regret of losing the opportunity to work in their preferred field.

An issue of access to public buildings was one factor that hindered full participation of persons with disabilities in the education sector (WHO & WorldBank, 2011). Then, the education limitation led to less employment opportunity and put persons with disabilities into the risk of poverty (Narayan et al., 2000; Palmer, 2011).

Unrecognised Ability and Disappointment

Among those 30 participants (I) who lost their jobs, 18 were employed by the government (5) and private companies (13). At least nine of them clearly mentioned their disappointment with their employers, who did not pay attention to them after the crashes, made them lose their job or change their position to one of less responsibility. Most of them are persons with amputations and functional limitation, except one with paraplegia. Half of the persons with amputation and functional limitation expressed their ability to continue doing their job, but they were not considered as being so. It is interesting to note that three of them had a job in the government sector.

Loss of Roles and Status in Families

It is important to note the roles and status of the primary participants (I) in their families after the road crashes. These roles and status might link to their income generating capacity. Among the in-depth interviews with the 26 married primary participants (I), 17 interviews were attended by their wives who were involved in the interviews in different extents. Although the primary participants (I) mentioned about their changes in terms of income generation for their families, none of them raised any change related to their role and status in their families. On the other hand, the participations of their wives in the interviews tended to show how strong or limited their roles are in their families, compared to their husbands, after the road crashes. The stronger the role of the wives might reflect the reduced roles of the husbands in generating income for their families.

Among those wives, two did not say anything and did not show any interest in participating in the interviews. The husbands of the two wives had set up their shop and worked to earn income for the families. The wives supported their husbands through taking care of their children and helping to manage their shops. Both of the primary participants (I) were married after their crashes. It was clear in their interviews that both primary participants (I) earned a living for their family.

The other five wives responded to only a few questions when they were asked and did not contribute much during the interviews. One of the five wives worked intermittently in Thailand, while the other four did not have a job. Two out of the five primary participants (I) still continued their work in the government and as a farmer, although they expressed their difficulty in performing daily tasks and less income because of the road crashes. The other three primary participants (I) did not work anymore after the road crash, but they were financially supported by their children and the husband's mother. This showed the limited role of the wives in income generation for their families, and perhaps the stronger roles that the husbands still kept in the families.

The remaining 10 wives participated actively in the interviews and responded to many questions that were actually addressed to their husbands, who were breadwinners of the families before the crashes. Sometimes, the husbands stopped responding during the conversation and let their wives answer. All wives clearly emphasised their burden in taking care of their husbands (for paraplegia and

tetraplegia) and the heavier work they needed to handle after the crashes. These included their daily tasks of taking care of their children, farming and working hard outside to earn income. Of the wives, five stayed at home before the crashes, but needed to go out to get a job after. The husbands kept quiet to show their acceptance of the description by their wives of their hard work. Among the primary participants (I), three kept the same jobs as farmers, three got a new job, while the remaining lost their job and just stayed at home. Among those who still worked, they mentioned their reduced ability in generating income for their families. Although there was no comparative evidence of the husbands' role and status between before and after the crashes, the interviews and observations among the 10 primary participations (I) showed their lack of roles in the conversations, compared to their wives. This might reflect their limited roles in their families.

It is important to note that road crashes fully changed the life of 19 (41%) primary participants (I) who have never been back to their schools and previous jobs since the road crashes, as they only stayed at home. The primary participants (I) in rural areas are more likely to lose their social well-being than urban primary participants (I). Never returning to their workplace and schools and losing the role of breadwinner was more common among rural primary participants (I).

Moreover, those that were still able to keep their income generation roles were more likely to reply to all questions without being interrupted much by their wives, while those that fully lost their income generation capacity were reticent to speak during the conversation and let their wives answer. This might reflect their limited roles in their families in terms of decision making and being respected as a family leader. Narayan et al. (2000) mentioned about the expectation from society on the men's role in generating income. Once this role is changed due to job loss after their road crashes, there could be stressfulness, disintegration, aggressiveness, and anger (Narayan et al., 2000). The high proportion of unemployment among the primary participants (I) might illustrate the increased loss of social well-being in terms of career and status in their society, compared to the general population. In addition, the loss of social well-being also reflected the lack of a disability inclusive approach in society, such as physical and environmental barriers, transport accessibility and discrimination. These became the societal barriers as described in the section below.

6.9.6 Experiencing Societal and Environmental Barriers

Social and environmental barriers were obstacles for the primary participants (I) in performing their daily tasks at home, in their communities and at work. The barriers are summarised in this section into attitude of people around, physical environmental barriers, religions, transportation barriers and different types of social support. Through their description, it is interesting to note that those primary participants (I) tended to consider that those difficulties were due to their impairments, but not the impacts of those barriers that needed to be improved.

Attitude of People Around

Attitude of people around was one of the main issues raised by 35 primary participants (I). Different examples of the disturbing attitude of people around were given by most of the primary participants (I). Because of such attitudes, they decided to avoid them by reducing their participation or staying at home rather than going out. One of the examples related to aggressive behaviours by other people toward them, such as bullying words and their body languages making fun of their long term impairments. They said they would be more comfortable if people around them would just behave as normal, without giving any unusual attention to their disability.

Discrimination was another issue that was raised by 19 primary participants. Additionally, as part of the discrimination, nine primary participants (I) described a behaviour change in people they knew, but who have ignored them after the crashes. It is important to note that the term “discrimination” in Khmer was not understood well by five primary participants (I), who asked for clarification or needed further explanation and examples, such as being excluded from discussions, meetings or not having a fair opportunity for a job. Various reasons for being discriminated against were given. One of the reasons was linked to reducing wealth, and was given by five primary participants (I). Discouragement and despising behaviours were also mentioned by seven primary participants. Additionally, there were cases where they were not recruited or contacted for services because of their long term impairments, which were considered as affording less productivity or bringing bad luck that could be transferred to other people.

On the other hand, three primary participants (I) mentioned clearly that those people would change their perception when persons with disabilities could prove that they had money to buy the things they want, just the same as others, and they could

do things on their own and earn their living. Given such experiences, they fought for a life and stood up for themselves to prove their ability in living, just in the same conditions as other persons without disabilities.

In contrast, there were 12 primary participants (I) who mentioned that they did not have any issue with the people around them. They still could keep the same communication and relationship. They advanced similar reasons for this. They thought that people discriminated against others if the others have done something to disturb, hurt or harm anyone. They felt that they have not done any of these, so people in their villages still kept communicating with them as normal. Limited communication and contact might be a reason that they did not face any challenging circumstance. At the same time, there were four primary participants (I) who mentioned donations, such as money, rice, or some household goods, from their neighbours. The donation was provided as a sign of contributing to their living costs. They appreciated the donation in the absence of the overall social protection scheme.

It is interesting to note another attitude of people around related to being pitied, as mentioned by 19 primary participants (I). The concept of being pitied seemed fully accepted by all of them as a sign of showing sympathy and concern for their misfortune. They considered such an expression of pity as compassion from those people to denote deep awareness of their suffering. Additionally, the term “being pitied by other people” was connected directly to support from those people. Five primary participants (I) mentioned that those people who expressed their feeling of pity for them also provided support in terms of monetary value, rice or household materials, while another five said those people could not help them.

Therefore, primary participants (I) considered being pitied as a positive thing and a benefit to them in terms of support. On the other hand, it suggests that people in their communities still related “disability” to “inability”, becoming poorer and different from the rest of the community. They considered the persons with disabilities as people who needed charity and as being dependent in terms of support. This focus on individual support could divert attention from the elimination of societal barriers. Attitude of people towards persons with disabilities was identified as a factor that produces barriers to their participation in society (WHO & WorldBank, 2011). WHO and WorldBank (2011) identified such negative attitudes and behaviours of the communities as a factor that may lead to low self-esteem.

Changing the negative attitude in the society will improve the accessibility and participation of the persons with disabilities (WHO & WorldBank, 2011).

Physical/Environmental Barriers

Issues related to physical and environmental barriers, were mentioned by 14 primary participants (I) and five of them were para/tetraplegia. One of the barriers was a difficulty in accessing their classrooms, which were not on the ground floor, as mentioned by four primary participants. Among them, three said that it was one of the reasons they dropped out of school. Another barrier related to accessibility such as at a pagoda or other places where it was difficult for them to sit on the floor with their prosthesis. The other two complained about their houses where they needed to climb up the stairs. Only one primary participant (I) with a wheelchair mentioned about wheelchair inaccessibility along roads, such as lack of ramps, and in buildings, because of insufficient space for his wheelchair. Based on the response from most of the primary participants (I) the impact of environmental barriers was not a major concern.

On the other hand, the researcher observed significant environmental barriers during the interviews. Eighteen of the primary participants (I) lived in two-storey houses; eight were amputees, five had a functional limitation, four were paraplegics and one was a tetraplegic. Although none of the primary participants (I) complained about their houses, difficulties could be observed when they needed to use the stairs. Based on the observations during the interviews, six of them live on the ground floor only. Five of them are persons with para/tetraplegia. Additionally, only 34 of the 46 primary participants (I) live with their families and share the same bedrooms, without any separation. The remaining six have been separated to live on the ground floor of their houses and another six were set in a shelter, attached to or in front of the main houses.



Figure 6.2: House of a primary participant (I) who stayed only on the ground floor in Pursat
[By Socheata Sann, 2014]

Among 15 primary participants (I) with severe disabilities (tetraplegia and paraplegia), at least eight of them did not have an accessible toilet, based on the observations at their houses during the interviews. Their current toilets were either too small for their wheelchairs or were not high enough to accommodate their impairments. Accessible toilets for those with severe disabilities were observed among five primary participants (I), who constructed them or had them donated by two organisations after the road crashes.

Moreover, 13 out of 15 primary participants (I) with severe disabilities owned a wheelchair. However, based on the observation, eight of them lived in an environment that was not accessible in their wheelchairs. Of them, three did not use their wheelchairs at all, while the other five used it inside their backyard only. They needed assistance to push their wheelchairs if they wanted to go outside. At the same time, 26 primary participants' houses were along unpaved roads, which were not smooth and had potholes. During the rainy season, the roads are muddy. During the dry season, they are corrugated, as shown in Figure 6.3. All of those roads do not have pedestrian footpaths. This means they needed to walk or travelled with their wheelchairs on the same lanes as other vehicles.



Figure 6.3: A road to a primary participant (I) with tetraplegia in Battambang
[By Socheata Sann, 2014]

In addition, among the 18 primary participants (I) who live along a paved road, 13 of them needed to walk on road shoulders, without a proper footpath. These roads are also used by high speed vehicles, including trucks, as shown in Figure 6.4.



Figure 6.4: Paved road in front of a primary participant (I) in Kampong Cham
[By Socheata Sann, 2014]

Environmental barriers were also found in the study in Thailand and made the moving of persons with paraplegia and tetraplegia very difficult (J. King & King, 2011). WHO and WorldBank (2011) recommended the elimination of the environmental barriers to improve the accessibility of persons with disabilities in society.

Barriers Related to Religious

Although Karma was mentioned as a religious belief, none of the primary participants (I) described any restriction of their participation in religious events,

from a religion point of view. Full participation without any restriction in religious events was mentioned by 14 primary participants (I). On the other hand, another five raised some issues related to being uncomfortable to sit with their amputation and inability to travel. At the same time, three primary participants (I) said they were encouraged by the monks to sit in any style that felt comfortable with their prosthesis, without any hesitation. Additionally, there are various types of Khmer traditional games during Khmer religious ceremonies that involved running races, to hold, pull things or hop on and off. These could be a challenge for persons with disabilities to participate in. On the other hand, none of the primary participants (I) complained about the process of the games. Instead, two primary participants (I) said they could only stand outside and watch because they felt ashamed in front of the others. Impacts and barriers related to religion for persons with disabilities, besides the belief in Karma or misfortunes, were not found in the literature review.

Wheelchairs and Prostheses Do Not Necessarily Lead to Access and Inclusion

Wheelchairs were described as having both benefits and disadvantages by the primary participants (I). The obvious benefit as a form of transport was mentioned by three primary participants (I) as the wheelchair enabled them to travel around in their neighbourhood, without assistance from their relatives. None of these were standard wheelchairs: one was a hand-tricycle, one was a motor-tricycle and the third was a battery-powered wheelchair that can be driven along the road. These wheelchairs were considered as providing freedom of travel. They gave various examples of how this enabled their participation in sport, attendance at meetings and doing their business. Two other primary participants (I) expressed their satisfaction with using their wheelchairs in their local areas for exercising.

According to Cambodia traffic law, persons with disabilities are allowed to drive along the roads with specific modified vehicles and driving licences (Royal Government of Cambodia, 2014). The law does not provide a detailed description of the classification and definition of “disability”. It only refers to further information in a sub-decree, which has never been issued. Therefore, the modification of vehicles and driving licences for persons with disabilities are not available. This also shows that the wheelchairs of the primary participants (I) and their travel on roads were not governed by any formal regulation.

There are some negative issues related to the efficacy of wheelchairs. Different issues were raised with respect to obstacles for travelling with each transport mode, especially for a long distance trip. This included difficulty in having their wheelchair transported with them in a car, taxi or bus, to find a place to get it repaired and the limit on their wheelchair battery's capacity.

Based on observations during the interviews, there were three primary participants (I) that have not used their wheelchair at all. They mentioned physical barriers around the outside of their houses, which obstructed them from using their wheelchairs, such as backyards corrugated with potholes, especially during the rainy season. Five other primary participants (I) made only limited use of the wheelchairs around their backyard and rarely travelled outside. In addition, two primary participants (I) mentioned some side effects of wheelchair use, such as becoming dependent on the wheelchairs instead of trying to walk. They expressed their regret in spending too much time in their wheelchairs without proper walking exercise and reported a progress in walking once they started to use crutches to walk in their backyards.

Moreover, having a prosthesis is one of the factors that helped the amputee participants (I) to be more confident and able to participate in society. An important benefit of having a prosthesis is to be able to walk again. This included an ability to work in their rice field, do housework, go out for their business and drive their motorbikes. Additionally, because of the prosthesis, they felt like a person without disability, because the prosthesis complemented their losing part of their body. The prosthesis made them look like they had both legs. The primary participants (I) expressed that they released their stress and felt relaxed after they had their prosthesis. This shows the psychological effects of the prosthesis on the primary participants (I) with amputation.

On the other hand, prostheses from different PRCs tended to require different times in production inside PRCs and are differ in quality. They needed to spend time for its production, get it fixed, renew spare parts, get accustomed to the devices and be able to walk properly. Moreover, 10 out of 19 primary participants (I) complained about the prosthesis, such as difficulty in getting start, being uncomfortable, painful, not suitable for walking a long distance, not flexible enough for daily activities, especially in muddy rice fields. This complaint highlighted the problems amputee

persons needed to face, when most of them live in rural areas and have a primary job as farmers, who needed to spend their daily life in the fields. Further, misunderstanding and misuse as factors of this difficulty were mentioned by four primary participants (I). These include wearing the prosthesis so long, without taking it off so often, gaining weight, missing appointments to renew their prostheses and improper preparation of wearing.

Therefore, although wheelchairs played an important role in the mobility of some primary participants (I), it appeared that having a wheelchair discouraged them. At the same time, it should be noted that the researcher does not have information on any medication assessment of the suitability of wheelchairs for these primary participants (I) in the short or long term. In either case, wheelchair accessibility was reported to be limited, which hindered them from travelling inside their neighbourhood. These also present that the donation of the wheelchairs were not applicable to the local context.

In addition, although many primary participants (I) expressed their thankfulness for the services provided by the PRCs, issues related to quality, time consuming and how uncomfortable and inflexible the prosthesis was were also raised. The issues might affect the daily living and quality of life of the persons with disabilities. It was clear that the prosthesis services were crucial to contribute to daily living of the primary participants (I), but there was also room for improvement in the quality and usefulness of the prostheses. This also illustrated the barriers of full participation, access and inclusion of persons with disabilities, when the supporting facilities are inefficient. WHO and WorldBank (2011) presented the benefit of assistive devices, including wheelchairs and prosthesis, in helping persons with disabilities to improve their participation and to increase their independence. At the same time, issues of inappropriate environment and the inapplicability to the user needs with limited follow up and inefficient use were identified as areas for improvement (WHO & WorldBank, 2011).

Mobility of the Primary Participants (I) Depended on Transport Availabilities

Table A3.33 in Appendix 3 presents the frequency of travel among the primary participants (I) by their types of long term impairments. The frequency was summarised based on their description on their mobility during the last few months

before the first and second interviews. Most of the primary participants (I) with amputation were more likely to travel more often than those with the most severe impairments (tetraplegia).

The primary participants (I) who travelled every day had full time jobs, which were the main purpose of their trips. Sometimes trips referred to five to 10 times during the last three months. This group travelled mostly for their occasional jobs or to attend some events such as wedding ceremonies, Khmer religious events, parties. Those who rarely travelled reported their trips as occurring one or two times a year, when it was necessary and they could not avoid travel, such as attending their relatives' events (weddings, religious ceremonies) or for their health checks at a health facility. At the same time, five out of seven primary participants (I) with tetraplegia have never been outside since their discharge from their health facilities.

As shown in Table A3.34 in Appendix 3, the primary participants (I) accessed different types of transport. Many of them (17) could ride/drive their own vehicles, such as car, motorbikes, bicycle, and a wheelchair. Additionally, another 18 have not owned any vehicle, but have still been able to travel as passengers on motorbikes with their relatives or friends; or take a bus or taxi for long distance travel.

There were 11 primary participants (I) who did not express any willingness to go out of their houses. Severe disability (tetraplegia) was observed among three participants, who could not move at all and have been lying on their bed. Questions were directed to the other nine primary participants (I) about their reluctance to travel, but they did not provide clear answers. One of them said he needed someone to push his wheelchair. Based on observation and interview, it is suspected that being ashamed of being disabled was one of the main reasons, in addition to limited ability to access transportation, why they were hiding themselves at home.

Those who had their own motorbikes expressed their difficulties in either braking or changing gear with their amputated legs, which were not strong enough. Most of the time, they used their hand brake, which was not safe at high-speed. Among them, only one said he had an auto-motorbike which did not require him to push his amputated leg to change gear. It is important to note that none of them had modified their vehicles to suit their long term impairments.

Among those who did not drive by themselves, other types of issues were raised such as the difficulty of getting on and off a bus: they could not do so on their own and required assistance. Their travels depended on the availability of their friends or family members. For important trips, which they could not avoid, public transport was their option. Most of the time, they just paid for car or motorbike taxis which came to pick up them at their house.

It is also important to note how road crashes psychologically affected their mobility. Their memory about their crashes and current traffic situation scared them, as mentioned by nine primary participants (I). They complained about the increase in traffic and speeding issues. Additionally, when they heard high speed vehicles passing them from behind, such as trucks, they recalled the moment of their crash. Because of such fears, only two of them have been brave enough to drive their vehicles, while another decided to drive or travel as a passenger only when it was necessary.

Mobility and transportation issues, including their costs, were identified as a barrier for persons with disabilities in participating in activities and accessing support services, such as health care and education (J. King & King, 2011; Narayan et al., 2000; WHO & WorldBank, 2011). The issues are even greater among the poor in rural areas and these lead them to be more isolated (Narayan et al., 2000). Narayan et al. (2000) indicated lack of transportation as one of the poverty characteristics.

Relationship between Participation and Societal Barriers

Participation in society referred to any activity that primary participants (I) attended outside their houses. This included meetings, workshops, schools, work, religious ceremonies, or parties. As shown Table A3.35 in Appendix 3, 19 primary participants mentioned that there was no issue for them to participate in community events, while another 12 have not expressed any wish to go out at all. It is important to note that there was one primary participant (I) with paraplegia and another one with tetraplegia who mentioned about their freedom of fully participating and travelling because of their automatic wheelchair and disability accessible motorbike. They are the only primary participants (I) with para/tetraplegia who have been participating in society without hesitation. Most of the para/tetraplegic primary participants (I) just stayed at home. On the other hand, most of the primary participants (I) with amputation and functional limitation have been going out.

It was observed that there were various factors that might hinder the full participation of the primary participants (I), as summarised in Table A3.36 in Appendix 3. Those who reported experiencing active participation in society tended to raise a lot of issues related to environmental barriers and attitudes of people around, while those who just stayed at home did not mention much about these issues. On the other hand, among 12 primary participants (I) who stayed at home, 10 could not ride or drive their vehicles due to their long term impairments, while only one could travel with someone as a passenger. Although there is no statistical evidence, there could be a tendency that environmental barriers and attitude of people around did not happen much to those who stayed at home because they did not expose themselves much to society. At the same time, being independent in transportation might be one of the reasons that support the participation of the persons with disabilities into the societies. More independence in transportation might lead to more participation in society.

Most of the paraplegia and tetraplegia participants have only stayed at home or just participated in events sometimes. Most of them gave an example of the events such as workshops or training that were organised for persons with disabilities. They were invited to the events with full support from the organisers in terms of transportation and on-ground facilities.

The main issue of tetraplegia participants linked to their physical mobility, since three of them were not able to sit at all. Mixed responses were provided as reasons for staying at home or limiting their participation, such as:

- They do not like to be looked at by people around
- Difficulty to travel, get on and off of a vehicle
- It was difficult for them to move around with their wheelchairs, as there was not enough space
- Being ashamed of their disability
- Did not want to disturb their family members much for assistance
- They just said they wanted to stay at home, without giving any reason

It is also important to note that 15 primary participants (I) rarely travel and 11 of them were in rural areas. On the other hand, among 17 primary participants (I)

who travelled every day, 11 were in urban areas. At the same time, 29 primary participants (I) expressed that they could not ride any vehicle and needed others to transport them. Of them, 20 were in rural areas. This showed that the primary participants (I) in rural areas were less likely to travel outside and accessed fewer options of transport modes.

Example of Enabling Societal Factors for More Participation

It is also important to note that 10 primary participants (I) mentioned their preference in participating in meetings or workshops if such events were organised for persons with disabilities and attended by many other persons with disabilities. In addition to being more comfortable to be one among many with disabilities, facilitation during the events was also reported to be an important factor to enable them to participate. This included the environmental setting and procedures during the events such as activities that they could attend with their wheelchairs. In contrast, there were some examples of activities that did not foster participation since there was no allowance for persons with prostheses or in wheelchairs to participate. Four primary participants (I) expressed their partial enjoyment in playing sport, compared to before their crashes, which they could participate in and enjoy. One of them needed to change his preference from football to volleyball because of his amputation, while another two could continue playing football but only as a goalkeeper. Only one primary participant (I) with paraplegia experienced his full participation in volleyball, but among his team members only, who were also persons with wheelchairs and were supported by a non-governmental organisation.

Short Term Support from the Community Based Services

Community based services refer to support services for persons with disabilities in communities such as grants, supporting facilities, physiotherapy services or referral services to vocational training centres. The grants from those community based organisations (HI, CSCIA and DDSP) were a one-time support for each of the primary participants (I). Community based service providers visited the communities and identified people as beneficiaries for their community based projects. Although 22 primary participants (I) received the support service, this does not represent the overall context of persons with disabilities, because most of the primary participants (I) were referred to the study by those organisations. So, it is not surprising to see that most of them received community based services. Of them, 10

benefited from community based support from more than one organisation. Twelve primary participants (I) received support from other non-governmental organisations and another five received support from the government. The community based services were delivered through different channels to different target groups, by different service providing organisations. Narayan et al. (2000) indicated community based organisations as an important resource for the poor, who might have limited access to services from the government. WHO and WorldBank (2011) showed the benefit of community based projects in increasing the visibility and participation of persons with disabilities.

As a benefit, the community based scheme was considered by the primary participants (I) as a factor to prove to family members that they were still beneficial to the whole family via such grants. One of the support services was a poverty card, which is part of the “Health Equity Fund” program, received by five primary participants (I). The cards were provided following an assessment conducted by non-governmental organisation staff and local authorities. The cards provided benefit to the primary participants (I) in giving free health services in provincial hospitals or health centres. The cards enabled them to benefit by covering some of the hospital cost, without requiring advance payment. However, services in hospitals and health centres were not appraised by the primary participants (I) who had the cards. Additionally, there were few complaints in term of equipment that was not useful, limited follow up after the project ended and short term support.

Experiencing Vocational Training with Different Perception

An overview of the vocational training is presented in Section 4.5.4: Non-governmental Disability Support Services. Vocational training courses were attended by 12 primary participants (I), organised by different organisations. Among them, nine are persons with amputation, the other three are paraplegic. The usefulness of the vocational training was confirmed by four out of nine primary participants (I) who found jobs or set up a business based on their skills. Additionally, two of them gave examples of being included into society and enjoying time with their schoolmates. On the other hand, another five were not satisfied with their courses and they could not find any jobs based on the skills. Reasons were mentioned such as their inability to apply the skill after taking courses (for example, the work was too

heavy for them), not their preferences and experiencing discrimination during the training.

Council of Ministers (2011) highlighted issues related to the vocational training on the limited link between the training courses offered and the needs of the labour market and people's demands. The study confirmed this issue as it identified that half of the persons with disabilities who received vocational training could not apply these skills for income generation. Additionally, some of the training skills were not in line with their preference and the environmental barriers in their working spaces. This is an example of the support given to individuals, but which lacked the removal of environmental barriers. Then, because of this gap, persons with disabilities still could not participate and apply their skills in the society.

Therefore, societal barriers were an obstacle for the primary participants (I) in performing their daily tasks at home, in their communities and at work. The barriers included the attitude of people around them, physical environmental barriers, religious and transportation barriers. From their accounts, it is interesting to note that they tended to attribute these difficulties to their impairments, rather than the impact of barriers that could be removed. Most of them decided to stay at home with less mobility, instead of fighting for the elimination of the barriers. Environmental barriers and negative attitudes could also be avoided by staying at home. These might be because they were not exposed to society. At the same time, being independent in transportation might be one of the reasons that would support the participation of the persons with disabilities into society. Greater independence in transportation might lead to more participation in society. In addition, examples of enabling societal factors were given by a few primary participants (I) who actively participated in societal events. Societal barriers were also described by J. King and King (2011) in their study in Thailand, including transport infrastructure, roads and paths around houses. The barriers illustrated the limitation of the disability inclusion and adaptation of the social model of disability. It also highlighted the needs for a stronger political will to make changes in reducing those societal barriers (J. King & King, 2011). Such barriers impact persons with disabilities to be dependent and have limited participation in society and other opportunities (WHO & WorldBank, 2011).

In addition, the support services were provided in different channels and types of grant schemes, but most of them were short term support, without long term impacts. On the one hand, it contributed to living costs and promoted better participation from the family members. On the other hand, the support has not reflected the concept of disability inclusion yet, as it tended to focus on an individual approach, not an integrating approach into a broader society.

6.9.7 Impact on Children and their Care

Limited Time Left for Children

Ten primary participants (I) who had children, mentioned that there was a side effect on their children, as nobody took care of them when their wives left home to look after them at their health facilities, such as hospitals, traditional healers or SCRC. Most of their children were less than 10 years old at the time of the crashes and were just left at home or with their relatives. This constituted a reduction in the well-being of the children due to limited care from their parents. Palmer (2011) also presented experiences of children being left out at home without care. Additionally, an issue of low health status among children who have parents with disabilities is noted by WHO and WorldBank (2011).

Children Needed to Share Some Responsibilities

More responsibilities were given to children, as reported by nine primary participants (I). Those children helped to take care of them on a daily basis at home, such as cleaning their wounds, assisting them to toilets and feeding them. Additionally, their children provided assistance for income generation, since three of the primary participants (I) were not able to farm or do their business but supervised and provided guidance to their children to replace their labour. Another four primary participants (I) reported that their children left their work to take care of them during their stay in hospital. Greater domestic workload, especially for female children, was also mentioned by WHO and WorldBank (2011).

Five primary participants (I) described the impact on their children who dropped out of school after their road crashes to work to support the family. Two primary participants (I) reported that their children experienced shame and stigma at school and in their village after their family became poorer because of road crashes. Palmer (2011) presented similar experiences of shame and stigma. An impact on

children's education was also identified by Taksdal (2011) and WHO and WorldBank (2011). The family members needed to allocate their time and money for the primary participants (I) while children needed to compensate by having less daily care and support. This reflected the issue of disability and poverty cycle as presented by Ingstad and Eide (2011), Palmer (2011) and Narayan et al. (2000). The impact led to less family income and increasing family expenses, while dropping out of school by children or siblings, and family debt were reported.

6.10 CHAPTER 6 DISCUSSION

The qualitative research contributed to an understanding of how persons with disability live, and interpreted their lived experiences, their local contexts, and how they think and view their world (Liamputtong, 2009; Merriam, 2009). As presented in the introduction section, this chapter responds to the following RQs:

- RQ2: What are the characteristics of road crashes that lead to long term impairments?
- RQ3: What role do emergency and post-crash care play in influencing the occurrence and severity of long term impairments?
- RQ4: What are the impacts of disabilities resulting from road crashes on the persons themselves?
- RQ5: What are the impacts of disabilities resulting from road crashes on their families?
- RQ6: What potential changes to road safety policy would reduce the prevalence of long term impairments as an outcome?
- RQ7: What potential changes to health policies would reduce the prevalence of long term impairments?
- RQ8: What potential changes to disability policy would better meet the long term needs of persons with disabilities and their families?

In addition to responding to the RQs above, it is also important to take into consideration the context of data availability on severe disabilities as discussed below.

6.10.1 The Characteristics of Road Crashes Contributing to Long Term Impairments

The study illustrated the effect of road crashes on poorer communities. Poorer living condition was observed in rural areas among the primary participants (I). At the same time, most of them travelled by inexpensive modes of transport, such as motorbikes, bicycles, agricultural vehicles or were pedestrians. This presented an important point on the unaffordability for safer transport modes for people in low-socio economic groups and this made them become more vulnerable. Additionally, road crashes occurred among the primary participants (I), who were either a student or had a job at the time of crashes. The majority of them were the breadwinners of their families before crashes. It presents an impact on careers and income generation of the individuals and hence their families.

The study findings also illustrated that long term impairments happened in all types of crashes, not only among those who were hit by big vehicles. Passenger and goods vehicles were involved in more than half of the crashes that led to long term impairments of the primary participants (I). At the same time, three quarters of the primary participants (I) were injured in crashes that involved only one or two injured persons. Additionally, 13 primary participants (I) had single vehicle crashes, and eight of them resulted in paraplegia and tetraplegia.

Helmets and seatbelts are safety items used to reduce the severity of injuries during crashes. However, none of the primary participants (I) travelling by passenger/goods vehicle had a seatbelt on and a low helmet-wearing rate was described. Travelling a short distance and at night were the reasons for not wearing a helmet. The primary participants (I) were unaware of the importance of helmets and seatbelts. The findings illustrate the need for having better education campaigns to promote helmet wearing for any time and at any distance of travel. At the same time, promotion on the basic benefit of seatbelts is also important, since it was not recognised at all among the primary participants (I).

Fourteen primary participants (I) experienced hit and run crashes. In most cases, the offenders escaped from taking responsibility and paying compensation. Additionally, various roles of traffic police were mentioned, including crash investigation, vehicle confiscation and compensation negotiations. The issues of unfair compensation and the need for bargaining power were also raised. These cases

of hit and run and unfair compensation expressed two main issues. The first one is the unethical concept of the drivers who did not want to take responsibility for their actions. Another one is the lack of the enforcement and the justice system. Such examples might also present the effect of road crashes on the poor communities who were not able to raise their voices for better compensation, while the richer counterparts might be able to take better advantage of the system.

It is interesting to note that the primary participants (I) are more likely to consider their drivers or counterpart drivers as offenders who provoked the crashes. This clearly expressed their concept of avoiding their responsibility in the crashes and putting it on others. It illustrated irresponsibility or the lack of understanding on the crash causes and the traffic law. Very few of the primary participants (I) gave references to some basic elements in the traffic law, such as drink driving and helmet wearing. More comprehensive concepts in the law, for example, give way rules, speed limit, changing lane without due care were not mentioned as references in crash responsibility.

Additionally, various types of road crash causes were described by the primary participants (I). They included human errors, vehicle defects, road condition, cultural and religious belief. The primary participants (I) put more focus on the human errors than vehicle defects and road conditions in the first instance of their description. Human errors were expressed by the primary participants (I) as inappropriate behaviours mostly related to drink driving, dangerous overtaking and careless of drivers (without clear explanation).

In addition, drink driving was reported as being involving in road crashes by 40% of the primary participants (I). Drinking alcohol was mentioned as a common thing to do with friends and families and during any party or social event. Although few of them mentioned the prohibition of drink driving and referred to the traffic law, many others tended to accept drink driving, as long as the drivers were not drunk. Very few primary participants (I) raised an issue of the side effects of alcohol after drinking a little bit, while others still believed that drinking did not affect their ability to drive, if they drank only one to two cans of beer. This finding presented the limited knowledge of the primary participants (I) on the side effect of alcohol drinking and the traffic law, which states certain limits of blood and breathe alcohol concentration.

At the same time, there were different perceptions and a spectrum of belief in Karma, blackspot and *Reasey* as a cause of road crashes and disabilities. This showed an important role of cultural and religious belief among primary participants (I) and (II) on how they perceived their road crash attribution and accepted that crashes could not be prevented. On the other hand, some of them mentioned Karma and blackspot, and emphasised human errors that led to their crashes at the same time. This finding presented the involvement of cultural and religious belief in road crashes among the primary participants (I). J. King and King (2011) also presented similar findings related to the cultural construction of risk, including the belief in Karma and blackspot in Thailand, that follow the same Buddhist religion. From a positive point of view, because of the belief, some of them tended to release their stress, calm down their anger towards the offenders and let things alone by accepting it as their fate. This might psychologically contribute to recovery from their disappointment and sadness. On the other hand, the belief might overtake the fact of tangible causes such as drink driving, speeding, dangerous overtaking. This might have a side effect on the prevention concept, since they might not take better action to prevent road crashes but rather continue with such dangerous behaviours. The more they have those types of cultural and religious beliefs, the more difficult promoting road safety messages through only tangible and direct messages on the key risk factors. For example, some of the primary participants (I) suggested religious ceremonies to prevent road crashes at blackspot, or refresh their good luck.

Moreover, cultural and religious belief was more likely among the primary participants (I) in rural areas, compared to urban areas. They were more likely to describe the involvement of Karma, spirits, *Reasey* and blackspot as crash attributions. The belief might be linked to their living condition and areas, education and the participation in modern society in urban areas. Although the study did not attempt to assess this linkage and the sample size is small, it at least pinpointed the likelihood of the difference of belief among the urban and rural primary participants (I).

6.10.2 Role of Emergency and Post-crash Treatment in Influencing the Severity of Long Term Impairments

After the crashes, there were various post-crash factors that might influence the severity of long term impairments and lead to disabilities. This section grouped those

factors into three: inadequate emergency response, insufficient post-crash treatment and treatment and support on discharge. It is also important to note that the findings from this study are based on lived experiences and perceptions of the primary participants (I) who have had severe injuries. They might tend to blame aspects of the system for their severe injury.

Inadequate Emergency Response

The first group of factors related to the inadequate emergency response at the crash scenes and during the transportation to the first health facilities. This included the limited usefulness of the national emergency number. First contacts for the emergency support for the primary participants (I) were made mostly through phone calls to their family members or they were supported by people around them. None of the primary participants (I) mentioned about accessing the national emergency number (119). This illustrates the limited coverage of the national emergency number and the lack of awareness of the primary participants (I) of the number.

Additionally, the support that was provided by people around to the primary participants (I) was limited without any proper first aid skill and equipment, especially the absence of cervical collars and spinal boards for spinal injured persons. The movement from a crash scene up to a transport mode, without these supporting facilities, might be one of the factors that contributed to the severity of injury of persons with spinal cord injuries.

Then, another factor in this group is an issue related to transport modes of the primary participants (I) to the first health facilities. These varied, including ambulance, motorbike or local transport. This shows the limited access of the ambulance for emergency response. In addition, a long waiting time for the services and lack of facilities in the ambulance were also reported. Additionally, the absence of the ambulance services might lead to increasing the severity of spinal cord injuries because it led some of the primary participants (I) to seek other available options, such as motorbikes, without accessing any cervical collar or spinal board to immobilise their head, neck and back. Buchanan and Nawoczinski (1987) emphasised the importance of having immobilising facilities and stabilisation during transportation. These were not found among the primary participants (I) with spinal cord injuries. Additionally, the availability of the ambulance services might be dependent on the areas of crashes, since only six out of 29 primary participants (I) in

rural areas accessed the services. Although the study did not present any scientific evidence, their lived experiences provided important information on how those inadequate emergency responses might contribute to those long term impairments.

Insufficient Post-Crash Treatment

The second group of factors is the insufficient post-crash treatment through public health facilities in provinces and Phnom Penh, private services and traditional healers. Those treatment providers involved different types of capacity, quality and results.

The first factor in this group involved unstandardised referrals and readmission of health facilities during the post-crash treatment. From one health facility to another, only 16 out of 39 primary participants (I) were transported by ambulance from their first health facility to the second one. Around half of the referrals were decided by the primary participants (I) and their families, while the other half were advised by hospital staff. Reasons for changing the health facilities included avoiding being amputated by seeking medical opinion from another health facility, limited capacity of the current health facilities, as suspected by the primary participants (I) or admitted by the health staff, and looking for a lower cost option. The different reasons for changing the health facilities showed that there was no standardised procedure and decision-making process as it might be based on case by case and the individual's perceptions. They also expressed the lack of belief of the primary participants (I) on the capacity of the government health facility and the limited capacity of the local and provincial facilities in supporting road crash casualties, especially those with severe impairments. Additionally, many changes from one health facility to another might have a side effect on the timeliness and readiness of having proper treatment and might lead to more severe injuries because of late treatments.

Additionally, advance payment for the emergency treatment was another factor to prolong waiting time in the emergency room. Around one-third of the primary participants expressed their disappointment on the advanced payment in the health facilities. Half of them were just left without any treatment, until their relatives arrived and paid for the services, while the other half were able to pay in advance. This type of practice might lead to delay in having proper treatment and therefore more severe injury. At the same time, it reflected the discrimination against the poor

who might not be able to pay for a proper service. The findings highlighted an issue of having cash in hand in order to receive the treatment. Given the absence of a social protection scheme, all primary participants (I) needed to have the capacity to pay for the services, either by themselves or from their family members.

In addition to the formal health facilities in hospitals, health centres and private clinics, traditional healer services were also mentioned by the primary participants (I). They were provided in different forms, including invisible treatments such as *Sdos/Phlom*, *Sroch Terk* or burned incense and visible ones such as slight heated platform, traditional medication, using braces and physical therapy. The primary participants (I) had different experiences, a spectrum of belief and a point of view on traditional healer services. While some of them received the services and were satisfied, others expressed their disappointment and needed to seek help from the public health services. Avoiding being amputated, flexibility of the services and low cost of treatments are factors behind seeking other services. Additionally, physical therapy was also mentioned as a benefit from the traditional healer service. Accessing this type of service emphasised the traditional belief in such traditional medication practices, in addition to the cultural and religious belief related to road crash attributions. At the same time, it clearly illustrated the option of the primary participants (I) in the services, in the absence of a proper and sufficient formal health system and unaffordable cost for the treatment, especially for poor communities. This is another factor that impacted on the poor, since they needed to access the lowest cost option, which might result in delaying proper treatment and having more severe long term impairments.

6.10.3 Impacts of Disabilities on Persons with Disabilities and their Families

The research findings illustrated the impacts of disabilities on persons with disabilities and their families, including the reduction in physical well-being, low psychological well-being, less economic well-being and loss of social well-being.

Impairments Leading to Decreased Sense of Physical Well-being

The impact on physical well-being was observed among the primary participants (I). The impact included living with pain, low quality of medication services and lack of physical therapy, moving difficulty and lack of hygiene and comfortable. Based on Song (2015) and Sinha et al. (2014), phantom pains have

negatively influenced the quality of life of the persons with disabilities. In addition, WHO and WorldBank (2011) recognised pain as a health condition of the persons with disabilities.

Although the support on discharge was mentioned as of some benefit for the primary participants (I), the impact on the physical well-being showed the limitation and insufficiency of the services. Complaints were made related to the prostheses such as quality, time consuming and how uncomfortable and inflexible they were. Side effects of wheelchairs were also mentioned as a discouraging factor in doing leg exercises and making persons with disabilities become dependent on them.

It is also important to note that to reduce their pain, the primary participants (I) accessed medical services from various pharmacies without proper prescriptions. The finding is consistent with the report of Levine and Gardner (2008) on improper drug prescription and over dispensing of antibiotics, which increases disease resistance. The quality of these type of outlet pharmacies was raised as an issue by Levine and Gardner (2008) including over-prescribing, over-dispensing, mis-prescribing and fake versions of drugs.

Reducing Physical Well-being among Family Members

Family members in Cambodia share their responsibility in taking care of each other and living in the same household together. Ongoing impact on family members was mentioned by 35 primary participants (I) such as time consuming in taking care of the primary participants (I) at hospitals as well as on discharge and the limited time left for their kids. Some of the primary participants (II) expressed this as a burden to the families and they were exhausted to go on. Wives took over most of the work in their houses as well as having more responsibility to work outside to generate family income. This also showed the important role of the family in taking such responsibility in Cambodian society. None of the primary participants (I) and (II) described any support from the outside of their families to reduce such burden on the family physical well-being. Additionally, Narayan et al. (2000) concluded that generally, female-headed household might be able to generate less income than male headed ones. This also implies that the families are more vulnerable to poverty, compared to the income generated before the road crashes.

Reducing Psychological Well-being due to Impairments

Various examples of low psychological well-being were given such as suicidal ideation, low feeling, stressfulness, worry, sadness, miserable time and feeling worthless. Expression of depression was described by most of the primary participants (I). WHO and WorldBank (2011) also clearly mentioned depression as a common secondary condition that may reduce functioning and quality of life, and increase health care costs among persons with disabilities. Additionally, persons with disabilities who experience depression may have a higher risk of premature death (WHO & WorldBank, 2011).

A feeling of “shame” mainly because of their long term impairments and the reduction in income generation was mentioned by 28 primary participants (I) and their family members. More expression of hopelessness and being ashamed was observed among the primary participants (I) in rural areas than urban areas. Narayan et al. (2000) presented shame as a psychological dimension of poverty. Because of this, persons with disabilities might lose access to social networks (Narayan et al., 2000). Reducing shame and stigma among the family members might help to increase interpersonal relationships, leisure, employment and social activities (WHO & WorldBank, 2011).

The expression of hopelessness and low psychological well-being presented the limited awareness of the ability and rights of persons with disabilities. Most of the primary participants (I) did not demand for what they should have been provided, but asked for monetary support and charity. Most of them and their family members did not express their belief in the ability of the primary participants (I), regardless of their different types of long term impairments. Although most of the primary participants were referred to the study by supporting organisations, they were not fully convinced about their ability. This also showed the insufficient counselling services in terms of motivation and promotion on the ability and rights of persons with disabilities among individuals and their family members. A slogan was mentioned many times in different provinces related to “Strong shoulders and healthy legs”. It was an expression of having hands and legs as a symbol of having the ability to live and generate income for their families. Ability to walk is still the most important factor for those persons with long term impairments.

Impairments reduced Economic Well-being

One of the first difficulties mentioned by all primary participants (I and II) is the cost to cover their treatment and expenses for the family to take care of them. Based on their occupation, most of the primary participants (I) needed to spend at least one year's income to cover the cost of one crash. Additionally, there were 12 primary participants (I) who mentioned debts they needed to pay back because of their road crashes.

Reduced economic well-being due to the limited social support scheme and a gap in the public health systems that did not provide any facility to reduce the burden of the primary participants (I) and (II) were discussed. This might also illustrate that the poorer the individuals were, the more inadequate the support at the emergency stage and the greater the burden to the families in term of accessing cash for advanced payment as well as to cover the overall treatment during the hospital admission and on discharge. Additionally, the grant program and vocational training scheme were not sufficient to tackle the growing issues.

The expenses of treatment and daily care, in addition to the drop in family income and opportunity cost leads whole families into poorer conditions, and may lead to poverty (Narayan et al., 2000; Palmer, 2011). This is an element in the disability and poverty cycle, which is discussed in the report of Narayan et al. (2000) and the conceptual review of Palmer (2011).

Impairments leading to Less Social Well-being

Loss of social well-being was expressed by the primary participants (I). Only 26 (58%) out of 46 primary participants (I) are married and live with their wives and families, while the others are single (15, 33%) or divorced (4, 9%). According to the National Institute of Statistics (2014), 60% of the population aged 15 and above are married/lived together, while only 1.6% are divorced and 31% were single. Although the sample size of the study was so small and the result could not be generalised, there could be a tendency that persons with disabilities might have different proportions of marital status, especially with the high ones for being divorced and single.

It is important to note that road crashes fully changed the life of 19 (41%) primary participants (I) who have never been back to their schools and previous jobs

since the road crashes, as they only stayed at home. Additionally, at least nine of them clearly mentioned their disappointment with their employers, who did not pay attention to them after the crashes, made them lose the jobs or change their position to one of less responsibility. Being ashamed, transportation issues and inaccessible classrooms were the reasons for dropping out of school. The primary participants (I) in rural areas were more likely to lose their jobs than those in urban areas. The other 27 have been back to work/schools after a period of time, which varied from one month to more than two years. Compared to the working force population, the employment rate in Cambodia was 82% in 2013 (National Institute of Statistics, 2014). The high proportion of unemployment among the primary participants (I) might illustrate the greater loss of social well-being in terms of career and status in their society, compared to the general population.

Moreover, it is also important to note the roles and status of the primary participants (I) in their families after the road crashes. These roles and status might link to their income generation capacity. The smaller the role they have in income generation, the less status they have in their families. Compared to the general population in Cambodia, 73% of households were led by males in 2013 (National Institute of Statistics, 2013). Narayan et al. (2000) mentioned about the expectation from society on the men's role in generating income. Once this role is changed due to job loss after their road crashes, there could be a situation of stressfulness, disintegration, aggressiveness, and anger (Narayan et al., 2000).

It was clearly mentioned by nine primary participants (I) that because of them, their family members needed to be absent from their work, hire someone to replace them or close their business during their treatment. Later, more work by carers was mentioned to cope with the family expenses, without the financial contribution from the persons with disabilities. Similar findings of the impact on carers to work outside were also illustrated in Thai context (J. King & King, 2011). Further, nine primary participants (I) expressed the impact on their children and siblings, who dropped out of school after their road crashes. Such impact was also described by Taksdal (2011) among family members of Mine/UXO victims in Cambodia.

Therefore, this study confirmed the findings of Eide and Ingstad (2011) on the involvement and importance of families and their responsibilities to share their resources. As Eide and Ingstad (2011) emphasised, disability interventions are

needed to include family support schemes and consider a family as a unit with the persons with disabilities.

Limited Inclusion due to Societal Barriers

As Oliver (2009) and Mertens et al. (2011) illustrated about the impairments and societal barriers that led the persons with long term impairments into disability, this study shows that societal barriers were an obstacle for the primary participants (I) in performing their daily tasks at home, in their communities and at work. The societal barriers included attitude of people around, physical environmental barriers, religions and transportation barriers. Through their description, it is interesting to note that those primary participants (I) tended to consider those difficulties that were due to their impairments, but not the impacts of those barriers that needed to be improved. Most of them decided to push themselves backward by staying at home with less mobility, without fighting for the elimination of those barriers. The expression related to the societal barriers by the primary participants (I) illustrated one important perception that disability seems to be responsible for by individuals and their families, but not the society and institutions, especially the government.

Additionally, environmental barriers and attitude of people around were rarely mentioned by those who stayed at home. These might be because they did not expose themselves much to society. At the same time, being independent in transportation might be one of the reasons that supported the participation of the persons with disabilities into the societies. The more independent they are in transportation might lead to more participation in the society. At the same time, examples of enabling societal factors were given by few primary participants (I) who actively participated in societal events.

Moreover, the concept of a rights based approach and the requirement of eliminating the societal barriers were not fully understood among the primary participants (I) and (II). The belief in disability as being the individual's responsibility might lead to the limited movement of those persons with disabilities in demanding their rights and better accessibility to society and reducing their full participation after having long term impairments. This finding aligned with the others about their low psychological well-being, especially the hopelessness, and their final requests for charity and monetary support to start up their own business, rather than going out to work with others.

The study findings on the societal barriers also demonstrated the inappropriate context of the society and lack of understanding and supporting persons with disability in Cambodia. This presented loopholes in the society towards disability inclusion. Although the issues of physical, psychological, economic and social well-being expressed the individuals' needs, the societal barriers highlighted the needs to tackle society as a whole in order to promote full participation of the persons with disabilities and contribute to improving their well-being.

6.10.4 Potential Changes to Road Safety Policy

The study highlighted the need for proper intervention to tackle not only mass casualty crashes (involving many injuries), but also such single injury crashes, which might lead to very severe impairments. In another words, the severity of long term impairments should be prioritised, not only the number of injuries in a crash.

Additionally, very low seatbelt and helmet-wearing rates were expressed by the primary participants (I). This shows limited safe behaviours on such important safety features. It requires better intervention in terms of promotion and enforcement to increase the wearing rates. At the same time, the knowledge of the primary participants (I) is very low on traffic law and the side effects of drink driving, especially among the rural communities. Targeting drink driving prevention for public awareness campaigns is needed with a comprehensive explanation on how alcohol affects driving ability.

Lack of traffic enforcement and improper justice system was mentioned by the primary participants (I). It showed the limited bargaining power of poorer communities, compared to the richer ones. Proper enforcement and justice systems are another area that should be strengthened, especially to tackle hit and run cases. In addition, the insurance system should be tackled in the NRSAP in order to provide better benefit to the road users and support the social protection scheme.

Further, it was clear that cultural and religious belief has been engaged with the crash attributions among the primary participants (I) especially in rural areas. The belief should be well understood by practitioners in delivering road safety messages to poor communities. Religious groups should be considered to be involved in public awareness and community promotions on road safety messages.

The persons with disabilities mentioned Karma/spirits/fortune tellers. Some of them expressed the view that road crashes are results of the involvement of Karma/spirits and therefore could not be prevented. Because of this belief among community members, the disability experienced as a result of a road crash was interpreted as punishment for their bad deeds in a previous life; as a result of this presumed responsibility they suffered stigmatization, and were isolated from their communities. This led to a lack of access to services, rehabilitation and medical support. An implication from this finding, is to have road safety awareness and education to convince those people that although they believe in Karma, there is a need for prevention mechanisms (such as helmet wearing, respect speed limit, no drink driving, etc.) that can contribute to reducing the severity of injuries.

6.10.5 Potential Changes to Disability Policy

Treatment and support on discharge helped to reduce the severity of long term impairments. After the discharge from hospitals or traditional healers, the primary participants (I) explained four types of support: physical rehabilitation service (received by 24 primary participants (I)), spinal cord rehabilitation centre (eight), community based support (20) and vocational training (12), in addition to provision of prosthesis and wheelchairs. On the other hand, four primary participants (I) have never received any service at all. This showed a distribution spectrum of the services across different areas in the country. Depending on different coverage areas, the primary participants (I) received different types and quality of support which might lead to different contribution to reducing their long term impairments.

Additionally the issue of economic well-being was found to illustrate the lack of a social protection and insurance scheme. The expenses to cover their treatment put a burden on the primary participants (I) and their families leading to poverty and debts. It is crucial to support and reduce this burden through better social protection schemes, such as local loan programs for road crash emergency treatment, introducing a local insurance scheme for road crash emergency fund or general health care scheme, job finding assistance for persons with disabilities, or referral services to existing support services. So, such a policy will help to reduce the burden towards the monetary issue as well as to generate income in their recovering stages.

The main services provided by the PRCs included the prostheses and physical therapy. This type of service is included in Action 2 of the NDSP. Although many primary participants (I) expressed their thankfulness for the services provided by the PRCs, there were also some complaints about the prostheses such as quality, time consuming and how uncomfortable and inflexible they were, especially their inapplicability in rice fields during the rainy season. Therefore, it was clear that the PRC services were crucial to contribute to daily living context of the primary participants (I), but there was also room for improvement on the quality and usefulness of the prostheses, which might also be due to improper uses and limited understanding of the primary participants (I) on the products.

Additionally, counselling services were mentioned as very limited by the primary participants (I) who mostly could not recall the services. At the same time, the study also found that the belief in physiotherapy was still very limited among the primary participants (I), since they only thought about the medication process to cure their long term impairments and inability to walk. Therefore, counselling services on the importance of full participation in the society without the ability to walk are also an area to be strengthened.

In addition, wheelchairs were provided as part of the PRC, SCRC and community services. It is interesting to note the usefulness of the wheelchairs in transportation accessibility as well as their side effect. The important role was mentioned by three primary participants (I) as a factor that has enabled them to travel around their areas, without assistance from their relatives. On the other hand, the wheelchairs have discouraged three primary participants (I) in doing exercises to be able to walk. Additionally, an issue was also raised in term of environmental barriers, which obstructed them when they use the wheelchairs. These illustrated the improper donation of wheelchairs without proper assessment on the needs and implications of them on the primary participants (I). These might lead to increasing the severity of the long term impairments. It is also clear that wheelchair donation requires eliminating environmental barriers to maximise its usefulness in local communities and road network.

Additionally, half of the persons with disabilities who received vocational training could not apply them for their income generation. The training skill was not in line with their preference and the environmental barriers in their working spaces.

Free services for hospital treatment were more likely to be provided to the primary participants (I) rural areas. None of those in urban areas benefited from this service. There was no standardised procedure for every person with a disability. Those who lived in coverage areas of the support might benefit more than those outside the areas. The findings indicated different types of support to different areas in the country. This presents the need for standard support and systems throughout the country.

In addition to policies towards improving physical, psychological and economic well-being of persons with disabilities and their families, loss of social well-being and societal barriers highlighted the need to improve society as a whole. This includes the behaviour change towards persons with disabilities, accessibility (environment, transport, knowledge, information), equity in term of jobs and education. These also emphasised the importance of having disability intervention as an inclusive approach towards different sectors, such as education, transport, public works, social affairs, public and private sectors.

6.10.6 Potential Changes to Health Policies

In addition to road crash interventions, long term impairments should also be targeted for prevention efforts to reduce the severity of the impairments. The study highlighted the groups of factors that might increase the severity of long term impairments and lead to disabilities. The factors mainly related to the health facilities and structures which are composed of inadequate emergency responses, insufficient post-crash treatment and limited standardised support on discharge. Efforts are needed to strengthen the national systems, such as national emergency number, ambulance system, trauma care systems, and community interventions, including first aid responses at crash scenes. It is also important to note the issue of advance payment which needs to be addressed by the Ministry of Health in all public health facilities in order to ensure proper emergency services and quality. The findings pinpointed the inadequate health care system and the necessity of having better social protection schemes to prevent having unnecessary prolonging treatment and services that might lead to long term impairments.

Furthermore, the impact on physical well-being required better medical and physical rehabilitation support on discharge. This should include the improvement of the public health facilities, especially in rural areas. The improving interventions will

require full participation from the health sector under the MoH and rehabilitation sector of MoSVY. At the same time, it also illustrated the needs for daily living adaptation (knowledge, practice and facilities at home) for persons with disabilities to enable them in minimising the burden for caregivers, such as their wives and children. Additionally, reducing physical well-being was also expressed clearly among the family members. It is important to develop a policy to reduce such a burden among family members of the persons with disabilities. For example, social or volunteer services should be initiated to provide partial daily care of the persons with disabilities, especially during the first year of their long term impairments.

Low psychological well-being as expressed by the primary participants (I) presented the need for better counselling services to motivate them to be able to stand by themselves. A proper counselling guideline needs to be developed to include relevant messages and concepts based on the local context and languages. For example, it should include an explanation of the rights of persons with disability, the ability and confidence in pursuing their living goal within their own limitation and the importance of their full participation in society. Case studies of successful persons with disabilities should also be included. The counselling services should also be provided to the family members to ensure the proper support and motivation from them towards the persons with disabilities.

Moreover, medication service and advice were also an issue for persons with long term impairments after the hospital discharge. Most of them needed to pay for their medications, while only two mentioned about free services at health centres because of their poverty cards. It is important to note that 19 primary participants (I) accessed medical services at private pharmacies around their areas. There was a tendency that a better medicine was the one that could cure them faster. Although the study did not aim to conduct a comprehensive assessment on the medication service, the findings highlighted a limited understanding and inappropriate practices of the medication without proper prescription. It might not only lead to unnecessary payment, but also side effects on their health. Interventions on the elimination of the un-qualified medical outlets and pharmacies are needed.

6.11 CHAPTER 6 CONCLUSION

Information on severe disabilities is very limited, even among disability organisations. The difficulty in identifying persons with severe disabilities highlighted the need to set up a proper data system and network to improve the visibility of those individuals. Additionally the research findings reflected the limited standardised procedures from road crashes to the discharge and especially imbalanced services and support towards the poor communities. The poorer the primary participants (I) were, the less bargaining power for fair compensation, chance of accessing emergency responses, ability to pay for advance payment in cash and the more burden in terms of treatment cost to their families. This also illustrated that all responsibility for requesting compensation and full treatment seemed to sit within themselves and their families. It also highlighted the need for prevention interventions from different types of stakeholders, including traffic police, health care professionals and community based supporting teams.

Furthermore, the study findings presented various types of impact on the persons with disabilities and their families. These included reducing physical well-being, low psychological well-being, less economic well-being, loss of social well-being and societal barriers. The impact highlighted two types of loopholes, which are the insufficient implementation of the current policies and absence of relevant policy development. Additionally, insufficient support on discharge might become part of the factors to influence the impacts of disabilities on physical, psychological, economic and social well-being. The impact was observed among the persons with disabilities and became a burden on their families, especially among the poor and rural areas. Hence, interventions to reduce the impact and burden are needed for both the individuals and their families.

It is important to note that the impact on well-being and the societal barriers were observed in both rural and urban areas, regardless of the standard of living of the primary participants (I). Although there were higher tendencies among the rural areas in terms of job losses, expression of hopeless and limited access to transport, the urban primary participants (I) also faced them. However, support from the government and NGOs were more likely to target the rural areas with limited activities in urban areas. Although the economic well-being might be better for primary participants (I) in urban areas, compared to rural areas, psychological,

physical and social well-being and societal barriers were still a burden for them. This study illustrated the need for interventions and disability inclusive approach to support persons with disabilities in both rural and urban areas. It demonstrated disability as a cross-cutting issue and required participations from various sectors.

Chapter 7: Case Study of Policy Development

7.1 INTRODUCTION

This chapter presents the research findings of Study 4: Case Study of Policy Development. The main objective of this study was to identify gaps in the National Road Safety Action Plan (NRSAP) and National Disability Strategic Plan (NDSP), based on contributions from policy makers. The descriptions of the NRSAP and NDSP are included in Section 4.3.1 and Section 4.5.1 respectively. Based on points of view of the policy makers (secondary participants), the study also proposed relevant recommendations to improve quality of life among persons with disabilities (and their families) and for a safer system for all road users. The study findings contributed to the RQs 6 to 8 as below:

- RQ6: What potential changes to road safety policy would reduce the prevalence of long term impairments as an outcome?
- RQ7: What potential changes to health policies would reduce the prevalence of long term impairments?
- RQ8: What potential changes to disability policy would better meet the long term needs of persons with disabilities and their families?

Additionally, this study enabled the researcher to apply policy process and assess the feasibility of promoting knowledge use based on the research findings among policy makers through their participation in the study. The study also led to the development of a follow up study to adopt and implement the policy changes.

This chapter starts with an overview of the study methodology, followed by the study results. It then includes a discussion on the policy recommendations emanating from analysis of the workshop outputs and a mention of the study challenges. A short conclusion is presented at the end of the chapter.

The term “secondary participants” refers to all policy makers or stakeholders, working in the road safety and disability sectors, who attended meetings and/or were interviewed in Studies 1 and 4. As mentioned in Chapter 6, primary participants (I) are persons with disabilities due to road crashes who were recruited for Study 3. Their family members who attended their interviews are defined as primary participants (II).

7.2 STUDY 4 METHODOLOGY

7.2.1 The Study Framework

There are many advantages in gathering information from experts and policy makers as valuable information can be collected on existing national policies, action plans, and recent developments in the sectors (Marshall & Rossman, 2011). Moreover, disability and road safety cut across all sectors, involve diverse actors and require a multi-sectoral approach (WHO, 2004b, 2014a). Bringing together representatives from different organisations with different backgrounds (government, local and international NGOs) facilitates such a multi-sectoral approach. Many publications (M. J. King & Wood, 2013; Rutten & Gelius, 2013; SWOV, 2012) highlight the gaps between research and policy and the importance of a communication and interaction process that contributes to co-production of knowledge and actions between researchers and policy makers. Therefore, the multi-sectoral approach was incorporated into this study, which involved policy makers from different sectors.

Moreover, SWOV (2009) discusses influencing factors of road safety knowledge use by policy makers in the policy development process. The SWOV approach is used as a framework for this Study 4 to conduct a case study of policy development. According to SWOV (2009), there are four groups of factors that influence policy makers’ acceptance and use of knowledge from research, as summarised in Table A3.37 in Appendix 3. The first factor is *form and nature of the knowledge*. An effort needs to be made to present research findings in readable forms to increase the likelihood of knowledge use by policy makers, in addition to the quality of the research itself. The second group is the *user’s context*. Research knowledge is more likely to be used when the research findings are in line with the

vision, needs and opinion of relevant policy makers. This group also included the correct moment for the study to appear, contacts, good quality and the engagement of external evaluators. *The nature of the problem* is the third group that aims for a solution to the problem and involves actors and political consensus regarding the problem. This group of factors produce knowledge that is more likely to be used. The last group is *the form of the decision-making process*. The use of research knowledge is facilitated if the knowledge fits with the political sensitivity, distributing efforts and the engagement of intermediaries. These groups of factors are adopted for this study as a policy integration framework, within a multi-sectoral approach.

In addition, as presented in Section 1.4, SWOV (2012) presented a scale of the level of knowledge use, which consists of seven levels, as shown in Table 1.2. The groups of factors in Table A3.37 in Appendix 3 form the main contributors towards *reception*, *cognition* and *effort* among the secondary participants, which are the first, second and fourth levels in the seven level scale of road safety knowledge use adapted by SWOV from Knott and Wildavsky (1980). The resulting framework for Study 4 is summarised in Figure 7.1. The third level, *reference*, was not relevant in this study because of the way the policy development workshops functioned, while the higher levels of *adoption*, *implementation* and *impact* lay beyond the timeframe of the research. They are proposed to be included in the follow-up study, as described in Section 8.12.1.

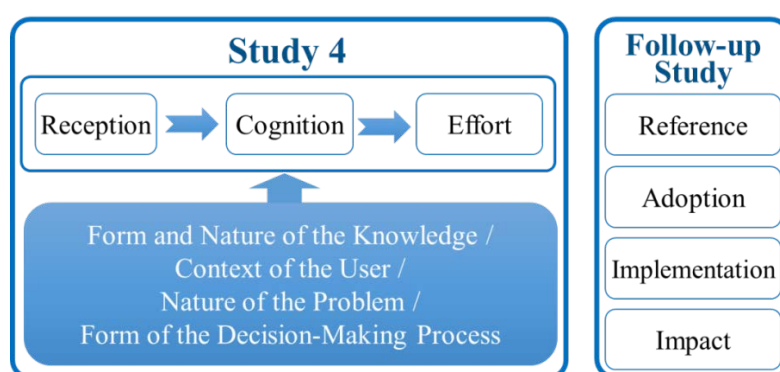


Figure 7.1: The framework of Study 4

To facilitate the reception and cognition processes, a series of workshops and activities were organised in Stage 1 (Workshops 1 and 2 in Figure 7.2). These helped

to provide ongoing information to policy makers on the research findings from the analysis of road crash and disability databases (Study 2) and the updated data that were collected from the field (Study 3). They also enabled the gathering of feedback from the secondary participants on the research findings and discussion of current policies. As shown in Figure 7.2, Stage 1 was started at around the same time as Study 2, following a preliminary stage. Using an iterative approach to the data that was analysed (Study 2) and collected among the primary participants (Study 3), a fairly steady stream of evolving information was periodically fed to the secondary participants. This led to an exchange of ideas and concepts from the policy maker working group and the data collection from the field.

The last workshop (Workshop 3 in Figure 7.2) aimed to build up an effort to include research findings in two related policies: NRSAP and NDSP. Through a presentation of the key findings, secondary participants were involved in the development of relevant recommendations for NRSAP and NDSP, based on the findings.

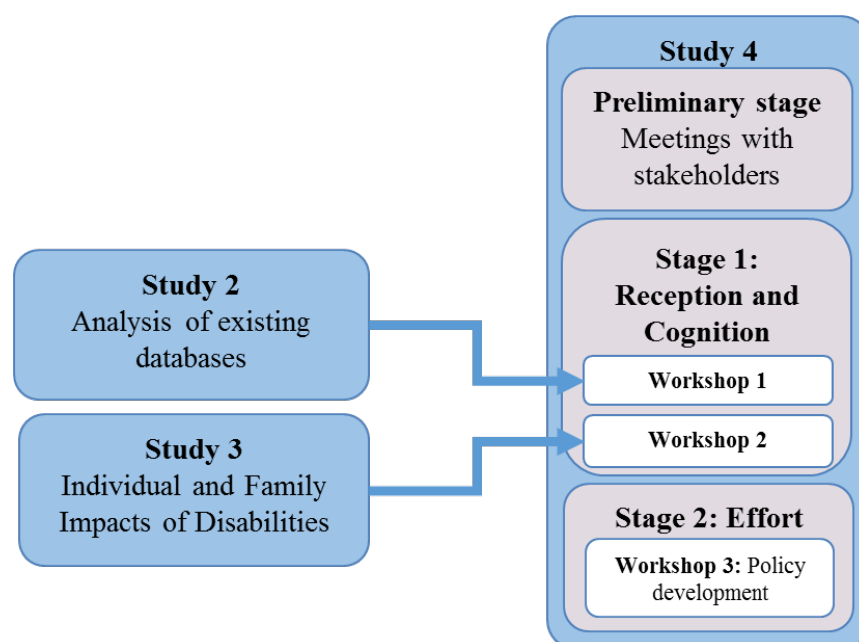


Figure 7.2: Overview of Study 4 and contributions of Studies 2 and 3

Procedure and Participants

An ethics application for the preliminary stage was approved in June 2013 (QUT Ethics Approval Number: 1300000372). Another ethics application was

submitted for Stages 1 and 2. It was approved in May 2014 (QUT Ethics Approval Number: 1400000259).

In the preliminary stage, meetings were organised with:

- one hospital staff member
- six employees from four organisations working in disability sectors
- nine employees from seven road safety related organisations

To arrange all workshops in Stages 1 and 2, invitations were sent to 47 representatives from 35 organisations. A total of 39 secondary participants from 26 organisations participated in the workshops. The majority (25 out of 39) attended only one workshop, while nine attended two workshops and the remaining five attended all three workshops. The secondary participants were from Phnom Penh and four other provinces: Siem Reap, Takeo, Pursat and Battambang. As shown in Table A3.38 in Appendix 3, the secondary participants in Stages 1 and 2 represented governmental and non-governmental organisations working in both sectors: road safety and disabilities. Additionally, some had worked at the national level in Phnom Penh, while others had community based experience in their project areas in provinces.

It is also important to note that among all 39 secondary participants, 23 were in a management position in their organisation. They were either at the top position, such as directors, or among management teams that contribute to the development of their organisation's policy, framework and action plan. Additionally, nine were from the government sector, including important ministries, such as the Ministry of Interior, Ministry of Social Affairs, Veterans and Youth, Ministry of Public Works and Transport, National Road Safety Committee, Ministry of Health and Ministry of Rural Development. All had been involved in the development and implementation of the NRSAP and NDSP.

Although the secondary participants came from different background: road safety vs disability, national policy makers vs community based teams, and governmental institutions vs non-governmental organisations, engagement among all participants was smooth. They updated each other about their field of work and exchanged ideas mostly related to the research topic about road crashes and persons with disabilities. On the other hand, there was a slight tendency for participants to spend more time with colleagues from the same fields than with the others.

Disability is a cross-cutting issue and requires full cooperation and collaboration among all related sectors. In Cambodia, the road safety, public health and disability sectors are not fully isolated from each other. Public health institutions belong to both road safety and disability committees. The Department of Public Works and Transport has become a member in the disability group as well as the road safety committee. At the commencement of the research, it was decided to include the three policies (health, road safety and disability) because these three policies have common context and need strong cooperation and collaboration among the institutions involved. The involvement of the three sectors in the workshops in Study 4 enabled policy makers to gain a better understanding of the contextual information based on lived experiences of persons with disabilities.

The Preliminary Stage

The preliminary stage aimed to gather information to ascertain whether the methods proposed for the overall PhD study (Studies 1, 2, 3 and 4) were viable. It also helped to gather de-identified data for Study 2 and confirm the scope of disability impacts for Study 3. This preliminary stage was conducted in July 2013 through meetings with secondary participants. It was useful for the research program to refine the detailed methodology before the primary data collection was conducted.

Based on discussions during the meetings in the preliminary stage, road crashes were recognised by the secondary participants as one of the main key risk factors for long term impairments which lead to disabilities in Cambodia during the last five years. However, the detailed context of road crashes and their effects had not been explored. Although the disability stakeholders had recognised the issue, the main focus was on physical rehabilitation. Only one organisation (Handicap International) had been working on both aspects: prevention of road crashes and post-crash rehabilitation.

Additionally, during the meetings, the secondary participants confirmed their interest and willingness to participate in the subsequent workshops (in Stages 1 and 2). These positive and supportive responses helped to ascertain that the methods proposed for the later studies (Studies 3 and 4) were viable. This also confirmed that the action research method was accepted and supported.

Stage 1

Stage 1 involved Workshop 1 and Workshop 2. This stage aligned with the first and second level of the scale of knowledge use introduced in the Fact Sheet by SWOV (2012), that is, reception and cognition. The main objectives for this stage were to:

- update policy makers on the progress of the overall PhD study
- present preliminary findings, based on the secondary (RCVIS and PRC databases in Study 2) and primary (in-depth interviews and observations in Study 3) data analysis
- identify policy implications of the preliminary findings

Two weeks before each workshop, invitations including information sheets and consent forms were sent to 22 organisations (attention to 32 people). Follow up phone calls were also made to confirm participation.

Workshop 1 was organised on the 20th and 23rd January, 2015 (same contents for both dates) due to the availability of participants. The workshop was supported by the principal supervisor, Prof. Narelle Haworth. A total of 23 participants attended Workshop 1. They were from eight road safety organisations and eight disability organisations. Eight of those organisations were government institutions. A total of two participants came from Siem Reap and Takeo provinces. The workshop was held for a half day (8.00-11.30am) in Phnom Penh and included presentations on overview of the PhD research, RCVIS and PRC databases and preliminary findings. Group discussions were then organised after the presentations on the issue of data quality (Group I) and implications for service provision (Group II).

Due to time constraints, group discussion II was not organised in the workshop on the 20th January. Instead, participants were given 10 minutes to write down their comments or suggestions on the implication for service provision and prevention response and treatment, based on those preliminary findings from the secondary data analysis. All 22 participants signed the consent forms and indicated their interest to participate in the subsequent workshops by providing their contact detail.

Workshop 2 was organised in Phnom Penh, on the 12th February, 2015, with support from one of the associate supervisors, Dr. Julie King. Nineteen participants from three road safety organisations and 12 disability organisations attended the

workshop. There were three governmental institutions among the organisations. Three participants came from Pursat and Battambang provinces. Topics in Workshop 2 included presentations on overview of the PhD research, primary data collection method and preliminary findings from Study 3. A group discussion was organised on the issue of reaching persons with severe disabilities.

During the last 10 minutes in Workshop 2, participants were asked to write down their suggestions and recommendations on implications for service provision (PRC/Disability) and prevention response and treatment (RCVIS/road crashes), based on the presentation of preliminary findings. All 19 participants signed the consent forms and indicated their interest in participating in the subsequent workshop by providing their contact details.

Stage 2

Workshop 3 was organised in this stage and was aligned with Level 4, “effort” in the Fact Sheet by SWOV (2012). The workshop aimed to identify policy gaps and propose recommendations based on the key findings from Studies 2 and 3. It was organised on the 28th May, 2015 in Phnom Penh, with support from an associate supervisor, Dr. Mark King.

Similar to the process in workshops 1 and 2, invitations were sent out through emails to 36 participants from 23 organisations in Phnom Penh. Participants from provinces in previous workshops 1 and 2 were not invited due to budget limitations, as it was not possible to cover their accommodation and travel costs to Phnom Penh. Half of them sent their regrets as they could not attend due to other commitments. Ultimately, 18 participants from 10 organisations attended the workshop. Presentations in Workshop 3 included the research findings and relevant policies in Cambodia, followed by workshop activities as below:

- o Participants were asked to write down on stickers any relevant recommendations, based on the research findings
- o Participants identified the main responsible organisations for each of their recommendations and pasted them on three relevant flipcharts: Government-Road Safety, NGOs-Road Safety, and Disability
- o Participants were divided into three groups (Government-Road Safety, NGOs-Road Safety, and Disability) to classify each recommendation

into the relevant components of the road safety action plan and disability action plan

Participation confirmations were gathered a few days before the workshops to enable the researcher to identify workshop participants and classify them into relevant groups. The group members were arranged based on the topics of questions. In some group sessions, members came from the same field of work, while in other sessions they were mixed to have a good view from different backgrounds. During their registration at the beginning of the workshops, participants already noticed their group members, through colourful marks on their name tags. This helped them to form their groups and start up their discussion quickly during the group discussion sessions.

All participants were familiar with such a workshop process, which involved presentations, question/answer session and group discussion. Because of this, the organisation of the workshops ran smoothly and they quickly adapted themselves into the workshop activities. Questions for workshop activities were repeated with further explanations from the researcher, to ensure that all participants understood them fully and were ready for the activities.

In the first two workshops, there appeared to be a fair exchange of ideas in the group discussions. A group member wrote down suggestions and ideas on a flipchart. However, the output of the group discussion tended to be very consensual among all group members and very brief, lacking in detail. Only common ideas that were mostly agreed upon by all members were written out. Many other ideas that were considered as minor were excluded from the group reports. For example, during a group discussion session, each group (of 5-8 members) reported around 10 bullet points. It took them around 30 minutes for the discussion. The same questions were asked of other participants in another workshop, and each participant wrote down at least three to five points in 10 minutes.

7.2.2 Analysis

The thematic analysis was used for this study. All workshops were tape recorded with permission from participants in advance. During the workshops, two research assistants were appointed as minute takers. The minutes were reviewed and updated, based on the audio records. The outputs from the group discussions were

summarised based on the questions for each discussion and group activity. Then, main themes were identified based on findings from the workshops.

7.3 RESULTS OF THE WORKSHOPS

The outputs from the meetings and workshops in Study 4 are presented in this section. They illustrated the “*Reception*” and “*Cognition*” among the secondary participants towards policy changes. The first result subsection includes all findings related to improving the data systems (PRC and RCVIS). The second subsection provides an overview of the interaction and responses of the secondary participants on the key research findings.

7.3.1 Responses from Policy Makers to Improve the Data Systems

In Workshops 1 and 2, the issues of data collection for RCVIS, PRCs and especially for severe disability were raised. All secondary participants acknowledged the issues and provided a list of recommendations. The recommendations for improving PRCs have not been seen in the existing NDSP, which has not included any activity to improve the data collection system on persons with disabilities. In addition, participants provided more precise recommendations for RCVIS, compared to the existing actions in the NRSAP, which mentions training and equipment for hospital staff and police officers only briefly.

Physical Rehabilitation Centre Data System

A list of recommendations was proposed as presented in Table A3.39 in Appendix 3. Following the presentation by the researcher, there was no objection on the weakness of the system. All secondary participants accepted and proposed a list of recommendations to strengthen and standardise the patient management system in all PRCs. This computerising system has been implemented so far for the registration of the PRC patients. Once the system is standardised in all PRCs, the data should be merged into a national database under the management of the Persons with Disability Foundation (PWDF), whose role and capacity needed to be built.

Additionally, the secondary participants proposed that PRC services should be promoted in communities and to local authorities via mass media and outreach activities to reach persons with disabilities. The promotion could be conducted through appointing focal points in each community and extending community based

rehabilitation. At the same time, the quality of the services in PRCs should also be improved, including physical rehabilitation and counselling services. It is crucial to continue its financial support to cover travel, meal, and accommodation cost for poor patients to encourage them to come to the centres for the services, as proposed by the secondary participants. Another important action is to strengthen collaboration and cooperation among related stakeholders, especially hospital teams, to ensure smooth and on time referrals after the hospital discharge.

Recommendations to improve RCVIS and Road Safety

Gaps in RCVIS were identified by the secondary participants during their group discussion. They included lack of participation from some health centres and hospitals and no monitoring system on casualties after the hospital discharge. As summarised in Table A3.40 in Appendix 3, to improve the system the data collection process should be strengthened by revising the data collection form and speeding up the process of transferring data from the provinces to the national teams. This will require close monitoring and visits at hospitals and health centres to reinforce the data collection. The scope of the data collection should also be extended to ensure full participation from all hospitals and health centres. The system should also consolidate other systems, such as death registration, which is under local district structures to ensure its accuracy. The RCVIS reports should be disseminated to target relevant policy makers, such as the Ministry of Health. At the same time, data analysis needed to be improved in terms of double data cleaning and merging procedure. Similar to the PRC recommendation, the secondary participants stated that capacity building is needed for data collection teams and data analysis teams. Additionally, it would be beneficial to conduct a comprehensive assessment on current challenges and issues, in order to identify other solutions such as online data entry and transfer from provincial to national levels. The proposal should be piloted before its extension.

Based on the RCVIS findings, the secondary participants recommended that drink driving, speeding and helmet wearing should be targeted. Additionally, interventions to promote road safety should consist of different aspects such as strengthening law enforcement and community based education, especially on drink driving along rural roads and extending better emergency response. At the same

time, improvements to road safety engineering need to be considered in addition to social media campaigns.

Recommendation to collect better information on severe disabilities

It was clear during the workshop that there was a limitation in terms of collecting data on severe disabilities. As summarised in Table A3.41 in Appendix 3 the secondary participants suggested collection should be through different sources to capture full and better contextual data. These included existing disability related structures such as PRCs, SCRC, provincial and national teams of the MoSAVY and Disability Action Council (DAC). Another data source is the Ministry of Health structures that cover provincial health departments, hospitals, health centres, private clinics, especially the Neurological Surgery Department at Preah Kossmak and Calmette hospitals. This also included the existing RCVIS. The third type of data source is the local government structures in commune or district levels, who oversee their local people through their local registration. Other government structures should also be consulted, such as traffic police and the teams in the National Institute of Statistics. In addition, non-governmental structures should also be included, especially those who work in communities, village health support groups, community representative groups, media and social networks.

7.3.2 Responses from Policy Makers to the Overall Key Research Findings

In the last workshop, 18 primary participants attended from road safety related organisations (9), disability related organisations (6) and organisations that were involved in both sectors (3). Half of them worked in non-governmental organisations, while the other half were in the government sector.

The workshop commenced with a presentation of 53 key findings, summarised from Studies 2 and 3. Each finding was numbered for secondary participants to refer to at a later stage. The slide presentation is included in 0. The key findings were presented and classified into four main types from road crashes to the overall impact on the individuals and their families. Table A3.42 in Appendix 3 summarises the numbers of the findings classified into the four main types. Each type constituted around one fourth of the total findings.

After the presentation, the secondary participants were asked to write down their recommendations, based on the key findings. They also provided their reference

numbers of the key findings on stickers, which were distributed to them in different colours, based on their working background:

- Yellow stickers: for participants from road safety NGOs
- Green stickers: for road safety governmental organisations
- Blue stickers: for participants from disability organisations

All secondary participants proposed a total of 117 recommendations. Those recommendations referred to two-thirds of the key findings. The remaining one-third of the key findings were not considered for further recommendations by the secondary participants. The top 10 key findings with the highest numbers of recommendations proposed by the secondary participants are shown in Table A3.43 in Appendix 3. Additionally, it is interesting to note that almost half of the recommendations were linked to the key findings on road crashes, as shown in Table A3.44 in Appendix 3. At the same time, only 15% of the recommendations related to the impacts of disabilities. This showed that the secondary participants were more likely to prefer crash information, prevention and recommendation than the others.

After they proposed their recommendations, the secondary participants worked in groups to discuss and classify the recommendations into relevant sections of the NRSAP and NDSP. Around one-fourth of the recommendations (31) were classified as falling under the NDSP, while the majority (86) were relevant for the NRSAP. The colours of the stickers helped to identify which organisation types had put forward the recommendations. It is interesting to note in Table A3.45 in Appendix 3 that only a few recommendations of the secondary participants from road safety related organisations were proposed for the NDSP. Recommendations proposed by the secondary participants from disability related organisations were for both action plans.

As presented in Table A3.46 in Appendix 3, all of the recommendations related to the findings in road crashes and most recommendations for the long term impairment findings were classified into NRSAP. On the other hand, most of the recommendations for the impact were considered for NDSP. Only the recommendations for the disability related findings were justified for both action plans. This might reflect the perception of the secondary participants in considering NRSAP as an intervention to contribute to preventing road crashes, long term

impairments and disability. At the same time, NDSP was considered as an intervention for supporting persons with disabilities and reducing the impacts of disabilities.

7.4 CHAPTER 8 DISCUSSION

This chapter discusses the findings from Study 4 only, based on the series of workshops with the secondary participants. Full discussions on the overall potential changes to the policies are presented in the following chapter, which consolidates all findings from Studies 1 to 4. This study provided two types of results. The first one is the contributions to the overall research questions (6 to 8) as below. The discussion in this section for the three research questions is based on perceptions and recommendations from all secondary participants during the different workshops, meetings and interviews.

RQ6: What potential changes to road safety policy would reduce the prevalence of long term impairments as an outcome?

RQ7: What potential changes to health policies would reduce the prevalence of long term impairments?

RQ8: What potential changes to disability policy would better meet the long term needs of persons with disabilities and their families?

The results also illustrate of the policy process, based on the existing theory and concept proposed by SWOV (2012), SWOV (2009) and Knott and Wildavsky (1980).

7.4.1 Potential Changes to Road Safety Policy

Through the workshop process, all of the recommendations for NRSAP were classified into its eight pillars by the secondary participants, as summarised in Table 7.1.

Pillar 1: Road Safety Management: four recommendations were made for three key findings. The recommendations included setting up a supporting package system for road crash victims and insurance. This was considered as a social protection scheme to cover treatment cost and a supporting package for those sustaining long term impairments. Additionally, a funding mechanism was also recommended for the

NRSAP implementation. Another recommendation was proposed to strengthen the vehicle registration system. An additional action included the improvement of the RCVIS quality, timeliness and scope.

Pillar 2: Road Engineering: seven recommendations were made for three key findings. Improving road infrastructure was proposed, such as footpaths for pedestrians, carts, and persons with disabilities, in addition to setting up road safety audit teams to investigate and improve black spots. All actions would require capacity building and adequate equipment.

Pillar 3: Safe Vehicles: six recommendations were made for three key findings. These included the improvement mechanisms for vehicle checks and strengthening law enforcement on vehicle safety, such as mirrors for motorbikes. Another recommendation was also raised to develop the vehicle standard for persons with disabilities.

Pillar 4: Road User Behaviours: 12 recommendations were proposed based on five key findings. The first group of recommendations was about the public awareness campaigns on helmet wearing, speeding and drink driving. This also included the promotion on the general traffic law and the requirement of having a proper driving licence to the main target groups. Second, integrating road safety lessons into the national education system from the primary to university programs was also mentioned by the secondary participants.

Pillar 5: Post-crash Responses: 26 recommendations were made based on seven key findings. One of the main recommendations was for actions to improve capacity, quality, and ethics of health staff for the emergency and in-hospital services. Additionally, strengthening the national emergency system (119), dispatch centres and referral system to relevant expertise hospitals were also recommended under this health facility component. Another key recommendation was about the involvement of communities, village volunteers, students and governmental officials in first aid, especially along the national roads. This also included setting up first aid posts along selected areas, which would require identification of funding sources. The third group of recommendations was for traditional healers by providing proper training and information on the side effects and benefits of this practice, in comparison to different types of injuries and formal medical treatment in hospitals.

Pillar 6: Law Enforcement: 24 recommendations were proposed based on six key findings. The first group of recommendations was about promoting and strengthening transparent and consistent traffic law enforcement, especially on speeding and drink driving with adequate equipment. Severe penalties and proper enforcement mechanisms should be in place to tackle hit and run cases. Another enforcement recommendation was to set up safe speed zones. Development and finalisation of the alcohol policy were also mentioned by the secondary participants.

Pillar 7: Driving licence: two recommendations were made to implement a mechanism for driver licensing of persons with disabilities.

Pillar 8: Fleet safety management: two recommendations to improve facilities for persons with disabilities in public and private transport modes.

Table 7.1: Recommendations for National Road Safety Action Plan

Pillar 1: Management 4 Recommendations - Supporting system - Insurance - Vehicle registration - Funding mechanism	Pillar 2: Engineering 7 Recommendations - Road improvement - Audit team and Blackspot - Capacity building for road infrastructure	Pillar 3: Vehicle 6 Recommendations - Vehicle standard for persons with disabilities - Vehicle checks - Vehicle safety enforcement	Pillar 4: Behaviour 12 Recommendations - Public campaign on Helmet, Drink Driving, Speeding - Education system - Law promotion - Driving license promotion
Pillar 5: Emergency 26 Recommendations - Health facilities: capacity / quality - 119 system - First aid: capacity building / posts / funding mechanism - Traditional healer: training / side effects	Pillar 6: Enforcement 24 Recommendations - Consistent and transparent law enforcement - Speed zones - Hit and run enforcement - Role model - Alcohol policy	Pillar 7: Licence 2 Recommendations - Driver licensing for persons with disabilities	Pillar 8: Fleet 2 Recommendations - Facilities in public and private transportation for persons with disabilities

In addition, as shown in Table A3.45, participants from road safety organisations showed their limited interest in disability policy, since they only proposed six recommendations for this policy, compared to 63 recommendations for road safety policy. On the other hand, disability related participants were involved in both policies by having fair recommendations for each one. This might be due to the fact that disability related participants have been involved in the road safety sector at least as road users in their everyday activities, while road safety participants have not

been so involved in the disability field. This also might demonstrate the lack of interest of the road safety stakeholders in considering safe roads for all road users, including the persons with disabilities.

7.4.2 Potential Changes to Disability Policy

A total of 31 recommendations were made by the secondary participants, who then classified them into six out of 10 actions in the NDSP. There was also a general recommendation for the overall plan related to the financial mechanism and support, such as setting up a national security fund, pension fund, small grant schemes and poor identity cards for persons with disabilities.

Action 1: Poverty reduction through increasing employment opportunity, improving living standards and empowerment for persons with disabilities: two recommendations were made for two key findings. The first recommendation was for the MoSAVY and Ministry of Labour to provide more vocational training courses. The second was to increase working opportunity for persons with disabilities, in collaboration with private companies.

Action 2: Provision of health and rehabilitation services: 13 recommendations were made for eight key findings. The first key recommendation was about medical and rehabilitation services, which included capacity building to relevant staff members and providing better accessibility for persons with disabilities to access the services. The second recommendation was to strengthen the services, scope and staff capacity in the physical rehabilitation centres to all provinces and especially its outreach community services in remote areas. This also included identification of a funding mechanism and the needs for increasing numbers of social workers for disability assessments, counselling, and referral facilitations in the centres. The last recommendation was about introduction and extension of personal assistant services for persons with severe disabilities.

Action 5: Education, vocational training: seven recommendations were made for four key findings. Vocational training courses were mentioned as one of the key recommendations. The courses, available in different types of subjects, should be provided to suit different types of disabilities. At the same time, encouragement and more opportunity should be promoted to persons with disabilities to attend vocational training courses. Another recommendation was to integrate pedagogical skills for

teachers in delivering formal school programs for students with disabilities. This also included the improvement of school infrastructures, in collaboration with local commune authorities.

Action 6: Expression of opinion, access to information, participation in political life: four recommendations were made for two key findings. The recommendations were mainly focused on promoting the rights of persons with disabilities in communities and to the general population.

Action 7: Participation in cultural and religious life, sports, leisure, recreation: two recommendations were made for two key findings. The first action was about conducting proper job market assessment and identifying relevant topics before setting up vocational training programs for persons with disabilities. Another recommendation was to organise public awareness and upgrade the working environment to cope with different types of disabilities.

Action 8: Accessibility: physical environment, transport, knowledge, information, communication: four recommendations were made for two key findings. It was recommended to upgrade facilities to reduce physical barriers for persons with disabilities. At the same time, promoting mobility and transportation facilities were also mentioned by the secondary participants as actions to empower persons with disabilities to enable their better participation in the society.

Table 7.2: Recommendation for National Disability Strategic Plan

Action 1: Poverty 2 Recommendations	Action 2: Health 13 Recommendations	Action 5: Education 7 Recommendations
- More vocational training courses - Job opportunities	- Medical and Rehabilitation resources + Accessibility - Physical Rehabilitation Centres in communities and remote areas - Formal funding mechanism - Social workers - Personal assistant services	- Vocational training options - Integration into formal school programs
Action 6: Opinion 4 Recommendations	Action 7: Participation 2 Recommendations	Action 8: Accessibility 4 Recommendations
- Promote the rights of persons with disabilities	- Assess subjects for vocational training courses - Working environments for persons with disabilities	- Physical barriers - Mobility - Public transportation

In addition to the above recommendations from the secondary participants, there was a brief discussion on the definition of “impairment” and “disability” in Cambodia (as stated in the Sub-Decree) and the international concept, which is adopted in this PhD study. It was interesting to note that in the sub-decree, issued by the government, there was no differentiation between “long term impairment” and “disability”. The severity of disability was defined by different types of the long term impairments. On the other hand, in the presentation, the researcher presented both elements as a state of changes. The long term impairments were referred as individual characteristics, such as amputation and para/tetraplegia. The researcher explained about disability as a result of societal barriers, such as discrimination, transport facilities and physical environmental barriers. The presentation highlighted the different stages of sustaining long term impairment and becoming persons with disabilities due to societal barriers. This kind of differentiation was raised by one secondary participant from the government as not being aligned to the official document and regulation in the country. This also reflected the need to review the existing government regulations on this important concept of disability, which might divert the attention of the stakeholders away from the need to have necessary interventions for long term impairments and disability and support to persons with disabilities.

Moreover, the national data collection system on long term impairments and disabilities should be included within a clear responsible organisation. Another action is to introduce an insurance and social protection scheme. The third recommendation is to strengthen the collaboration and cooperation among stakeholders, to fill the gap between the hospital discharge and rehabilitation services. Increasing the job opportunity for persons with disabilities, in collaboration with private companies was also mentioned as another recommendation by the secondary participants. The NDSP should also include capacity building for those traditional healers to identify and assess injuries that they are able to treat or they should refer to hospitals on time.

It is also important to note the recommendations from participants related to an issue of family members mistreated to persons with disabilities. The research findings highlighted the issues of families' perception and treatment of persons with disabilities and the positive support of family members to reduce long term impairments and disability severity. However, only one out of 117 recommendations was raised to promote support and encouragement from family members to persons with disabilities. This has shown that almost all of the secondary participants did not pay much attention to improve the relationship and support inside families of persons with disabilities and the living conditions in their families. This also reflected the fact that the NDSP has not covered sufficient intervention related to families of persons with disabilities, in spite of the important role of families and their contribution towards the quality of life of persons with disabilities.

7.4.3 Potential Changes to Health Policies

Implications for national health policies were not a primary objective in Study 4. On the other hand, during the workshops, secondary participants raised several issues related to the health policies. It is interesting to note the numbers of recommendations for each pillar in the NRSAP and action in the NDSP in Table 7.1 and Table 7.2 that were in line with the health policies. All of those recommendations included the improvement of hospital facilities, capacity and quality, first aid at scenes, the national emergency numbers, traditional healer training, medical and rehabilitation services. The high numbers of recommendations reflects the high concern related to the inadequate services in the health sector.

7.4.4 Process of Policy Development

The study adopted the process of policy development, proposed by SWOV (2012), SWOV (2009) and Knott and Wildavsky (1980). Table 7.3 summarises the applications of factors that influenced the knowledge utilisation to Study 4. In terms of *form and nature of the knowledge*, the readable presentation, the utilisation of knowledge and quality of the research were applied. The research findings were presented in very simple formats, without any statistical analysis elements. For example, the findings from the RCVIS and PRCs were shown in a simple graph format, not in a table with statistical elements (Standardised Residuals or Pearson Chi-square test). The presentation format and styles were different from the academic language used in this PhD thesis. Additionally, they were tailored to best fit the secondary participants' background from road safety and disability sectors, through different workshops. It was clear that all participants, either working in the national or community based workplaces, were only interested in the results of the research with simple words. None of participants asked about the research analysis techniques or SPSS coding, variables or level of confidences in the quantitative analysis from the national data systems, RCVIS and PRCs. At the same time, this is also one of the factors that reflected the trust of the secondary participants on the research quality, in addition to the assurance of the supervisors and panel members on the quality.

Additionally, *Context of the user* included vision of the decision-making process, needs, opinion, correct moment, contact, reputation of the researcher and external evaluators. Based on discussions during the meetings in the preliminary stage of Study 4, secondary participants expressed their interest and support on the research topics. They were then invited into the workshops, based on their interest and working background. During the workshop presentations and discussions, none of the participants showed any objections to the research findings, although the findings included critical issues related to the government as well as NGOs, such as quality of the data collection, advanced payment in hospitals, quality of the vocational training, complaints on prosthesis and limitation of counselling services. Some participants provided explanations of the issues, based on their points of view and their current working condition, but none of them questioned the findings. This might be due to the way the findings were presented without references to any

specific organisations, although they could guess which organisations might be related to the issues. The engagement among all participants and the output of the discussions showed their acceptance of the findings and provided recommendations for improvement. At the same time, the research findings were presented one year after the implementation of the NDSP and at the half way point of the NRSAP implementation. It could be the time to reflect on the implementation and introduce the changes into the policies. Additionally, the researcher worked in road safety and disability fields for almost 10 years. This gave her an opportunity to build networks and contacts with the related stakeholders. This enabled her to reach all related organisations and invite their representatives for the workshops as the secondary participants. Because of the network, those organisations were familiar with the researcher and her achievements in previous projects. The working experiences, her PhD program and the university reputation have built trust and confidence among the secondary participants in the research findings.

As factors related to the *nature of the problem*, it was clear since the preliminary stage that those secondary participants expressed their concern on the need for preventing road crashes and supporting persons with disabilities. The issues were recognised officially by the government and endorsed by the Prime Minister. The development and approval of the NRSAP and NDSP showed the willingness of the government, although the implementation of the policies is a constraint.

Moreover, *form of the decision-making* process was delivered through the efforts to distribute knowledge and the engagement of intermediaries. The study workshops enabled participants to propose recommendations based on the research findings. They were asked to refer their recommendations to the referencing numbers of the findings. The study framework also involved secondary participants from different background, including the government and non-government sectors, road safety and disability sectors, and national and community based sectors. They were the intermediaries between the research team and their top management teams, who are the final decision makers for the policy development and implementation. This engagement enabled the researcher to gather their feedback and contributions on the chain of events from road crashes to long term impairments, disabilities and impact.

Table 7.3: Application of SWOV factors to the study

Factors influencing knowledge utilisation	Application to this study
Form and nature of the knowledge:	
Readable presentation of the study	✓ The key findings of the research were available in local language (Khmer). They were presented and discussed with the secondary participants during the workshops.
Whether the knowledge can be used and implemented (specific and applicable conclusions)	✓ Research findings were tailored to best fit the secondary participants' background, either road safety or disability sectors and become relevant to their working experiences.
Quality of the research (methodological reliability)	✓ The research quality was assured by the supervisors, panel members and the university.
Context of the user:	
The user's vision of the decision-making process; this must fit in with that of the knowledge producer (analytically or politically)	✗ The research findings were presented and discussed for implications, but the decision-making process was not completed.
Extent to which the research corresponds to the user's needs	✓ The research fully corresponded to the secondary participants' need, as they were identified and invited for the workshops, based on their working background and interest.
Extent to which the research corresponds to the user's opinion	✓ All secondary participants did not express any objection on the research findings, instead, they discussed its implications.
The correct moment for the study to appear	✓ The research findings were presented at the time for feedback on the implementation of the current policies.
(Informal) contacts with researchers	✓ The researcher worked for nine years in the sectors and built good contacts with all secondary participants.
Good reputation of the researchers in the user's estimation	✓ The achievement of the researcher in her working background and the reputation of the university helped to build trust on the research findings.
Engagement of external evaluators to evaluate the knowledge, thereby increasing its reliability	✓ External evaluations were conducted in the forms of panel members (confirmation and final seminars).
Nature of the problem:	
Clarity concerning the aim of the solution to the problem (e.g. is it a routine problem?)	✓ Preventing road crashes and supporting persons with disabilities were the clear aims of the secondary participants.
How many actors are involved in the decision making (complex environment)?	? It is a complex environment and procedure, and the research did not complete the decision-making stage.
Political consensus regarding the problem	✓ The problems of road safety and disability were endorsed by the Prime Minister, with high political will, but the implementation of the policies and collaboration were still limited.

Form of the decision-making process:		
Centrality of the decision making	✖	The final decision makers were not reached, as the decision-making process was not completed during this PhD research.
Number of actors involved in the decision making	?	There were different layers of decision making and the research did not reach the top layer in the road safety and disability sectors, due to time constraints.
Political sensitivity of the decision making / presence of conflict	✖	Political sensitivity was not observed in the preliminary stage of the decision making through the workshops.
Efforts to distribute knowledge during the decision-making process	✓	Efforts were made to inform the secondary participants, who then discussed and identified implications for both national policies during the workshops.
Engagement of intermediaries to distribute knowledge during the decision-making process	✓	The workshops were crucial to engage the secondary participants, who were the intermediaries to distribute the knowledge to their top management and decision makers.

Those groups of factors influenced the knowledge utilisation among the secondary participants. The influencing factors enabled the secondary participants to be involved from the level of *reception*, *cognition* to the last stage in the study, which is the *effort*. Figure 7.3 summarises the relationship between the influencing factors and type of knowledge use among the secondary participants in the study. In terms of reception, the secondary participants actively participated in the workshops and accepted the research findings without any objection. Form and nature of the knowledge (readable presentation) and the context of user (correct moment, contacts and reputation) contributed to the first stage of knowledge use.

Then, cognition was observed, when the secondary participants participated into their group discussions and proposed recommendations based on the research findings. The first three out of four groups of factors influenced the cognition.

As part of their effort, they identified gaps in the NRSAP and NDSP and classified their recommendations into relevant pillars of the NRSAP and actions of the NDSP. The last three groups led to the stage of effort.

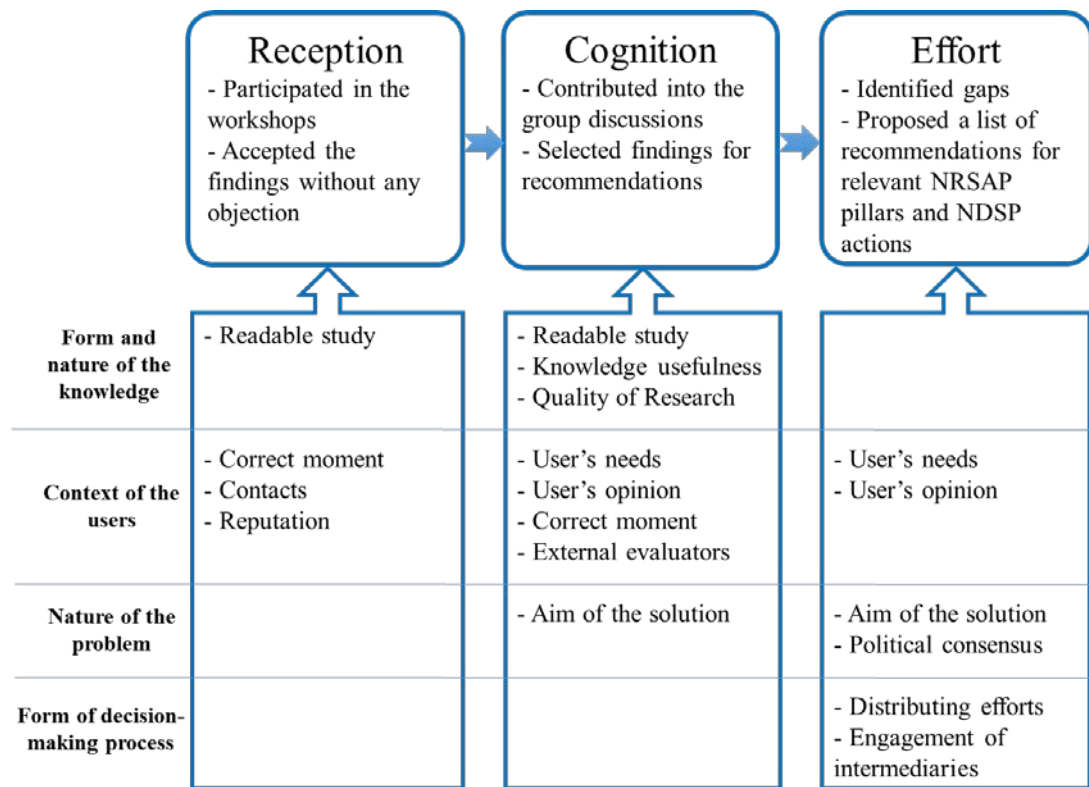


Figure 7.3: Summary of the contributions from the secondary participants

In addition, the policy process adopted in the study presented a showcase of how research could be translated into policy and practice. The concept of SWOV (2009, 2012) guided the principle of the study to take into account the form and nature of the knowledge, context of the user (secondary participants), nature of the problem and form of the decision-making process. These factors enabled the study to open the research findings to the policy makers for the reception, cognition and efforts towards policy changes. Due to the time constraints, the overall PhD study could not present the full relevance of the research on the adoption of the policy changes, implementation and impact. However, this study is part of a wider approach to introduce the action research. It is a starting point to set up the reception, cognition and effort, followed by a plan for a follow-up study to complete the full picture of the action research. The framework of the follow-up study is included in Section 8.12. Therefore, this study confirmed the feasibility of promoting knowledge use based on the research findings among policy makers, although it required the follow-up study to reach the impact.

Based on this discussion, it could also be concluded that the concepts introduced by SWOV (2009, 2012) are feasible to apply in a developing country context, such as Cambodia. It introduced the whole process and enabled the researcher and policy makers (secondary participants) to work together to translate research into policy, though the process was not fully completed. The concept shaped the research translating procedure into clear results in term of efforts through relevant recommendations, made by the secondary participants.

Moreover, the topic of this PhD research has been identified by the researcher, to fulfil the requirement of her PhD degree. Although there is sufficient evidence through the literature review on the needs of this topic, policy makers and practitioners in road safety and disability sectors have not considered it as their priority. They have shown their interest in the research findings, but they also justified them as a narrow focus. The study presented its findings in Study 3 as public health issues, through individual cases. As SWOV (2012) presented, policy makers tended to look more for the majority of issues than the minority. Based on the data, persons with disabilities due to road crashes are considered as a minority by both sectors.

7.5 STUDY CHALLENGES AND LIMITATION

Disability: in this study, only disabilities due to road crashes were included. The research findings might not be considered to be representing other causes of disability and types of long term impairments. During the workshops, the researcher did not have enough time to convince the secondary participants that the research findings contributed to taking better actions towards improving the life of persons with amputation, paraplegia and tetraplegia. Regardless of the causes of disabilities, persons with the same disability types would experience the same social barriers.

Road Safety: Study 3 focused on individual cases, while policy makers tended to pay more attention to mass casualty crashes (involving many fatalities, casualties in one crash). At the same time, reducing the number of fatalities is mentioned as the national target, but long term impairments have not been included.

In addition, the study attempted to adopt “action research” as a general approach, but it did not cover the whole concept of this approach. At the beginning,

it aimed to work together with policy makers from the early stage of the proposal and framework development to the revision of the existing policies and submissions for approvals from relevant ministries. However, due to time constraints, after the preliminary stage, as part of Study 4 conducted in July 2013, the research framework and methodology were developed by the researcher with support from her supervisors. Although a consultation with the policy makers in Cambodia was made during the preliminary stage of Study 4, no further discussion was conducted during the development and finalisation of the study framework and research methodology after the preliminary stage. This was due to the deadline of the PhD milestones. On the other hand, workshops in Study 4 helped to discuss the research progress and findings with the policy makers. A fairly steady stream of evolving information was periodically fed to the policy makers. This led the researcher to an exchange of ideas and concepts from the policy makers working group and the data collection from the field.

Furthermore, as presented by SWOV (2012), the concept to measure the degree of knowledge use was also adopted in this study. However, the last three levels of the concept (Adoption, Implementation and Impact) were not accomplished. Through the workshops, policy makers received the research results (Reception) and understood (Cognition). They participated into the development of recommendations to be classified into the existing policies (Effort). The researcher had to finish her work with the policy makers at this stage in May 2015, in order to have enough time for writing up her thesis for submission by October 2016.

Another limitation of the study is the limited feedback from the secondary participants. After the workshop, a summary of the key findings was sent through emails to some of the secondary participants who attended the first or second workshop, but could not attend the last workshop. The emails also aimed to seek their feedback on the key findings and any recommendation they might have. Most of them replied to confirm receipt of the email, but none of them provided any feedback or recommendations. In addition, there was no further contact with the secondary participants who attended the last workshop. This led to lack of information on any implications of the research findings on their work experiences. Although the recommendations were proposed by the secondary participants during the last workshop, the research was unable to assess the level of adoption of the

recommendations by their management teams. The recommendations might reflect the reception, cognition and efforts of the secondary participants, but not from their management teams or their institution. Therefore, it is crucial to develop another preliminary stage in the follow-up study to assess the level of adoption by those key institutions on the policy changes, before designing the implementation stage.

Moreover, through the workshops, institutional issues were raised related to the funding mechanism and limited capacity of the human resources in the responsible organisations. Although it is important to take into consideration the institutional context, the study did not conduct proper analysis on this issue, especially the provincial structures of the departments related to road safety and disabilities. Provincial representatives from the government departments were not included into the workshops. This study limitation led to limited recommendation for the institutional strengthening, especially for the provincial structures.

7.6 CHAPTER 8 CONCLUSION

Through the workshops, the recommendations were classified into the relevant pillars of the NRSAP and actions of the NDSP. The number of recommendations reflected very good participation from all of secondary participants in the workshop and also expressed their support, reception, cognition and effort. This study confirmed the feasibility of the SWOV concept in translating research into policy, though the process was not fully completed, as it required further follow-up study.

The recommendations proposed by the secondary participants revealed three important issues. The first one is the key interventions and actions that need to be tackled in both policies. These linked to the gaps, especially in the scopes of the policies and the actions included in the policies. New actions were proposed to be integrated into the NRSAP, NDSP and health policies.

The second issue related to the institutional capacities of the key organisations in road safety, disability and health sectors. Most of the recommendations from those secondary participants were in line with the existing actions in both policies. Although the existing policies have already included those recommendations, this raised an issue of the implementing mechanism and its effectiveness. Those recommendations highlighted the needs to improve the existing systems related to

road safety and disability. They clearly expressed their concern through recommending improvement on the funding mechanism and human resources.

The third issue related to the coordination and cooperation in implementing those policies. Although the NDSP and NRSAP introduced a multi-sectoral approach by involving different institutions, the implementation was still questionable in terms of breaking down the institutional silos. The workshops illustrated a positive interaction among different institutions, but the recommendations expressed the limited interest of road safety secondary participants in disability policy.

All issues led to insufficient and ineffective implementation of the policies, which contributed to the impacts of road crashes, long term impairments and disabilities on individuals and their families. This emerging challenge did not only reflect the needs for policy changes, but also for institutional capacity building. It is also clear that the secondary participants recognised the deficiencies in their policy implementation and identified areas for improvement.

The study also highlighted the need to improve the data collections system on road crashes, long term impairments and disabilities. Through the workshops, there was no objection regarding the weaknesses of the RCVIS and PRC data systems. All secondary participants accepted and proposed a list of recommendations to standardise the patient management system in all PRCs and build capacity of related stakeholders. At the same time, gaps in RCVIS were identified by the secondary participants during their group discussion. Recommendations to improve the RCVIS included improving data collection procedure, disseminating more reports, building capacity of participating teams and conducting an assessment. In addition, sources of data collection for severe disabilities (para/tetraplegia) were proposed such as through disability structure, health structure, local government and NGO networks. This also presented a good starting point for the secondary participants in adopting an evidence-based approach towards policy development. However, there were no questions on how the research was conducted, including methodology. On the one hand, this might show the trust of the secondary participants in the research team. On the other hand, it might also show the lack of capacity in research methodology and accessing research quality. It presented the needs to improve this research capacity among the secondary participants.

Limited interest from the second participants on the involvement of families might reflect the fact that the NDSP has not covered sufficient interventions related to families of persons with disabilities. Moreover, the secondary participants from road safety organisations showed limited interest in NDSP, while disability related participants were involved in both policies by having fair recommendations for each one. The limited interest in the disability policy might become a challenge to extend the NRSAP scope to ensure safer roads for all road users, including persons with disability.

Chapter 8: Discussion and Conclusion

8.1 INTRODUCTION

The overall PhD research aimed to contribute to policy changes that will lessen the impacts of road crashes in Cambodia. In doing so, it sought to further our understanding of how to best develop evidence-based policies that will reduce the incidence and impact of long term impairments resulting from road crashes in low- and middle-income countries. Previous studies and reports from WHO and WorldBank (2011), Haagsma et al. (2012), Juillard et al. (2010), Ericson and Kim (2011) and National Institute of Statistics et al. (2011) recognised road traffic injury as a contributor to disability. However, there was limited analysis on the patterns of long term injury crashes and post-crash factors that might influence the severity of impairments and lead to disabilities. At the same time, it is crucial to have a deeper understanding of disability after a road crash and how it is experienced by the persons themselves and by their families. Their lived experiences can provide rich contextual information to help identify the gaps in national policies, such as in prevention and transport system design and treatment as well as full inclusion and assistance (Eide & Ingstad, 2011; J. King & King, 2013). To fill the gaps identified in the literature reviews, the PhD research had four main objectives:

1. To examine the nature and extent of long term impairments resulting from road crashes in Cambodia
2. To identify the factors that increase the severity of long term impairments and lead to disabilities
3. To explore the impacts of disabilities on individuals and their families
4. To identify potential changes in policies to prevent long term impairments, improve post-crash care and better address the long term needs of persons with disabilities

The chapter presents a full discussion of the research findings, which were aligned with the research aim and objectives and classified in accordance to the following research questions (RQs):

- RQ1: How much do road crashes contribute to long term impairments?
- RQ2: What are the characteristics of road crashes that lead to long term impairments?
- RQ3: What role do emergency and post-crash care play in influencing the occurrence and severity of long term impairments?
- RQ4: What are the impacts of disabilities resulting from road crashes on the persons themselves?
- RQ5: What are the impacts of disabilities resulting from road crashes on their families?
- RQ6: What potential changes to road safety policy would reduce the prevalence of long term impairments as an outcome?
- RQ7: What potential changes to health policies would reduce the prevalence of long term impairments?
- RQ8: What potential changes to disability policy would better meet the long term needs of persons with disabilities and their families?

The overall PhD research consisted of four studies, which were:

- Study 1: Institutional structures and policies
- Study 2: Analysis of road crash and disability databases
- Study 3: Individual and family impacts of disabilities
- Study 4: Case study of policy development

As presented in Figure 1.1, all studies contributed to the research conceptual framework, which was based on the approaches introduced by Knott and Wildavsky (1980) and SWOV (2012). It consisted of “generating knowledge” and “policy implication” components. The first component examined the existing policies (Study 1) and explored the characteristics of road crashes, long term impairments, disabilities and their impacts (Studies 2 and 3). Following the data collection in the field and analysis from Studies 1 to 3, the second component, policy implication, formed the basis of Study 4. The overall PhD research covered the generating knowledge component (Studies 1 to 3) and the first part of the policy implication

(Study 4) that consisted only of the “*Reception*”, “*Cognition*” and “*Effort*”, without including any further steps to *adopt* and *implement* the recommendations and research findings. Hence, the research could not show the desired effects of the recommendation (*Impact*). The second part of the “policy implication” component is proposed as the follow up study (presented in Section 8.12) to complete the full process of the policy integration. The main purpose of the follow up study is to support the policy makers in adopting and implementing the policy changes and evaluating the effects.

All studies identified the need to improve data collection on road crashes, long term impairments and disabilities in Cambodia and therefore the chapter begins with a discussion of this issue. The following sections discuss the findings in terms of the RQs. After that, the implications of this Cambodian case study for the implementation of the UN framework of the Decade of Action for Road Safety 2011-2020 are considered. Potential further research is then proposed, before concluding remarks are made.

8.2 IMPROVEMENTS TO DATA SYSTEMS

This section describes the recommended improvements to data systems for road crashes, casualties and long term impairments and disabilities.

8.2.1 Data Collection System for Road Crashes and Casualties

Cambodia is one of the few countries that collect information on road crashes and casualties by combining data from traffic police and health facilities and is often held up as a model in South East Asia and more widely across developing countries. However, the research identified that the contribution of health facilities fell by almost two-thirds from 2007 to 2012. Another issue was the insufficient information in the forms that need to be revised, in addition to the need for improvement in the process of the form collections in health facilities.

The reduction in the number of RCVIS forms completed by health facilities might reflect reducing commitment of the hospital management team to allocate resources to completing forms. To increase the completeness of the data collection, a stronger management role and commitment is needed, especially from the Ministry

management, rather than providing a monetary incentive to make the system work more effectively, as has been suggested. Additionally, since the hospital staff seem unwilling to complete the question related to disability at hospital discharge, it might be better to replace this with a question on how long a casualty needs to fully recover from their injury. This might help gather more information on the severe injuries such as those that require at least six or 12 months for their treatment.

The in-depth interviews identified underreporting related to road conditions, vehicle defects and drink driving. The research also identified the need for RCVIS to change its merging process to keep all information from both data sources for the records that are reported by both sources. At the same time, this system included limited information (and errors) on the emergency responses, including transport mode to the first health facilities, first aid received, and the discharge results. This will require proper data collection flow inside the hospitals/health centres to ensure that the RCVIS data collection forms are not missing and are fully recorded.

The reduction in reporting by health facilities means that the trends in RCVIS indicate a reduction in road trauma, and changes in severity patterns, that do not reflect the true situation. Given these identified biases, this PhD study presented analyses of the traffic police only and health with/without police data separately where necessary. However, this approach has not been taken in the RCVIS annual reports published by the National Road Safety Committee which are the source of the information on road crashes and deaths for Cambodia section in the Global Status Report on Road Safety 2013, published by WHO (2013a). Thus, the PhD research has identified serious problems with the road crash trend information for Cambodia that is currently used by both national and international organisations for data collection.

The RCVIS is one of the key activities in the NRSAP, under Pillar 1. The suggestion above should be included into the action plan to ensure high level representation and engagement. At the same time, it is also very important to include RCVIS (Injury Surveillance System – under the MoH) in the next round of the Health Information System Strategic Plan. This integration might help to ensure the recognition of the system under the health structure, gather better management commitment and reduce the need for monetary incentives.

8.2.2 Data Collection System for Long Term Impairments and Disabilities

Currently, the datasets in the PRCs are the only comprehensive sources of information regarding physical long term impairments. However, each organisation that administers the PRCs has set up its own patient management system, which are not completely consistent in terms of the information collected. The government has commenced the process of introducing a common database to all PRCs. It is important to ensure that the common database will allow for analysis of unit record data, rather than comprising only summary tables.

The current PRC dataset has limitations in term of scope. The PRC databases provide estimates of the number of people with physical long term impairments, but lack contextual information on social barriers or challenges. Therefore, the data describes the long term impairments of their patients, but not the disability. The addition of questions on social barriers and impact will help not only to have a better understanding of the disability context, but also to identify the output of the PRC services in terms of changes in clients' participation in the society and impacts on themselves and their families. At the same time, the system should also extend its role for not only registration but also follow up on those changes when their clients come for later services.

The PRC dataset covers only persons with physical long term impairments who present to the PRCs for services. The interviews highlighted that many persons with para/tetraplegia and cognitive impairments do not access the services there and hence their information in the PRC data systems is limited. The government has plans to establish a nationwide registration system for persons with disabilities, complementary to the introduction of the social financial support scheme to the poor with disabilities. It is therefore crucial from the early stage of this system to have clear definitions and differentiation of long term impairments and disabilities. Including contextual information on societal barriers will enable the government and related stakeholders to identify relevant indicators and measurements to tackle societal barriers, not only long term impairments. This will also require a revision of the current definition of the disabilities in the Cambodian Disability Law. At the same time, this national registration system and the PRC merging system should be incorporated into the NDSP to ensure their high profiles among the relevant

government institutions, in addition to the financial resources for their implementation.

Many national surveys and national administrative databases include long term impairments and disabilities, but they present different figures on the prevalence of disability because of varying definitions and classifications of long term impairments. Only basic types of long term impairments can be disaggregated from the data sources. At the same time, almost all surveys and administrative databases include only information on individual characteristics without information on environmental factors. Introducing common definitions and classifications of long term impairments and disabilities, and including societal barriers is perhaps the lowest cost option to at least gather better information on the magnitude of the issue on the nationwide scale, before the national registration system is established.

In addition, the difficulty in identifying persons with severe disabilities to approach to participate in Study 3 may reflect the limited support services for those people, who were not known and were excluded from disability support interventions. It highlights the need for a better information system as well as services and inclusive programs towards severe disabilities.

Furthermore, the quantitative and qualitative methods in this PhD research complemented each other in terms of providing information on the overall magnitude of the problem as well as comprehensive information on the lived experiences of persons with disabilities. As recommended by WHO and WorldBank (2011), regular qualitative studies are needed to gain in-depth and contextual information, not only to understand and explore but also to measure qualitative changes in the lived experiences of persons with disabilities. Additionally, it is crucial to incorporate this knowledge into policy development in order to bring about better sustainable changes (Eide & Ingstad, 2011).

8.3 THE EXTENT OF LONG TERM IMPAIRMENTS RESULTING FROM ROAD CRASHES

As presented in the introduction section, the first objective of this PhD research is to examine the nature and extent of long term impairments resulting from road crashes in Cambodia. This section contributes to this objective and responds to the

first research question (RQ1) on “*How much do road crashes contribute to long term impairments?*”. The discussion in this section is based on the analysis of RCVIS and PRC datasets in Study 2.

Disabilities as a consequence of road crashes can be viewed from the perspective of disability, or public health or traffic safety. From the public health perspective, road traffic injuries ranked as the 10th highest cause of the loss of Disability Adjusted Life Years and especially, the 5th ranked cause in Southeast Asia in 2010 (Murray et al., 2012). Long term impairment requires ongoing cost for persons with disabilities and this consumes resources from the health system.

From the perspective of disability, neither the overall prevalence of disability nor the contribution of road crashes in Cambodia are well-established. The four national disability data sources provide different prevalence rates, ranging from 2.1% to 4% in 2013. The actual rate probably lies between 10% and 15%, as estimated by the WHO and WorldBank (2011). Additionally, based on the available information in the PRC data, road crashes constituted only 2% of impairment causes from 1980 to 2006, but increased to 15% during the latest years of the data set (2007 to 2011).

From the public health perspective, the data reported by health facilities identified 416 persons with long term impairments due to road crashes in the period 2006-2012. The proportion of long term impairments among the records with discharge results varied from year to year, reaching 1% in 2009 and 2010. This is somewhat lower than the estimate of 1.2% by WHO (2013a).

From the perspective of traffic safety, while disability related crashes contributed only 5.2% of the total road crash cost in 2011, individual cost related to disability (included loss of output and medical cost) was double the cost of a fatality and 10 times higher than a serious injury from which the person recovered (Sann, Ear, et al., 2012). Besides, the 5.2% cost of disability was based on the 1% of health centre discharges which were coded as “long term impairment” multiplied by the cost. However, the analyses in this PhD study show that the 1% is likely to be highly under-reported, so the 5.2% is likely to be a gross underestimate.

Although the RCVIS and PRC datasets show a reduction in number of clients due to road crashes and casualties with long term impairments in 2010 and 2011, the two datasets differ in both their absolute numbers and trends. In addition, the data

that was recorded by police only indicated increasing trends among fatalities and serious injuries, but a decrease in slight injuries. The trends in the police only data are likely to be more representative of the real trends in fatalities and serious injuries (although even the police data appears to be increasingly incomplete for slight injury). Therefore, the observed reductions in RCVIS and PRC might not represent the real trend of long term impairments due to road crashes.

The analysis of the PRC and RCVIS datasets indicated that the percentage of impairments that were due to road crashes has increased dramatically in recent years. At the same time, the overall numbers of long term impairments in Cambodia are not accurate, as different national surveys provided different estimations. The PRC dataset excluded the data on severe long term impairments, while RCVIS dataset involved under-reporting issues. Both data sources (PRC and RCVIS) presented loopholes in terms of data collection procedure and quality. On the other hand, at least, they may indicate that the number of long term impairments due to road crashes has been increasing.

8.4 CHARACTERISTICS OF ROAD CRASHES THAT LEAD TO LONG TERM IMPAIRMENTS

This discussion section responds to the second research question and contributes to the second research objective to “*identify the factors that increase the severity of long term impairments and lead to disabilities*”. The discussion is based on findings from the analysis of the RCVIS and PRC databases (Study 2) and interviews with the primary participants in Study 3.

The analysis of the databases indicated the issues of quality and completeness of the datasets, which led to limited information on the characteristics of crashes resulting in long term impairments. Additionally, all of the risk factors that were significant for long term impairment and fatality categories presented the same effects for both categories in the Multinomial Logit Model analysis. The model clearly illustrates that long term impairments and fatalities have similar characteristics and those risk factors influence both outcomes in the same way. Those risk factors included age group (0-14), collision counterparts (passenger vehicle, goods vehicle, stationary) and poor ambulance services. These results suggest that

the same interventions are likely to reduce both fatalities and long term impairments. Therefore, characteristics of road crashes that led to fatalities are discussed in this chapter to complement the limited information on the long term impairments.

8.4.1 Transport Modes

The RCVIS data indicates that more than half of persons with long term impairments and fatalities are vehicle controllers. Another one-third are passengers and 8% are pedestrians. Pedestrians constitute a higher proportion among fatalities, while the proportion of vehicle controllers is higher among long term impairments. The majority of fatalities and persons with long term impairments were travelling by motorbikes at the time of crashes. Motorbike controllers constituted the highest proportions among all road user types and were more likely to be killed or have serious injuries than motorbike passengers. More than half of the fatalities were hit by passenger and goods vehicles (such as cars, buses, trucks, vans). The proportion of casualties who were hit by motorbikes was the highest among long term impairments, compared to fatalities.

The interpretation of the proportions of injured and killed persons as a function of transport mode is hampered by the lack of exposure data pertaining to the use of these modes. Nevertheless, the general finding of increased severity of outcome to pedestrians and motorbike riders is consistent with that found across developed and developing countries (WHO, 2013a, 2013b).

8.4.2 Contributing Factors

The helmet and seatbelt wearing rates were recorded in RCVIS by the traffic police and health facility staff (11% among motorbike casualties and 27% among car/bus/truck drivers). These low rates were also identified among the interviewed persons with disabilities, who expressed during the interviews that none of them used a seatbelt and only five out of 34 motorbike drivers and passengers (15%) wore a helmet.

The analysis on the following contributing factors (human errors, collision types, vehicle defects, etc.) to road crashes was based on police data only because those contributing factors are not available from hospital dataset. Although single vehicle crashes comprised only 9% of overall casualties, their fatality proportion is the second highest, compared to other collision types. Thirteen out of 46 interviewed

persons with disabilities were injured in single vehicle crashes, and eight of them sustained para/tetraplegia.

Human errors were coded in the police data for at least 95% of crashes. Speed was reported as the major human error that was responsible for more than half of the fatalities (53%) and long term injuries (56%), followed by drink driving. Drink driving and speeding were more likely to be coded in fatal cases and severe injuries than other human errors. Although speeding was identified by traffic police in RCVIS as the main cause of half of the road crashes, the interviewed persons with disabilities did not express their concern as much as drink driving. Drink driving was recorded by traffic police in the RCVIS data collection forms (14%), based on rough assessments by traffic police officers, such as smell of alcohol or behaviour of drivers at the time of crashes. This also meant that those drunk drivers who managed to flee the scene would not be reported into the system. The findings from the interviews with persons with disabilities suggest that there may be significant under-reporting of drink driving in the RCVIS database and little awareness of the risk of drink driving and standard drinks.

Additionally, vehicle defects and road conditions were coded as contributing to road crashes among only 4% and 3% of casualties in RCVIS by traffic police, while they were mentioned in 12 and eight cases respectively among all 46 interviewed persons with disabilities. Most of the cases were identified through probing questions only. Therefore, the low proportions in the RCVIS might not reflect the real context of crash causes related to these issues.

Cultural perceptions were also identified as contributing to the crashes and prolonged long term impairments by some interviewed persons with disabilities, while they could not be identified in the RCVIS. The perceptions included an involvement of Karma, spirits/ghosts at blackspots and other cultural/religious beliefs. Because of these beliefs, four of the interviewed persons with disabilities considered road crashes as “accidents” that could not be avoided or prevented. The findings related to Karma confirmed the results of the study conducted by (J. King & King, 2011) in Thailand, where the majority of the population are Buddhist, as in Cambodia. Although there was a spectrum of belief among the interviewed persons with disabilities, it might prove that there is a need to take it into consideration in the

development of educational campaigns related to road safety and disability, especially for communities in rural areas.

Moreover, around one quarter of casualties reported by traffic police in RCVIS and 14 (out of 46) interviewed persons with disabilities were injured in hit and run crashes. The proportion of fatalities in hit and run cases was higher than among non-hit and run cases. Hit and run cases are more likely among speed-related and dangerous overtaking crashes and occur along the national roads, compared to other types of roads. Those hit and run cases led to a chance of escaping from taking responsibility. The findings highlighted the need to have better actions in the current National Safety Action Plan to prevent hit and run cases.

8.4.3 Characteristics of Casualties with Long Term Impairments

Males and those of working age (15-59 years old) comprised the majority of fatalities and long term impairments and were over-represented compared to the population. This finding is consistent with data from both developed and developing countries published by WHO (2013a). Students, workers and farmers constituted 70% of the overall road crash fatalities and long term impairments. The much greater representation of unemployed people in the PRC and interview groups than in the RCVIS data suggests that the crashes led to unemployment.

Following the analysis of the data in RCVIS, it is clear that long term impairments and fatalities have similar characteristics and risk factors influence both outcomes in the same way. Therefore, road crashes and long term impairments can be addressed by the more generic approaches of trying to reduce incidence of all crashes (as a general prevention aim), severe crashes (which leads to a focus on speed, helmets, motorcyclists, etc.) and improving post-crash response.

8.5 THE INFLUENCE OF THE EMERGENCY RESPONSES AND POST-CRASH CARE ON THE SEVERITY OF LONG TERM IMPAIRMENTS

This section discusses RQ 3: “*What role do emergency responses and post-crash care play in influencing the severity of long term impairments?*”. There were two main issues identified: the inadequate emergency responses and capacity of post-crash treatment.

8.5.1 Inadequate Emergency Responses

The information on the emergency responses was limited in RCVIS and so was complemented by the qualitative interviews. The police data indicated that around half of the casualties were transported by health facility vehicles, while the proportion in the hospital data was only 27%. The health facility vehicles are more likely to provide transport in serious cases (fatalities and severe injuries) than slight cases. In the interviews, only 16 (out of 46) were transported by ambulance and the others were transported by motorbikes, cars, trucks or local transport (agricultural vehicles, remorques) to the first health facility where they received treatment.

Indicators to measure emergency interventions were not included in the second Health Strategic Plan 2008-2015. The lack of national indicators, responsible ministry departments, budget and timeframe in the health policies might lessen the effectiveness of the emergency response services. The persons with disabilities and hospital staff reported that most of the ambulances were not well equipped, and while being adequate for transporting people from one health facility to another, might not be sufficient to provide emergency service during the transportation of road crash casualties from crash scenes, in addition to the limited coverage of the national emergency number.

After a crash, first contacts were made mostly through phone calls to family members of the interviewed persons with disabilities, or they were supported by their friends (passengers/drivers in the same vehicles) or villagers around the areas of crash scenes. This support, including first aid, might enable the primary participants to access the health services faster than waiting for an ambulance, but it might involve inappropriate practices, especially in moving casualties from the roads to roadside, or putting them on or off vehicles to transport them to the first health facilities. The various types of non-ambulance transport modes and the long waiting time might have contributed to the severity of injuries, especially for those that sustained spinal cord injuries.

8.5.2 Inadequate Post-Crash Care

Post-crash care was provided through public health facilities, private services and traditional healers with varying capacity, quality and results. Firstly, an issue of having many health facility referrals was raised and illustrated as an issue of quality

and capacity of the health facilities. Various reasons for being transferred included suspicion of the interviewed persons with disabilities regarding the service quality of the hospitals, acceptance of limited capacity by the hospital teams, looking for better options in terms of lower cost and avoiding amputation. The different reasons for transfers showed that there was no standardised procedure and decision-making process. Having many referrals might illustrate the limited capacity of the hospitals in delivering services for the severe injuries, a side effect on the timeliness and readiness of having proper treatment.

Second, payment systems in the public health facilities were also identified as influencing the severity of long term impairments. This included an advanced payment that needed to be ready before receiving treatment in some hospitals and the amount of the overall cost. The unstandardised service fee and procedures that were practised among hospitals and the full responsibility to cover the cost by the interviewed persons with disabilities and their families means that the burden to families started from the early stage of post-crash treatment. At the same time, it reflected discrimination against the poor who might not be able to pay for a proper service.

Third, another issue related to the positive and negative effects of traditional healer services on the severity of long term impairments. On the one hand, the services might result in more severe impairments because of the delay in receiving proper and adequate treatment in formal public health facilities. On the other hand, the services involved psychological and physical rehabilitation treatment, which influenced the motivation of the persons with long term impairments. Additionally, accessing these types of traditional services emphasised the belief in such traditional medication practices, in addition to the cultural and religious belief related to road crash attributions. It was sometimes the only choice of the primary participants (I) when there was an absence of a proper and sufficient formal health system and unaffordable cost for the treatment, especially for poor communities.

8.5.3 The influence of Support on Discharge on the Severity of Long Term Impairments

Support on discharge included medical follow up, physical rehabilitation services, spinal cord rehabilitation centre, community based support and vocational

training. The research findings suggested that the different types of support influenced the severity of long term impairments.

First, medical follow up from various pharmacies was accessed by the interviewed persons with disabilities without proper prescriptions. The quality of these outlet pharmacies was raised as an issue by Levine and Gardner (2008) who identified problems such as over-prescribing, over-dispensing, mis-prescribing and fake versions of drugs. Second, there were some side effects of the physical rehabilitation services, including difficulty of wearing prostheses (quality, time consuming, discomfort and inflexibility) and side effects of wheelchairs. Song (2015) and Sinha et al. (2014), found that these issues and pains negatively influenced the quality of life of the persons with disabilities.

The support on discharge to interviewed persons with disabilities included physical rehabilitation service at their houses, charity events, donation of household facilities, and referrals to grant, loan or vocational training programs. Additionally, the support services were provided in different channels, in a short term form, without long term impacts. On the one hand, it contributed to living costs and promoted better participation from the family members. On the other hand, the support has not reflected the disability inclusive concept, as it tended to focus on an individual approach, but not an integrating approach into a broader society.

The findings in this section help to identify potential changes to health policy that could assist in reducing the likelihood that people who are injured in road crashes experience long term impairments. At the same time, the implications for health policy will benefit road crash casualties with long term impairments as well as other types of injuries.

8.6 IMPACTS OF DISABILITIES ON PERSONS WITH DISABILITIES AND THEIR FAMILIES

This discussion section is based on research findings from the in-depth interviews with the persons with disabilities and their families in Study 3. It addresses the fourth and fifth research questions as below:

RQ4: What are the impacts of disabilities resulting from road crashes on the persons themselves?

RQ5: What are the impacts of disabilities resulting from road crashes on their families?

Family members in Cambodia share the responsibility of taking care of each other and living in the same household together. In the absence of social protection schemes, the family role has been highlighted as the main source of support to those persons with disabilities, beginning at the road crash scenes. The impairments and disabilities of a family member impact on expenses, income, time spent caring, and the lifestyle and living standard of the whole family (Narayan et al., 2000; Palmer, 2011; Taksdal, 2011; WHO & World Bank, 2011). In addition to societal barriers, impacts of disabilities described by the persons with disabilities and their families can be classified as reduction in physical well-being, low psychological well-being, less economic well-being and loss of social well-being.

8.6.1 Physical Well-being

The impact on physical well-being observed among the interviewed persons with disabilities included experiencing different types of pain such as phantom limb pains and stump pains, which negatively influenced the quality of life of the persons with disabilities (Sinha et al., 2014; Song, 2015). This is in addition to uncomfortable prostheses, improper use of wheelchairs, and medical services that might lead to over-prescribing, over-dispensing, mis-prescribing and fake versions of drugs. WHO and WorldBank (2011) recognised pain as a common health condition among people with disabilities and suggested rehabilitation services as a tool for pain management. Additionally, living in conditions of poor hygiene and uncleanness might lead to poorer health conditions, as recognised by WHO and World Bank (2011).

Moreover, lack of belief in the effectiveness of physiotherapy was also observed among most interviewed persons with disabilities, especially those with para/tetraplegia and the resulting physical inactivity might lead to more critical conditions of long term impairment (WHO & World Bank, 2011). Additionally, the aim of being able to walk is a more important focus for them than their ability to use their hands which can lead to more severe impairment of their hands and the loss of the ability to work with their hands. Providing only rehabilitation services, without proper counselling services, might contribute to them having wrong perceptions by focusing on walking ability but not use of their hands.

Poor physical well-being was described as an ongoing impact and a burden on the family members. Since immediately after the crashes, involvement of family members was described such as calling for the emergency ambulance, and being ready for advanced payment at the hospitals, in addition to time consumed to take care of the persons with disabilities at hospitals as well as on discharge and limited time left for their children. All of the family members emphasised their difficulty, especially during the first year of the long term impairments. This showed the important role of the family in taking such responsibility in Cambodian society.

J. King and King (2011) and WHO and World Bank (2011) recognised the responsibilities of family members as caregivers and noted that caregivers often have limited knowledge and skills in providing appropriate care or identifying health problems of the persons with disabilities (WHO & World Bank, 2011). Their work as a caregiver was added to their domestic responsibilities, and their work outside to generate income to compensate for the loss of the family breadwinner's job.

The description of the impacts on their physical well-being from those interviewed persons with disabilities and their families clearly demonstrated the insufficient and ineffective implementation of the current policies to tackle these issues and the needs for policy changes. Such difficulties were observed among the interviewed persons with disabilities of different socio-economic status. This might reflect an issue of family care for the primary participants (I), no matter whether the family was well-off or poor.

8.6.2 Psychological Well-being

Factors that contributed to reduced levels of psychological well-being were described among the interviewed persons with disabilities, including suicidal ideation, low feeling, stressfulness, worry, sadness, misery, feeling worthless, and being ashamed. Impacts on psychological well-being of family members were expressed as tiredness, stressfulness, worry, sadness and being exhausted. Being ashamed might be linked to their reduced income generating capacity. WHO and World Bank (2011) mentioned depression as a common secondary condition that may reduce functioning and quality of life, and increase health care costs. Persons with disabilities who experience depression may have a higher risk of premature death (WHO & World Bank, 2011). Additionally, reducing shame and stigma among

the family members might help to improve interpersonal relationships, leisure, employment and social activities (WHO & World Bank, 2011).

In addition, various types of difficulties, hopelessness and inabilities were described to some extent regardless of the type of long term impairments. These underlined the limited awareness of the ability and rights of persons with disabilities. Most of them did not demand rights they should have been provided with, but asked for monetary support and charity. Another factor might be the social and cultural construction commonly expressed as “having strong shoulders and healthy legs”, which demonstrates that their ability to walk is very important for those persons with long term impairments. This finding confirmed the explanation of Oliver (2009) on the belief and importance of being able to walk by non-walking persons as a physical act and social symbol.

Moreover, although family members intended to express care, worry, love and concern, it sometimes had an unintended negative effect on the interviewed persons with disabilities and could become a discouragement that led them to focus more on their impairment and inability than their ability.

8.6.3 Economic Well-being

One of the first difficulties mentioned by all interviewed persons with disabilities and family members is the cost of treatment and expenses for the family to take care of them, in addition to a reduction and inability to generate income. The impact on the economic well-being of families started from the moment of arriving at hospital, as all treatment required direct advanced payment in cash. Such urgent cash payment became a burden to the family members to identify funding sources by using their own savings or borrowing from others. The burden on the family is to pay back the debt that was borrowed to cover the treatment, in addition to the loss of their property such as land and house.

Therefore, this study confirmed the findings of Eide and Ingstad (2011) on the involvement and importance of families and their responsibilities to share their resources. Eide and Ingstad (2011) emphasised the need to have social protection policies and supporting schemes targeting the family as a unit, not only the individuals with disabilities. Based on the description of the family burden, it is crucial to have social protection schemes to reduce the burdens such as the treatment

cost, time loss, property loss and debt, in addition to the need of psychological support and avoiding intentional or unintentional discouragement.

In the NDSP, actions towards supporting persons with disabilities were also presented, such as a social security fund for persons with disabilities, and grants for setting up small businesses. However, the interviewed persons with disabilities mentioned its limited scope as it was just a one-off support, with limited follow-up from the supporting organisations. Limited economic well-being presented the lack of social support scheme and the gap in the public health systems, which did not reduce the burden of the persons with disabilities and their families. This is another example of the unsuccessful implementation of the NDSP. It also illustrates that the poorer the individuals were, the more inadequate support at the emergency stage and the more burden to the families in terms of accessing cash for advanced payment as well as to cover the overall treatment during the hospital admission and on discharge. Additionally, the grant program and vocational training scheme were not sufficient to tackle the growing issues for the society and families. Moreover, the role of the family members seemed overlooked in the workshops with the policy makers. They provided almost no recommendations or action towards involving family members in improving the lives of persons with disabilities. Although there was some support to reduce the impacts on economic well-being and social well-being, none of the persons with disabilities and family members described any support to reduce the burden on the family physical well-being.

8.6.4 Social Well-being

Impacts on social well-being were described relating to participation in society through education and jobs, and status in their families. Many of the interviewed persons with disabilities have changed their life style from being active in the society, either as students or working, to staying at home. The impact on dropping out of schools and job loss confirmed results of the studies conducted by Handicap International France (2009), Juillard et al. (2010) and WHO and WorldBank (2011). Being a cause of shame, transportation issues and inaccessible classrooms were the reasons for dropping out of school. Additionally, unsupportive employers and inability to do heavy work were mentioned as reasons for losing jobs. The research finding also showed the impact is more likely among severe disabilities (para/tetraplegia) and in rural areas.

Moreover, losing income generation ability might lessen roles of persons with disabilities in their families in terms of decision making and being respected as a family leader and breadwinner. Once this role is changed due to job loss after their road crashes, there could be a situation of stress, disintegration, aggression, and anger (Narayan et al., 2000).

Other social impacts included in lost working time and dropping out of schools among family members such as by children and siblings to replace their roles as a family breadwinner. This risk of dropping out of school was also identified by Taksdal (2011) and constituted a reduction in the well-being of the children due to limited care from their parents. Palmer (2011) also presented experiences of children being left at home without care. Additionally, an issue of low health status among children who have parents with disabilities is noted by WHO and World Bank (2011). In addition, more responsibilities were given to children, as reported by nine primary participants (I). Greater domestic workload, especially for female children, was also mentioned by WHO and World Bank (2011).

Such impacts on social well-being among the primary participants are another factor that arises from the gaps in policy implementation among the government and non-government institutions. It demonstrates the limited coverage of support services, insufficient vocational training courses and the societal barriers. The loss in social well-being clearly represents issues of social acceptance and disability inclusion and highlights the need to focus disability interventions towards society for better participation of persons with disabilities.

8.6.5 Societal Barriers

As defined in the Convention on the Rights of Persons with Disabilities, published by the United Nations (2006), disability results from the interaction between the persons with impairments and attitudinal and environmental barriers that hinders their full and effective participation in society on an equal basis with others. Societal barriers were an obstacle for the interviewed persons with disabilities in performing their daily tasks at home, in their communities and at work, including the attitudes of others, the physical environmental, religious and transportation barriers. Additionally, the issues of physical and environmental barriers included classroom accessibility, wheelchair accessibility along the roads, in their house yards and public buildings. WHO and World Bank (2011) consider attitudes towards persons with

disabilities as a factor that produces barriers and recommended it be changed, in addition to the elimination of environmental barriers to improve the accessibility of persons with disabilities in the society.

Transport mobility was another main barrier. Although around one-third of the primary participants (I) were able to ride their own vehicles, difficulties in terms of controlling their motorbikes with their prosthesis, capacity of their wheelchair batteries and road surface condition were raised. The availability of door to door pick up by taxi services was an option for them, but the costs were a limitation for the poor. They rarely used bus services. Many other interviewed persons with disabilities did not express any willingness to travel outside at all. At the same time, being independent in transportation might be one of the reasons that support the participation of the persons with disabilities into the societies. The more independent they are in transportation might lead to more participation in the society. As raised by Savill et al. (2003), transport barriers hinder persons with disabilities from employment opportunities, access to education, and social and recreational participation.

The interviewed persons with disabilities expressed their belief that disability seems to sit in individuals and their families, but not the society and responsible institutions, especially the government. The concept of a rights based approach and the requirement of eliminating the societal barriers were not fully understood among the interviewed persons with disabilities and their family members. The belief that disability was the individual's responsibility might have led to the limited movement of those persons with disabilities in demanding their rights and better access to society and limit their full participation after having long term impairments. This finding aligned with the others about their low psychological well-being, especially the hopelessness, and their final requests for charity and monetary support to start up their own business, rather than going out to work with others.

Additionally, being excluded from the society might lead persons with disabilities to focus their living on an individual based approach. They tended to seek support from NGOs through community based support on grant/loan schemes to set up their own business or work around their houses such as farming or raising animals, rather than looking for a job in a broader environment. This might be a reason that most organisations have a tendency to tailor their community based

support in Cambodia to focus on physical rehabilitation, vocational training and grant/loan schemes, rather than integrating persons with disabilities into the society. Such approaches might be based on the requests from persons with disabilities, but they might not effectively target the necessary priority and contribute to full participation of the persons with disabilities into the society.

Those who expressed their active participation in society tended to raise a lot of issues related to environmental barriers and attitudes of others. In contrast, those who just stayed at home did not mention those issues often and did not make many complaints or demands. It seemed that environmental barriers and attitudes of others were less relevant to those who stayed at home, because they have not exposed much to the society.

Although there are various types of support for persons with disabilities such as vocational training and small grant/loan scheme, there are also various contributing factors to the impacts of disabilities. These included employment opportunity, which was not provided fairly to the persons with disabilities. It was clear that discrimination existed in both the governmental and private sectors, where persons with disabilities were dismissed, demoted to a less responsible position or refused a job. Because of such discrimination, some of the persons with disabilities have been working in an unsecured job condition or having non-preferred jobs. The issue of employment and working environment was clearly illustrated by J. King and King (2011) WHO and WorldBank (2011) and Juillard et al. (2010). In addition, the Council of Ministers (2011) highlighted issues related to the vocational training on the limited link between the training courses offered and the needs of the labour market and people's demands. The study confirmed this issue as it identified that half of the persons with disabilities who received the vocational training could not apply these skills for income generation. Additionally, the training skill was not in line with their preference and the environmental barriers in their working spaces. This is an example of where support was provided to individuals, but environmental barriers remained, preventing persons with disabilities from participating and applying their skills in the society.

The study findings on the societal barriers also demonstrated the inappropriate context of the society and lack of understanding and supporting persons with disability in Cambodia. This presented gaps in the society towards disability

inclusion. Although the issues of physical, psychological, economic and social well-being expressed the individuals' needs, the societal barriers highlighted the needs to tackle society as a whole in order to promote full participation of the persons with disabilities and contribute to improving their well-being. Additionally, the impact was observed among the persons with disabilities and became a burden on their families, especially among the poor and rural areas. Hence, interventions to reduce the impact and burden are needed for both the individuals and their families.

8.7 DISABILITY AND POVERTY CYCLE

The research indicates a bidirectional relationship between poverty and disability. Poverty is multidimensional and defined through three main approaches: the basic needs approach, capability approach and economic resources approach (Palmer, 2011). This PhD research did not intend to comprehensively analyse the poverty characteristics of the research participants, but identified some key elements as below.

Based on the basic needs approach, the Human Development Index is the most well-known tool to rank countries on health, education and living standard (Palmer, 2011). Cambodia is one of the poorest countries in the world, being ranked 136th out of 187 countries in the UN's Human Development Index and 20.5% of the population live below the national poverty line (Human Development Index, 2014). The research indicates that the majority of the interviewed persons with disabilities might not meet the basic needs that include food, sanitation facilities, health, shelter and education.

Additionally, following the capability approach, which included the functionings to have freedom to choose for achieving self-respect and social integration (Palmer, 2011), the research presents critical issues of social well-being and societal barriers among most of the research participants. Furthermore, the economic resources approach defines poverty based on a lack of resources, including cost of living for basic needs (Palmer, 2011). The research did not include an estimation of family expenditure and monthly income, but at least it reflects another poverty dimension among the research participants who lost their jobs, were unable to generate their income, lived dependently on their families, and fell into debt.

The previous sections in this chapter discuss the research findings and highlight the impacts of road crashes on individuals and their families. The impacts clearly illustrate the disability and poverty circle, which is summarised in Figure 8.1 below.

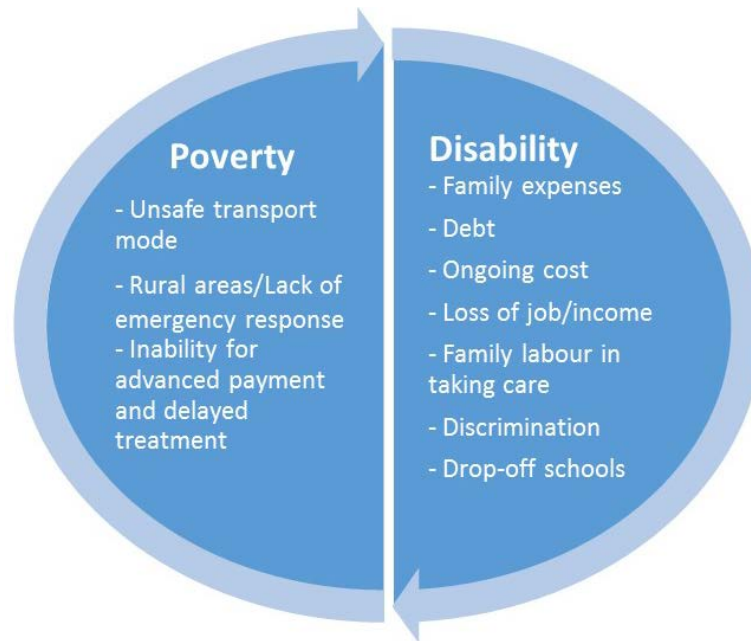


Figure 8.1: Poverty and Disability Cycle

The research findings demonstrate three main factors of poverty that may contribute to increasing the likelihood of long term impairment and disability. One of them is the vulnerability of travelling by motorbikes, goods vehicles, agricultural vehicles and walking. These modes are commonly used by people of low socio-economic status because they cannot afford other alternatives. Hence, road crashes tended to inflict more severe injuries on those people in poor communities who could not afford a safer mode of transport.

Second, the primary participants (I) who lived in rural areas were more likely to be poorer than those in urban areas. They were less likely to access ambulance services and so many of them had to choose other transport modes such as motorbikes and agricultural vehicles for their emergency transportation to the health facilities, without cervical collars or spinal boards for spinal cord injured participants. This lack of emergency response might lead to increasing the severity of injuries and long term impairments (WHO, 2005).

Limited financial resources and inability to pay for treatment was also another issue among the poor, who decided to discharge themselves from hospital and looked for less expensive services, such as a traditional healer. Additionally, some of them were left without any treatment in a hospital emergency room, until their relatives arrived and paid for the services. The delay in receiving proper treatment might impact on the severity of their long term impairments.

Moreover, the research also illustrates the impacts of disabilities and experiences of individuals and their families in terms of poorer socioeconomic outcomes, job loss, family consuming time for taking care, discrimination in society and education. The burden to families, such as debts, is more likely among the rural poor than those in urban areas. They complained about the cost of treatment that started as soon as they needed the emergency services. The treatment cost was estimated as at least one year's income. Family members needed to allocate their time and money for the primary participants (I) while children needed to compensate by having less daily care and support. This finding is aligned with the report of WHO and World Bank (2011) on the vulnerability of persons with disabilities towards poverty because of their limited assets to pay back their loans. This finding was also in line with the study of J. King and King (2011) in Thailand, in terms of the burden of extra work on family members to generate family income. Additionally, Narayan et al. (2000) concluded that generally, female-headed household might be able to generate less income than male-headed ones. This also implies that the families are more vulnerable to poverty, compared to the income generated before the road crashes.

Further, persons with disabilities in rural areas are more likely to stay home after the road crashes and never return to work or schools, in addition to less mobility in their society. Hence, most of them changed their roles from being a family breadwinner to being dependent on their family members. Palmer (2011) and WHO and World Bank (2011) highlighted a gap of unemployment between persons with disabilities and without disabilities, and concluded it as a factor of poverty among families with disabilities. Persons with disabilities experience employment discrimination through having less job opportunities and being paid less than persons without disabilities (WHO & World Bank, 2011). The more severe the disabilities, the more discrimination they may experience (WHO & World Bank, 2011).

Dropping out of school was another impact of disability. The education limitation led to less employment opportunity and put persons with disabilities into a risk of poverty (Narayan et al., 2000; Palmer, 2011).

Therefore, the research conducted for this thesis confirmed the disability and poverty cycle as presented earlier by Ingstad and Eide (2011), Palmer (2011), WHO and World Bank (2011), and Narayan et al. (2000). The impact led to less family income and increasing family expenses, while dropping out of school by the persons with disability, children or siblings, and family debt were reported. To reduce poverty, relevant social protection schemes are needed at the early stage to improve the emergency response and to reduce the severity of long term impairments.

8.8 POTENTIAL CHANGES TO CAMBODIAN ROAD SAFETY POLICY

This section presents a comprehensive discussion on the potential changes to the NRSAP, based on the results of all the studies in this thesis. It responds to the sixth research question: *“What potential changes to road safety policy would reduce the prevalence of long term impairments as an outcome?”*. In addition to the recommendation to improve the data collection system (RCVIS) in Section 8.2, the section discusses and classifies the study findings into the relevant pillars of the NRSAP.

8.8.1 General Recommendations

The research identified gaps in the NRSAP implementation due to limited resources among government ministries. Most of the road safety funds in Cambodia are allocated by NGOs. As the first general recommendation, the financial resourcing for the NRSAP needs to be identified for the implementation, not only from the MPWT, but also inside other related ministries, such as MoI, MoH, MRD, MoEYS. The NRSAP is a collaborating plan that requires shared responsibility among those related ministries, and hence financial contributions from them. So far, resourcing is largely limited to a small training budget.

Additionally, the policy reviews in Study 1 reveal that the NRSAP incorporates comprehensive actions in each pillar, but does not include performance indicators for the pillars and for the whole action plan. The result has been limited measurement,

monitoring and evaluation. Introducing performance indicators will also encourage better political will from the government in achieving the results.

Although the NRSAP has been developed with comprehensive interventions of the five pillars, based on the Global Decade of Actions for Road Safety, the resulting long lists of activities in the pillars cannot be delivered in Cambodia, where the human and financial resources are insufficient. This highlights the need for a better prioritisation of the action plan implementation, based on such limited resources.

It is important to note that there is very limited involvement of the insurance industry in the current NRSAP. They are mentioned only once in the NRSAP related to the vehicle safety standard (Pillar 3). The plan should encourage more participation from the insurance sector in many aspects, such as research (Pillar 1), public education campaigns (Pillar 4), emergency and hospital medical care (Pillar 5), fair compensation (Pillar 6) and insurance scheme for vehicle fleets (Pillar 8). Once the insurance system works well, this could be considered as a social protection scheme to cover treatment costs and a supporting package for those who sustain long term impairments. It can be also beneficial to road crash casualties to set up a road crash victim association, which is currently mentioned in Pillar 1, but without a clear scope and role. Based on the research, there is a need to ensure fair compensation and justice for road crash casualties, especially for the poor who do not have bargaining power. This should be one of the main roles of the association in protecting the rights of the poor.

8.8.2 Pillar 1: Road Safety Management

In addition to funding limitation, human resource issues have become an obstacle for the NRSC and its ministry committee members in terms of the decentralisation of its NRSAP to their departments and provincial teams. Building capacity of relevant staff and provincial teams is crucial for sustainable road safety. At the same time, an issue of lack of capacity in conducting vehicle investigation after road crashes was identified and this requires better strengthening of the vehicle registration system.

8.8.3 Pillar 2: Road Engineering

Improving road infrastructure is proposed, such as footpaths for pedestrians, ox-carts, and persons with disabilities, in addition to setting up road safety audit

teams to investigate and improve blackspots. All actions would require capacity building and adequate equipment. Further action on road accessibility for persons with disabilities, especially wheelchairs, will need to be introduced into road construction and audit projects under this pillar.

8.8.4 Pillar 3: Safe Vehicles

Vehicle safety was identified as an issue which requires improvement mechanisms for vehicle checks and strengthening law enforcement on vehicle safety, such as improper carriage of passengers on the rear of vehicles without proper seatbelts. Another recommendation is to develop and implement a vehicle standard for persons with disabilities.

8.8.5 Pillar 4: Safe Road User Behaviours

The RCVIS data identified hit and run crashes as a major issue contributing to injury in Cambodia. This should be one of the public awareness campaign topics in Pillar 4. It is important to explain how this increases the severity of injuries and what the implication is of hit and run on offenders based on the traffic law.

The very low seatbelt and helmet wearing rates identified in the research underlines the need for better interventions in terms of promotion and enforcement to increase wearing rates. At the same time, the knowledge of the interviewed persons with disabilities is very low on the traffic law and side effects of drink driving, especially in the rural communities. Targeting drink driving prevention for public awareness campaigns is needed with a comprehensive explanation on how alcohol affects driving ability. Increasing safe behaviours also needs proper and long term road safety investment on the national education from the primary to university programs.

Further, it was clear that cultural and religious beliefs can underline crash attributions among the primary participants (I), especially in rural areas. These beliefs should be well understood by practitioners delivering road safety messages to poor communities. Consideration should be given to involving religious groups in public awareness and community promotions on road safety messages.

In addition, it was very clear that males are more likely to be involved in crashes and sustain long term impairments, die or be transferred for further treatment. Priority should be placed on males for all public awareness interventions

to tackle their dangerous behaviours. At the same time, to reduce the overall numbers of fatalities, long term impairments and injuries, motorbike riders and young road users (15-29 years old) should be targeted. Pedestrians should be prioritised for better protection, although road engineering is also important to provide pedestrian facilities.

8.8.6 Pillar 5: Post-Crash Response

The research illustrated the limited capacity and quality of the emergency and in-hospital services. There is a need for the NRSC to put more focus and pressure on the Ministry of Health in implementing this pillar to strengthen the quality, capacity and moral codes of health staff for the emergency and in-hospital services. Additionally, strengthening the national emergency system (119), dispatch centres and referral system to relevant specialist hospitals is also recommended under this health facility component. Another key recommendation is the involvement of communities, village volunteers, students and governmental officials in providing first aid, especially along the national roads. This could include the creation of first aid posts along selected areas, which would require the identification of funding sources. At the same time, it is also important to take into consideration the role of traditional healers by providing proper training and informing the public of the side effects and benefits of this practice, in comparison to different types of injuries and formal medical treatment in hospitals.

8.8.7 Pillar 6: Law Enforcement

According to the interviews, road crash compensation was offered and provided in different amounts and there was no formal and standard procedure. The compensation was based on negotiation and bargaining powers by both parties involved in the crashes, mostly under the intervention of traffic police. Unfair compensation was raised and this highlighted the lack of a legal system to facilitate the process. It is also important to note that once the compensation could be settled, the crash cases were closed without being charged further. This also meant that once the offenders paid the compensation, they were not taken to court for their offences.

Lack of traffic enforcement and an improper justice system showed the limited bargaining power of poorer communities, compared to the richer ones. Proper enforcement and justice systems are important areas that should be strengthened,

especially to tackle hit and run cases. This will require an enforcement operation at crash scenes and a comprehensive investigation system, including promoting and strengthening transparent and consistent traffic law enforcement, especially on speeding and drink driving.

The inadequate enforcement and improper actions of traffic police might be linked to the overall issue of low salary for the government staff, including traffic police officers, who attempt to find alternative ways to supplement their income. Clear guidelines are needed to eliminate corruption in this enforcement sector.

8.8.8 Pillar 7: Driving Licence

There is a need to develop driving licence and vehicle modification guidelines for persons with disabilities. Although the current NRSAP mentions the driving licence system for persons with disability in Pillar 7 and vehicle adaptation in Pillar 3, the guidelines are not available and the implementation mechanism is currently not in place.

8.8.9 Pillar 8: Fleet Safety Management

The research identifies difficulties of persons with disabilities in accessing public transport services and the risks of travelling by passenger/goods vehicles. The study recommends improved facilities for persons with disabilities in the transport system. This includes public transport services that enable persons with disabilities to travel without barriers. Additionally, the study findings highlight the involvement of passenger/goods vehicles in road crashes and the severity of injury to their drivers, passengers and those hit by these vehicles. This highlighted the need for better fleet management to ensure proper driving skills of those passenger and goods vehicles, and improved vehicle standards.

8.9 POTENTIAL CHANGES TO CAMBODIAN HEALTH POLICIES

Both the NRSP and NDSP have less focus on reducing long term impairments than on preventing road crashes and supporting persons with disabilities. This research emphasised the importance of having health policies to fill the gaps in prevention and reduction of the severity of long term impairments. To tackle the growing issues of road crashes and long term impairments, potential changes to

health policies are needed. This section discusses the research findings to respond to the seventh research question as below:

RQ7: What potential changes to health policies would reduce the prevalence of long term impairments?

It is important to note that in the second health strategic plan 2008-2015, only four indicators were included for road safety and long term impairments, while indicators for serious injuries, emergency response and rehabilitation services were not included. Additionally, although there are national policies for pre-hospital and hospital trauma care; and the emergency medical services system included a comprehensive 12-action plan, there is no clear implementing agency, budget and schedule for each action plan. Therefore, in the absence of a clear financial mechanism and responsible departments, the implementation of the policies has become a challenging task for the MoH. In addition, lack of such important indicators in the national health policy indicated a weakness in policy implementation and illustrated the need for better inclusion. It clearly shows a need to refine the next National Health Strategic Plan to ensure adequate actions for emergency response and rehabilitation.

Additionally, the PhD research clearly highlighted the lack of emergency services, issues of unstandardized procedures for referrals, and quality for in-hospital services, in addition to insufficient numbers and quality of ambulance services. These issues were identified through the policy reviews, which were in line with the feedback from the research participants. While these actions have been included in the national policies, these findings demonstrated the ineffective and unsuccessful implementation of the policies. Further, efforts are needed to strengthen the national systems, such as national emergency number, ambulance system, trauma care systems, and community interventions, including first aid responses at crash scenes.

At the same time, although there is an official letter issued by the Minister of Health to advise all hospitals to provide services before asking for payment, in practice, payments must still be made upfront at the emergency rooms. The research showed that this led to delays in medical care services to the patients in the emergency room and might contribute to the severity of injuries. Internal policies and procedures in hospitals need to be reviewed to eliminate the practice, in addition to the need for a social protection scheme to cover those emergency expenses.

Moreover, private services play an important role in the health sector in Cambodia, as they covered 83% of people who need health care services and account for almost 50% of health service expenditures. This also meant the government policies covered only 16% of people who accessed the public health facilities as their first option. Issues were mentioned such as no standard procedure in place to qualify for private ambulance services, over-prescribing, over-dispensing and mis-prescribing of drugs, and fake or watered-down versions of drugs. Additionally, traditional healers also played a role in providing treatment services, which resulted in benefits as well as side effects. The health policy reviews have not clearly mentioned any specific intervention to target those private service and traditional healer quality. This is another gap in the policies that needs to be strengthened in terms of inclusion into the policies and their implementation. Excluding the private services and traditional healers might be one of the factors leading to unstandardized services and inadequate qualities of the sectors.

In addition, after hospital discharge, reduced physical well-being was expressed clearly among the persons with disabilities and their family members. It is important to develop a policy to reduce this burden. For example, social or volunteer services should be initiated to provide partial daily care of the persons with disabilities, especially during the first year of their long term impairments. At the same time, low psychological well-being was also another issue. There is a need for better counselling services to motivate persons with disabilities to understand their rights and be able to stand up for themselves. A proper counselling guideline needs to be developed to include relevant messages and concepts based on the local context and languages. The counselling services should also be provided to family members to ensure the proper support and motivation from them towards the persons with disabilities.

8.10 POTENTIAL CHANGES TO CAMBODIAN DISABILITY POLICY

Although the PhD research did not aim to conduct a comprehensive evaluation of the implementation of the NDSP, it indicated some of the strategic plan results as well as the gaps in the implementation of the plan. This section responds to the last research question as below:

RQ8: What potential changes to disability policy would better meet the long term needs of persons with disabilities and their families?

Similar to the issues of the NRSAP and health policies, the NDSP mentions responsible organisations, but budgeting and its mechanism are not included. Additionally, the plan does not mention any national targets and indicators for its action, potentially leading to limited monitoring and ineffective implementation. It also implies a lack of commitment from the government sector toward achieving measurable results. Therefore, relevant indicators should be included in the NDSP to measure its implementation. The financial mechanism needs to be prioritised, not only in the DAC and MoSVY, but also in the related ministries to better assume their responsibility in the NDSP.

The research also indicated that persons with disabilities received different types of support, based on their areas of living and types of long term impairments. This reflected that there was no standardised procedure, as the level of support varied among individuals and sometimes took many years to be received. It also indicated the lack of a systematic approach, limited coverage areas and insufficient resources in referring persons with disabilities to relevant supports after the hospital discharge. A standardised procedure should be in place to provide relevant support, as part of the NDSP and its implementation. Following the research findings and gaps, the implications for policy change is proposed and classified based on the current actions in the NDSP.

8.10.1 Action 1: Poverty Reduction

The PhD study illustrated the lack of a social protection scheme, loss of well-being and the burden to the whole family. Although social protection schemes have been introduced into the NDSP under Action 1, the financial mechanism for a social security fund for persons with disabilities has not functioned yet. There is therefore a need to strengthen the implementing mechanism for the schemes, such as local loan programs for road crash emergency treatment, local insurance scheme for road crash emergency fund or general health care scheme, job finding assistance for persons with disabilities, or referral services to existing support services. This might help to reduce the issue of advanced payment and speed up the process of emergency treatment in the public health facilities. Additionally, the current NDSP (Action 1) mentions the work opportunity for persons with disabilities in public sectors only,

but has not considered the private sector. Increasing job opportunities for persons with disabilities, in collaboration with private companies, is another recommendation. This also includes assessing the job market and identifying relevant topics for vocational training courses.

8.10.2 Action 2: Provision of Health and Rehabilitation Services

Negative impacts on physical well-being were clearly found among persons with disabilities. They started from the early stage of the long term impairments in hospitals and on discharge and became an ongoing issue with day-to-day pain. This also included improper uses of medication, over-prescribing, over-dispensing and mis-prescribing of drugs, and fake or watered-down versions of drugs. Therefore, the scope of the NDSP should be extended to cover the prevention of long term impairments, which includes adequate emergency and in-hospital services and the quality of private health sectors. This will require better commitment from the DAC and MoSVY in encouraging and putting more pressure on the MoH to strengthen the quality of the public health services. At the same time, cooperation between both sectors (health and disability) is needed for the rehabilitation services at hospital discharges to ensure proper and timely referrals.

It was clear that the PRC services were crucial contributors to the daily living context of persons with disabilities, but there was also room for improvement in the quality and usefulness of the prostheses, which might also be due to improper uses and limited understanding of the products by persons with disabilities. Additionally, counselling services were mentioned as very limited by the interviewed persons with disabilities who mostly could not recall having received any of these services. At the same time, the research also found limited confidence in the effectiveness of physiotherapy among them, since they only thought about the medication process to cure their long term impairments and inability to walk. This will require a motivation to accept their long term impairment, adapt themselves and the environment, while empowering them to continue their participation in society, not only through vocational training, but also the formal education system. Therefore, counselling services on the importance of full participation in the society without the ability to walk are also an area to be strengthened.

It is interesting to note the usefulness of wheelchairs in transportation accessibility as well as their side effects, which might lead to becoming dependent

and not practising leg exercises, in addition to environmental barriers along the roads, around local areas and homes. These might lead to increasing the severity of the long term impairments. These findings illustrated the problem of the improper donation of wheelchairs without proper assessment of the needs and implications of them on persons with disabilities. Wheelchair donation requires eliminating environmental barriers to maximise its usefulness in local communities and road network.

To strengthen the whole system of health and rehabilitation services, it is important to include capacity building of relevant staff members, strengthen the services and scope to all provinces and especially its outreach community services in remote areas. It will also then require the identification of a funding mechanism and the need for increasing numbers of social workers for disability assessments, counselling, and referral facilitations in the centres.

8.10.3 Action 3: Access to Justice

The prevalence of hit and run crashes was clearly highlighted. Additionally, the research highlighted a lack of insurance system and fair compensation for persons who sustained long term impairments due to road crashes. Bargaining power was reported as part of their compensation negotiation. There is a need for a better justice system and insurance scheme (such as the third party insurance system) for persons with disabilities.

8.10.4 Action 5: Education and Vocational Training

Although interventions for improving the accessibility of education and vocational training for persons with disabilities have been mentioned in Action 5 of the NDSP, the impacts on social well-being in the PhD study clearly highlighted the limitations in their implementation. Therefore, it is important to set up disability inclusive programs for the education curriculum, teaching methodology as well as eliminating environmental barriers in the schools. The role and responsibility of the MoEYS need to be strengthened. At the same time, improving education and vocational training also need to incorporate contextual information on persons with disabilities on their preference, job market and to eliminate environmental barriers in their working spaces. In addition, it is also important to ensure that vocational

courses, available in different types of subjects, should be provided to suit different types of disabilities.

8.10.5 Action 6: Expression of Opinion

In the interviews, the persons with disabilities reported their perception on the disability as an individual issue, but not the societal barriers. They tended to request charity and individual support, such as a small grant to start up their business in their local areas. The perception was that disability seems to sit in individuals and their families, but not the society and responsible institutions, especially the government. The concept of rights based approach and the requirement of eliminating the societal barriers were not fully understood among the persons with disabilities and their families. It is therefore important to change the belief in disability being the individual's responsibility and convince them of the need for a movement towards better accessibility into society and their full participation with long term impairments. Better promotion on the rights of persons with disabilities in communities and to the general population is needed.

8.10.6 Action 8: Accessibility

Public transport accessibility and driving licences for persons with disabilities are introduced in Action 8 of the NDSP. However, the interviewed persons with disabilities did not access public transport regularly and none of them had driving licences with the disability status. This is another example of the limitation of the implementation of government initiatives, which needs to be strengthened. This will also require collaboration with the NRSC as this action is also mentioned in the NRSAP. At the same time, road infrastructures were also an environmental barrier, such as for wheelchair users and tri-cycles.

Based on the research findings, it is important to note that all of the interventions from the non-governmental organisations and the government institutions tend to focus on an individual-based approach, where persons with disabilities are the focus of the intervention, such as provision of health and rehabilitation services, education, vocational training and grant schemes. Approaches towards improving social barriers, such as improving systems of transportation, education, employment in private sectors, have been very limited. Having persons with disabilities as the only target group to promote their rights, while the whole

society has not been informed, might not be sufficient. The research clearly highlighted the negative effects of poor attitudes of people around, including their family members, issues of accessibility and mobility. This will require better public education where the general population are advised of the rights of persons with disabilities. As Mertens et al. (2011) suggested, disability is a social problem that needs adjustment from the persons with disabilities as well as society. It is good to provide direct services to support persons with disabilities in Cambodia, as an individual approach since they have not been receiving adequate social protection. However, lack of environmental and social responsibility of the whole society is still a barrier that prevents full participation by persons with disabilities. These also emphasised the importance of having disability intervention as an inclusive approach towards different sectors, such as education, transport, public works, social affairs, public and private sectors.

8.11 IMPLICATION FOR THE DECADE OF ACTION FOR ROAD SAFETY 2011-2020

As presented in Section 2.6: Road Safety and Disability Related Policies, the NRSAP was developed based on the global plan for the Decade of Action for Road Safety 2011-2020. The global plan consists of five pillars:

- Pillar 1: Road safety management
- Pillar 2: Safer roads and mobility
- Pillar 3: Safer vehicles
- Pillar 4: Safer road users
- Pillar 5: Post-crash response

The global plan clearly introduces the needs for sufficient funding, lead agency, national plan and measurable targets for a sustainable response to road safety (WHO, 2011). For each pillar, main activities and indicators are proposed as a guideline for in-country action plan development and implementation. The global plan has strengthened the momentum of the NRSC in Cambodia in developing and approving the NRSAP. Based on the research findings, the overall PhD research has an implication for the global plan, beyond Cambodia, and as a case study of a

developing country. The discussion below is based on the results from Studies 1 to 4. Additionally, before going into each pillar implication, the section below starts with the general implications for the overall global framework.

8.11.1 General Implication

The global plan clearly highlights the need to set up national feasible targets and indicators for each pillar. However, it does not specify what the national targets should be. While this gives a flexibility for in-country teams to decide based on their local context, in some countries, such as Cambodia, the NRSAP has not mentioned any national target, intermediate outcomes and indicators in each pillar. At the same time, the global plan provides lists of activities that might be suitable for most of the countries. Such long lists might contribute to lack of priority setting in low-income countries that have limited resources. They might not concentrate on one or two prioritising interventions, but rather try to spread their limited resources across every pillar. In the end, too many actions with insufficient resources might not produce measurable and effective results.

8.11.2 Implication for Pillar 1: Road Safety Management

The activities mentioned in the global plan include the establishment of data systems that capture information on fatalities, injuries and crashes. The activities do not emphasise the need to collect long term impairment and disability data due to road crashes. It might lead to a lack of information on this issue and limit interventions towards reducing long term impairments and supporting persons with disabilities in the overall road safety interventions.

Additionally, the global plan introduces a list of indicators for Pillar 1. The list mentions the need for a national strategy and lead agency but it does not take into consideration the provincial structures. Based on this PhD research, in the developing context, such as Cambodia, there is a need for decentralisation of the national strategy to the provincial teams. The absence of provincial indicators might reduce the national plan implementation at the provincial level. At the same time, the global plan tends to focus more on having a lead agency, without providing an explanation of roles of the lead agency and the related ministries, such as MoH, MoEYS, MoI and MRD, who should play a very crucial role in the national plan implementation. Focusing only on the lead agency (such as the NRSC in Cambodia) may lessen the

role of the others and lead to the lack of the road safety action plan integration into those related ministry action plans. In Cambodia, the lead agency is responsible for overall coordination, while the implementation is under each related ministry. Based on the structure and policy review, it was clear that the implementation was constrained by the limited participation from those related ministries, especially the MoH.

Another issue that relates to the indicators of Pillar 1 is the absence of the measurement of the capacity of human resources in road safety institutions. This is an important issue in Cambodia where there is limited capacity and qualification among responsible institutions. For example, an indicator could be on the proportion of staff with road safety qualifications. Without such an indicator of the human resource and capacity, lack of capacity might become one of the challenges in terms of policy implementation.

8.11.3 Implication for Pillar 2: Safer Roads and Mobility

Pillar 2 presents activities and indicators of the safety and protective quality of road networks. It highlights the importance of the most vulnerable road users, such as pedestrians, bicyclists and motorcyclists. However, it does not include any intervention towards infrastructures and transportation systems for persons with disabilities. The concept of accessibility for persons with disabilities is not mentioned. Such an absence might represent the lack of integrating persons with disabilities into the transport and road networks. It might also hinder the achievement of safer roads for all road users, including persons with disabilities. Especially, many facilities and adaptations of the road system for persons with disabilities would also help older people and potentially children.

8.11.4 Implication for Pillar 3: Safer Vehicles

Activities in Pillar 3 focus on improving vehicle safety but concentrate mostly on cars, with some indication for motorbikes. The safety standard concepts and indicators are not fully relevant for low-income countries such as Cambodia, where many persons with disabilities were travelling by local transport modes at the time of crashes. Local mobility safety is not included into the pillar which means vehicle safety for people in rural areas might not be prioritised. In addition, the PhD research illustrated the need for having vehicle modifications that are suitable for persons with

disabilities, based on their disability types and spaces for their wheelchairs. On the other hand, the pillar mentions only the safety standard for general population, while vehicle safety standards and modifications for disadvantaged people, including persons with disabilities are not presented. This might be a barrier for them to be integrated into the road networks, which only accept the vehicle standard that might not be suitable for them.

8.11.5 Implication for Pillar 4: Safer Road Users

This pillar presents activities to improve road user behaviours. These activities are relevant for the Cambodian context in terms of speeding, drink driving and helmet wearing promotion and enforcement. On the other hand, the PhD research highlighted another important issue of “hit and run” crashes that might increase the severity of injuries and long term impairments. This might present the appropriate target towards those risk factors (speeding, drink driving, etc.) in public awareness campaigns, regulation and compliance, but also the lack of monitoring and investigation systems for a fair traffic law enforcement. At the same time, the indicators for this pillar tend to focus more on setting regulations, but not on the quality and effectiveness of the traffic law enforcement.

8.11.6 Implication for Pillar 5: Post-Crash Response

Pillar 5 includes activities that improve appropriate emergency treatment, trauma care and rehabilitation services. The PhD research highlighted insufficient post-crash responses that are not included in this pillar. The first issue is the quality and standard of ambulances, including their limited scope to mostly in urban areas. Although having a national emergency number is crucial, lack of quality and capacity of ambulances, such as in Cambodia, might still lead to inadequate support. Additionally, another important issue is the advance payment in the Cambodian public health system. The study highlighted the side effect of the payment, which was requested by the hospitals before the emergency support. This presents the need of providing sufficient and effective emergency treatment in the health facilities, regardless of an ability to pay. Moreover, the PhD research also identified improper practices and side effects of private health sectors, including pharmacies and traditional healers, who played a large role in providing health services at a time of limited and unsatisfied services from the public health system. Therefore, it might be

also helpful if the pillar included the assurance of the capacity, quality, and participation of private health sectors.

Furthermore, in terms of support to persons with disabilities, Activity 6 in the pillar mentions the encouragement and incentives for employers to hire and retain persons with disabilities. This is the only activity in the whole framework that relates to support to persons with disability. This one activity is not sufficient to express the necessary support. On the one hand, since this is not a disability framework, it might not be so relevant to include a long list of activities related to disability support. On the other hand, if only one action can be included into this road safety global plan, the action should focus more on the support and promotion of full participation of persons with disabilities into transport and infrastructure systems. This should include participation at the design, construction and auditing stages of all road network projects and road safety policies. This promotion might help to ensure the needs of persons with disabilities are taken into account at the policy discussion platform in the road safety field.

8.12 FOLLOW UP STUDY AND FURTHER RESEARCH

8.12.1 Follow up Study

The conceptual framework consisted of “generating knowledge” and “policy implication” components, as presented in Figure 1.1. The overall PhD research covered the generating knowledge component (Studies 1 to 3) and the first part of the policy implication (Study 4) that consisted only of the “*Reception*”, “*Cognition*” and “*Effort*”. This first part demonstrated the feasibility of the iterative approach to the data that was analysed (Study 2) and collected among the primary participants (Study 3) and the policy makers. A fairly steady stream of evolving information was periodically fed to the policy makers. This allowed the researcher to exchange ideas and concepts from the policy maker working group and the data collection from the field.

The second part of the policy component includes “*Reference*”, “*Adoption*”, “*Implementation*” and “*Impact*”, which are the levels of knowledge uses in the policy integration process adapted by SWOV (2009) from Knott and Wildavsky (1980). This second part is proposed as the follow up study to complete the full process of

the policy integration. The main purpose of the follow up study is to support the policy makers in adopting and implementing the policy changes and evaluating the effects.

The overall PhD research identified changes and implications for road safety, health and disability policies. To start the process in this follow up study, a consultative meeting will be organised among the policy makers to seek their support and interest in the study. Then, priority topics for further adoption will be discussed to ensure full participation from all of them. Based on the limited financial resources in Cambodia, particular focus might be put on the following topics:

- Data systems:
 - o Improving data collection system through revising RCVIS form and promoting participation from the health sector
 - o Introducing a comprehensive merging database among PRCs
 - o Piloting a data collection system for disabilities in selected communities
- NRSAP: two actions will be proposed into the NRSAP
 - o Developing relevant indicators for each pillar, including intermediate outcomes to improve the implementation and better measure the interventions
 - o Gathering support to develop an intervention towards reducing “hit and run” cases. This might include the establishment of a proper data linkage between vehicle and driving licence registration for better investigation conducts
- Health Policies:
 - o Introducing a national standard and requirement for ambulances to ensure minimum qualification for providing emergency support during the transportation from road crash scenes. This will include a monitoring and evaluation system for the ambulance performance in public and private health sectors
- NDSP: following actions will be proposed for the policy changes

- o Promoting full participation of persons with disabilities into the transport system and road networks, including designing, constructing and auditing stages

Since this will be a multi-sector approach, requiring full participation from related stakeholders, the proposed actions will be subjected to approvals from the relevant policy institutions and availability of resources. Through the study, monitoring and evaluation tools will be developed and conducted to measure the impact.

8.12.2 Future Research

This section proposes research topics for further studies, based on the findings and gaps in the current contexts of Cambodia. As mentioned earlier, there is the need to introduce clear performance indicators for both the NRSAP and NDSP. Having these indicators will allow proper monitoring and evaluation. Research studies can then assess whether these indicators are being reached.

The PhD study identified the limited capacity and quality of the health facilities, starting from the emergency and pre-hospital services to in-hospital services for road crash injuries and long term impairments. Although the research findings might not be sufficient to provide comprehensive recommendations for a whole health structure reform, based on its limited scope, they at least highlight the need for a more comprehensive study to explore the existing structure, service quality and capacity of the public health facilities, taking into account all types of injuries and diseases.

Additionally, the study identified the involvement of the insurance system in the compensation procedure. It will be beneficial to conduct further research to understand the overall insurance scheme and its possible contribution to poor people and those in the middle living standard. As part of the social protection scheme, insurance service might help to speed up the emergency procedure and cover the health treatment cost, especially for persons with long term impairments. At the same time, the study will need to take into consideration the benefit and the side effects of the system based on local context, before introducing it as a social protection scheme.

Furthermore, the importance of cultural and religious beliefs was observed in Cambodia, especially among the people in poor communities. It would be ideal to conduct a study on how public awareness and community based projects can use cultural and religious beliefs to reach people in the communities for road safety and disability messages.

Vocational training is a bridge to support persons with disabilities to be able to generate income for living. The research findings present some issues that affected persons with disabilities and obstructed them from applying their vocational skills. It is important to conduct further research to increase the usefulness of the vocational training, through exploring market demands and taking into consideration the types of long term impairments and societal barriers that lead to different types of disabilities.

8.13 CONCLUDING REMARKS

Road crashes have become a major public health concern and a main contributor to disabilities in Cambodia, especially during the last five years. The findings from the data analysis indicate that road crashes tend to inflict more severe injuries on those who were pedestrians or travelled by motorbikes and bicycles, than those who travelled by passenger/goods vehicles. In addition, key risk factors, including older age group (44-59 and 60+) and collision with passenger or goods vehicles contribute to long term impairments and fatalities with the same effects. These indicated that both groups have common contexts that suggest common priorities and interventions. Therefore, actions targeting the reducing prevalence of long term impairments might also contribute to the prevention of fatalities. These general interventions include targeting male vehicle controllers (16-60 years old) for speeding, drink driving, pedestrian safety, and community along national roads.

The research identified the lack of social protection schemes for persons with disabilities and their families. From the start, cost of treatment as well as care giving depended on their family resources. This became a burden on the families, and greater impacts of disabilities is observed among poorer communities. This is not only a problem for individuals, but the society that has not re-integrated the individuals into their prior active roles. The impacts clearly illustrate the disability

and poverty circle among most of the research participants. To reduce poverty, relevant social protection schemes are needed at the early stage to improve the emergency response and to reduce the severity of long term impairments.

The PhD research follows the stages from the occurrence of road crashes to the consequential long term impairments, then disability and finally impact on the individuals and their family. During these stages, various factors were identified that increased the severity of impairments, disabilities and impact, which might contribute to poverty. Multi-sectoral approaches and interventions are required to tackle the issues at the different stages. However, the findings from Study 1 indicated gaps and potential changes in the systems related to health, road safety and disability in terms of policy contents and implementing mechanism. All policies have not outlined comprehensive financial sources, indicators and targets in addition to the limited human resources. These might lead to insufficient measurement and lack of commitment from the political leaders. The NRSAP and NDSP have little focus on reducing long term impairments, compared to preventing road crashes and supporting persons with disabilities. This presents a crucial complementary role of the health sector in terms of delivering proper health services. Additionally, it highlights the need to extend the scope of the NRSAP to preventing road crashes, decreasing severity of injuries and long term impairments, and integrating persons with disabilities into the safe transport system. Similarly, NDSP needs to include the prevention perspective into its scope by having more interventions and putting more pressure to improve the public health services, quality and capacity. Although there will be an overlap of actions between the NRSAP, National Health Strategic Plan and NDSP, this will present the needs for better collaboration and cooperation between the main stakeholders: NRSC, DAC and MoH, and emphasise the role of MoH in strengthening its public health services. This might also support the NRSC and DAC in putting more pressure on the MoH on its contribution into the road safety and disability sectors.

Furthermore, this PhD research is a case study for developing countries in terms of applying a policy integration approach of promoting knowledge use based on the research findings among policy makers. It is the starting point of the action research related to road safety and disability. When the recommended policies/actions are implemented by the government, the quality of life of persons

with disabilities and their families will be improved in Cambodia. This will benefit not only persons with physical disabilities due to road crashes, but all others persons with physical disabilities due to other forms of accidents and diseases. It is also expected that the road safety policy changes will lead to a safer road system for all road users.

The research findings provide feedback to the Decade of Action for Road Safety 2011-2020. While differences in context exist, the results can be extrapolated on common issues such as a lack of priority setting in low-income countries that have limited resources, limited disability access concepts in the road infrastructure and transport system, ineffective law enforcement, insufficient emergency responses, trauma care and poverty.

References

- Am, S. B., & Nguon, S. (2014). *Situation Analysis for Disability Inclusive Governance and Community Development in Cambodia*. Retrieved from
- Angrosino, M., & Rosenberg, J. (2011). Observations on Observation, Continuities and Challenges. In N. K. Denzin & Y. S. Lincoln (Eds.), *The SAGE Handbook of Qualitative Research*. USA: SAGE Publications, Inc.
- Asia Insurance (Cambodia) Plc. (2015). Retrieved from <http://www.asiainsurance.com.kh/>
- Bergeron, J. D., Bizjak, G., Krause, G. W., & Beaudour, C. L. (2005). *First Responder* (7th ed.). United States of America: Pearson Prentice Hall.
- Biyanwila, J. (2011). Poverty and Disability in the Global South. *Third World Quarterly*, 32(8), 1537-1540.
- Braun, V., & Clarke, V. (2006). Using Thematic Analysis in Psychology. *Qualitative Research in Psychology*, 3(2), 77-101.
- Buchanan, L. E., & Nawoczenski, D. A. (1987). *Spinal Cord Injury, Concepts and Management Approaches*. United States of America: Williams & Wilkins.
- Cambodian-Australian Welfare Council Inc. (2010). *Khmer Culture and Attitude Towards Health*. Retrieved from
- Cambodian National Insurance Company (2012). Retrieved from <http://www.caminco.com.kh/index.html>
- Canoquena, J. M. d. C. (2013). Reconceptualising policy integration in road safety management. *Transport Policy*, 25(0), 61-80. doi:<http://dx.doi.org/10.1016/j.tranpol.2012.09.003>
- CDC. (2013). Well-being Concepts. Retrieved from <http://www.cdc.gov/hrqol/wellbeing.htm>
- Celik, A. K., & Oktay, E. (2014). A Multinomial Logit Analysis of Risk Factors Influencing Road Traffic Injury Severities in the Erzurum and Kars Provinces of Turkey. *Accident Analysis & Prevention*, 72, 66-77.
- Corbin, J., & Strauss, A. (2008). *Basics of Qualitative Research 3e* (V. Knight, S. Connelly, L. Habib, K. Wiley, & G. Treadwell Eds.). United States of America: Sage Publications, Inc.
- Council of Ministers. (2011). *National Social Protection Strategy for Poor and Vulnerable (2011-2015)*. Cambodia.
- Croll, E. J. (2010). The Intergerational Contract in the Changing Asian Family. *Oxford Development Studies*, 34(4), 473-491.
- Crowe, M., Inder, M., & Porter, R. (2015). Conducting Qualitative Research in Mental Health: Thematic and Content Analyses. *Australian & New Zealand Journal of Psychiatry*, 49(7), 616-623. doi:10.1177/0004867415582053

- Disability Action Council. (2014). *National Disability Action Plan, 2014-2018*. Cambodia.
- Eide, A. H., & Ingstad, B. (2011). Some Concluding Thoughts: the Way Ahead *Disability and Poverty, A Global Challenge*. United Kingdom: The policy press.
- Eliezer, I. (2012). The Buddhism of Cambodia. In C. Australia (Ed.).
- Ericson, M., & Kim, P. (2011). How Road Traffic Injuries Affect Household Welfare in Cambodia Using the Millennium Development Goals Benchmarks. *Asian Studies Review*, 35. doi:10.1080/10357823.2011.575209
- FORTE Insurance. (2011). Retrieved from <http://forteinsurance.com/Default>
- Geedipally, S. R., Turner, P. A., & Patil, S. (2011). Analysis of Motorcycle Crashes in Texas with Multinomial Logit Model. *Journal of the Transportation Research Board*, 2265, 62-69. doi:10.3141/2265-07
- General Secretariate of the National Road Safety Committee. (2013). Road Safety Cambodia. Retrieved from <http://roadsafetycambodia.info/>
- General Secretariate of the National Road Safety Committee. (2015). *Budget Report on Road Safety 2006-2016*.
- Ghose, L. (2007). Karma and The Possibility of Purification - An Ethical and Psychological Analysis of the Doctrine of Karma in Buddhism. *Journal of Religious Ethics, Inc.*, 35(2), 259-289.
- Giddings, L. S., & Grant, B. M. (2009). From Rigour to Trustworthiness: Validating Mixed Methods. In S. Andrew & E. J. Halcomb (Eds.), *Mixed Methods Research for Nursing and the Health Sciences*. USA: Blackwell Publishing Ltd.
- The Global Goals for Sustainable Development. (2015). Retrieved from <http://www.globalgoals.org/>
- Global Road Safety Partnership. (2008). *Speed Management: a Road Safety Manual for Decision-Makers and Practitioners*. Geneva, Switzerland.
- Globinmed. (2010). Global Information Hub on Integrated Medicine. Retrieved from http://globinmed.com/index.php?option=com_alfcontact&view=alfcontact&Itemid=119
- Grbich, C. (2013). *Qualitative Data Analysis* K. Metzler (Ed.) *An Introduction*
- Guillen, M. D., Ishida, H., & Okamoto, N. (2012). Is the Use of Informal Public Transport Modes in Developing Countries Habitual? An Empirical Study in Davao City, Philippines. *Transport Policy*, 26.
- Haagsma, J. A., Polinder, S., Lyons, R. A., Lund, J., Ditsuwon, V., Prinsloo, M., . . . van Beeck, E. F. (2012). Improved and standardized method for assessing years lived with disability after injury. *World Health Organization. Bulletin of the World Health Organization*, 90(7), 513-521.
- Handicap International France. (2009). *Disability facts in Cambodia*. Retrieved from Cambodia:

http://www.dac.org.kh/files/downloads/HIF_Disability_Facts%5BEnglish%5D.pdf

- Hasan, M. Q. (2014). *Disability Data Sources in Cambodia*. Retrieved from
- Hsiung, P.-C. (2008). Teaching Reflexivity in Qualitative Interviewing. *Teaching Sociology*, 36(3), 211-226.
- Human Development Index. (2014). Online dataset. Retrieved from: <http://hdr.undp.org/en/data>
- Infinity Insurance. (2007). Retrieved from <http://www.infinity.com.kh/>
- Ingstad, B., & Eide, A. H. (2011). Disability and Poverty: a global challenge *Disability and Poverty: a Global Challenge*. Great Britain: The Policy Press.
- Irwin, H. (1996). *Communicating with Asia, Understanding People and Customs*. Malaysia: SRM Production Services Sdn Bhd.
- Jayatilke, K. N. (1969). *Survival and Karma In Buddhist Perspective* Retrieved from <http://read.goodweb.cn/PDF/p36/Survival%20and%20Karma%20In%20Buddhist%20Perspective.pdf>
- Juillard, C., Labinjo, M., Kobusingye, O., & Hyder, A. A. (2010). Socioeconomic impact of road traffic injuries in West Africa: exploratory data from Nigeria. *Injury Prevention*. doi:10.1136
- King, J., & King, M. (2011). The Lived Experience of Families Living with Spinal Cord Disability in Northeast Thailand. *Third World Quarterly*.
- King, J., & King, M. (2013). *Linking the fifth pillar to the first in the UN Decade of Action*. Paper presented at the Road Safety on Four Continents 16th International Conference, Beijing, China. <http://eprints.qut.edu.au/58801/>
- King, M. (2000). *The Iceberg Principle: The Knock-on Effects of Addressing the Safety of "Special Needs" Road Users*. Paper presented at the Road Safety Research, Policing and Education Conference, Brisbane, Australia.
- King, M., & King, J. (2006). *Do high status people in an hierarchical society know how ordinary people attribute road crash causation? A case study from Thailand*. Paper presented at the The Social Change in the 21st Century Conference.
- King, M. J., & Wood, J. M. (2013). Translating Vision Research into Policy and Practice to Improve the Visibility, and Hence Safety, of Road Workers at Night. *Road & Transport Research*, 22(3), 62-71.
- Knight, N. (2000). *Thinking About Asia, An Australian Introduction to East and Southeast Asia*. Australia: Crawford House Publishing Pty Ltd.
- Knott, J., & Wildavsky, A. (1980). If Dissemination is the Solution, What is the Problem? *Knowledge: Creation, Diffusion, Utilization*, 1(4), 41.
- Levine, D. I., & Gardner, R. (2008). *Briefing Paper: Health Care in Cambodia*. University of California, Berkeley.
- Liamputtong, P. (2009). *Qualitative Research Methods* (Third ed.). Hong Kong: Oxford University Press.

- Ly, T. (1965). *Brief Study on Khmer Civilization*
- Marshall, C., & Rossman, G. B. (2011). *Designing Qualitative Research* (5 ed.). USA: SAGE Publications, Inc.
- Mays, N., & Pope, C. (1995). Qualitative Research: Rigour and Qualitative Research. *British Medical Journal*, 311(6997), 109-112.
- Merriam, S. B. (2009). *Qualitative Research, A Guide to Design and Implementation* (Second ed.). United States of America: The Jossey-Bass.
- Mertens, D. M., Sullivan, M., & Stace, H. (2011). Disability Communities, Transformative Research for Social Justice. In N. K. Denzin & Y. S. Lincoln (Eds.), *The SAGE Handbook of Qualitative Research* (4 ed.). USA: SAGE Publications, Inc.
- Ministry of Health. (2008a). *Health Information System Strategic Plan 2008-2015*. Cambodia.
- Ministry of Health. (2008b). *Health Strategic Plan 2008-2015, Accountability Efficiency Quality Equity*. Cambodia.
- Ministry of Health. (2008c). *National Policy for Pre-hospital and Hospital Trauma Care*.
- Mom, S., Huth, P., Ma, C., Chou, V., Yoeung, R., & Som, C. (2014). *Siem Reap Physical Rehabilitation Centre Follow-up Study on the Impact of Handover, 2011-2013*. Retrieved from
- Murray, C. J. L., Vos, T., Lozano, R., Naghavi, M., Flaxman, A. D., Michaud, C., . . . al., e. (2012). Disability Adjusted Life Years (DALYs) for 291 Diseases and Injuries in 21 Regions, 1990-2010: a Systematic Analysis for the Global Burden of Disease Study 2010. *The Lancet*, 380.
- Nakahara, S., Saint, S., Sann, S., Ichikawa, M., Kimura, A., Eng, L., & Yoshida, K. (2010). Exploring referral systems for injured patients in low-income countries: a case study from Cambodia. *Health Policy and Planning*, 25(4), 319-327. doi:10.1093/heapol/czp063
- Narayan, D., Patel, R., Schafft, K., Rademacher, A., & Koch-Schulte, S. (2000). *Voices of the Poor, Can Anyone Hear Us?* USA: Oxford University Press.
- National Centre of Disabled Persons. (2012). About National Centre of Disabled Persons (NCDP). Retrieved from http://ncdpcam.org/index.php?option=com_content&view=article&id=2&Itemid=2
- National Institute of Statistics. (2008). *General Population Census of Cambodia 2008*. Retrieved from Cambodia: <http://www.nis.gov.kh/nis/census2008/Census.pdf>
- National Institute of Statistics. (2009). *Cambodia Socio-Economic Survey - Health 2007*. Retrieved from Cambodia: <http://www.nis.gov.kh/index.php/publications/cses-reports/cses2007result>
- National Institute of Statistics. (2013). *Cambodia Inter-Censal Population Survey*. Retrieved from Cambodia:

- National Institute of Statistics. (2014). *Cambodia Socio-Economic Survey 2013*. Retrieved from Cambodia:
- National Institute of Statistics, Directorate General for Health, & ICF Macro. (2011). *Cambodia Demographic and Health Survey, 2010*. Retrieved from Cambodia:
- National Road Safety Committee. (2012). *2011 Annual Report, Road Crashes and Casualties in Cambodia*. Cambodia.
- National Road Safety Committee. (2013). *2012 Annual Report, Road Crashes and Casualties in Cambodia*. Cambodia.
- National Road Safety Committee. (2014a). *Cambodia Road Crashes and Casualties in 2013*. Retrieved from
- National Road Safety Committee. (2014b). *National Road Safety Policy 2011-2020*.
- Nguyen, H., Ivers, R., Jan, S., Martiniuk, A., Segal, L., & Pham, C. (2015). Cost and impoverishment 1 year after hospitalisation due to injuries: a cohort study in Thái Bình, Vietnam. *Injury Prevention*, 22, 33-39. doi:10.1136/injuryprev-2014-041493
- NVIVO 10 for Windows, *Getting Started* (2014). QSR International Pty Ltd. (Ed.) (pp. 44).
- Oliver, M. (2009). *Understanding Disability - From Theory to Practice*. China: Palgrave Macmillan.
- Palmer, M. (2011). Disability and Poverty: A Conceptual Review. *Journal of Disability Policy Studies*, 21(4), 210-218. doi:10.117/1044207310389333
- Poverty Alleviation Cambodia. (2008). Health. Retrieved from <http://www.pac-cambodia.org/Programs/Healthcare.php>
- Powell, B. A., Mercer, S. W., & Harte, C. (2002). Measuring the Impact of Rehabilitation Services on the Quality of Life of Disabled People in Cambodia. *Disasters*, 26(2), 175-191.
- Probst, B. (2015). The Eye Regards Itself: Benefits and Challenges of Reflexivity in Qualitative Social Work Research. *Social Work Research*, 39(1), 37-48. doi:10.1093/swr/svu028
- Richman, M. J., Nawabi, S., Patty, L., & Ziment, I. (2010). Traditional Cambodian Medicine. *Journal of Complementary and Integrative Medicine*, 7(1). doi:10.2202/1553-3840.1194
- Rifaat, S. M., Tay, R., & de Barros, A. (2011). Effect of street pattern on the severity of crashes involving vulnerable road users. *Accident Analysis & Prevention*, 43(1), 276-283. doi:<http://dx.doi.org/10.1016/j.aap.2010.08.024>
- Traffic Law, (2006).
- Cambodian Law on the Protection and the Promotion of the Rights of Persons with Disability, (2009).
- Traffic Law, (2014).

- Rutten, A., & Gelius, P. (2013). Building Policy Capacities: an Interactive Approach for Linking Knowledge to Action in Health Promotion. *Health Promotion International*, 29(3), 569-582. doi:10.1093/heapro/dat006
- Sann, S., Ear, C., Morrison, M., & Jong, M. D. (2012). *Analysis of 2011 Road Crash Cost in Cambodia*. Cambodia: Handicap International Belgium.
- Sann, S., Gnim, C., Phan, H., Morrison, M., & Jong, M. D. (2012). *Analysis of 2010 Road Crash Cost in Cambodia*. Cambodia: Handicap International Belgium.
- Sann, S., Sem, P., Ear, C., & Phan, H. (2012). *Capitalization of Experiences: Road Crash and Victim Information System*. Retrieved from Cambodia:
- Sarantakos, S. (2013). *Social research* (4th ed.). China: Palgrave Macmillan.
- Savill, T., Stone, J., Venter, C., & Maunder, D. (2003). Improving Access to Transport in Developing Countries. *Municipal Engineer*(156), 149-153.
- Secretariat of Disability Action Council. (2012). *Annual Report 2011*. Retrieved from Cambodia: http://www.dac.org.kh/files/publication/annual_repor_%20en_2011.pdf
- Sinha, R., J.A., W., Heuvel, V. D., Arokiasamy, P., & Dijk, J. P. v. (2014). Influence of Adjustments to Amputation and Artificial Limb on Quality of Life in Patients Following Lower Limb Amputation. *International Journal of Rehabilitation*, 37(1), 74-79. doi:10.1097/MRR.0000000000000038
- Song, S. (2015). *Change Quality of Life of Adults with Lower Limb Amputations after Three Months of Receiving Rehabilitation Services in Cambodia*. Retrieved from
- Song, S., Keo, R., Ull, M. H., Nom, C., Men, M., Pheng, P., & Chhea, C. (2013). *Improvement of the Quality of Life of Persons with Disabilities after Receiving Rehabilitation Services in Cambodia*. Retrieved from Cambodia:
- SWOV. (2009). *Use of Road Safety Knowledge by Policy Makers*. SWOV Fact Sheet, The Netherlands.
- SWOV. (2012). *Use of Road Safety Knowledge by Policy Makers*. (SWOV Factsheet). The Netherlands.
- Taksdal, M. (2011). My story started from food shortage and hunger: living with landmines in Cambodia. In A. H. Eide & B. Ingstad (Eds.), *Disability and Poverty, A Global Challenge*. Great Britain: The policy press.
- Thapa, R. (2011). *Victim Assistance in Cambodia, The Human Face of Survivors and their Needs for Assistance*. Retrieved from Belgium:
- Thomas, P. (2005). *Disability, Poverty and the Millennium Development Goals: Relevance, Challenges and Opportunities for DFID*. Retrieved from http://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=1257&context=gladnetcollect&sei-redir=1&referer=http%3A%2F%2Fscholar.google.com.au%2Fscholar%3Fhl%3Den%26q%3Ddisability%2Bcambodia%26btnG%3D%26as_sdt%3D1%252C5%26as_sdt%3D#search=%22disability%20cambodia%22
- Incheon Strategy to "Make the Right Real" for Persons with Disabilities in Asia and the Pacific, (2012).

- UNESCO. (2010). *Reaching the Marginalized*. Retrieved from <http://unesdoc.unesco.org/images/0018/001866/186606E.pdf>
- Convention on the Rights of Persons with Disabilities and Optional Protocol, (2006).
- US Centers for Disease Control and Prevention. (2001). *Updated Guidelines for Evaluating Public Health Surveillance System: Recommendations from the Guidelines Working Group*. Retrieved from
- Washington, S. P., Karlaftis, M. G., & Mannering, F. L. (2011). *Statistical and Econometric Methods for Transportation Data Analysis* (Second Edition ed.). USA: Taylor & Francis Group, LLC.
- Whitzman, C. (2015). Partnerships for disability-inclusive road development in Papua New Guinea: Unusual suspects and equivocal gains. *Planning Theory & Practice*, 16(1), 28-44.
- WHO. (2004a). *Guidelines for Essential Trauma Care*. Switzerland.
- WHO. (2004b). *World Report on Traffic Injury Prevention* M. Peden, R. Scurfield, D. Sleet, Dinesh Mohan, A. A. Hyder, E. Jarawan, & C. Mathers (Eds.), Retrieved from <http://whqlibdoc.who.int/publications/2004/9241562609.pdf>
- WHO. (2005). *Prehospital Trauma Care Systems*. Switzerland.
- WHO. (2006) Constitution of the World Health Organization. *Basic Documents* (45th Supplement ed.).
- WHO. (2007). *Drinking and Driving: a Road Safety Manual for Decision Makers and Practitioners*. Switzerland: Global Road Safety Partnership.
- WHO. (2009). *Global Status Report on Road Safety*. Geneva.
- WHO. (2011). *Global Plan for the Decade of Action for Road Safety 2011-2020*. Retrieved from
- WHO. (2012). *Health Service Delivery Profile, Cambodia*. Retrieved from http://www.wpro.who.int/health_services/service_delivery_profile_cambodia.pdf
- WHO. (2013a). *Global Status Report on Road Safety 2013, Supporting a Decade of Action*. Luxembourg: WHO.
- WHO. (2013b). *Pedestrian Safety, A road safety manual for decision makers and practitioners I*. Communication (Ed.)
- WHO. (2014a). *Draft WHO Global Disability Action Plan 2014-2021: Better Health for all People with Disabilities*. Retrieved from http://apps.who.int/gb/ebwha/pdf_files/EB134/B134_16-en.pdf?ua=1
- WHO. (2014b). *Global Status Report on Alcohol and Health*. Retrieved from http://www.who.int/substance_abuse/publications/global_alcohol_report/en/
- WHO. (2015a). Cambodia: WHO statistical profile. In WHO (Ed.), *Country statistics and global health estimates by WHO and UN partners*.
- WHO. (2015b). *Global Status Report on Road Safety 2015*. Geneva, Switzerland.
- WHO, & WorldBank. (2011). *World Report on Disability* WHO (Ed.)

- Wiman, R., & Sandhu, J. (2004). Integrating appropriate measures for people with disabilities in the infrastructure sector. *Eschborn: GTZ*.
- Yan, L. D., Mahadevan, S. V., Yore, M., Pirrotta, E. A., Woods, J., Koy, S., . . . Strehlow, M. C. (2015). An Observational Study of Adults Seeking Emergency Care in Cambodia. *Bulletin of the World Health Organization*, 2015(93), 84-92. doi:<http://dx.doi.org/10.2471/BLT.14.143917>
- Yeung, W., Leong, W.-Y., Khoun, K., Ong, W., Sambi, S., Lim, S.-M., . . . Wilder-Smith, A. (2015). Alcohol Use Disorder and Heavy Episodic Drinking in Rural Communities in Cambodia: Risk Factors and Community-Perceived Strategies. *Asia-Pacific Journal of Public Health*, 27(8), 835-847. doi:10.1177/1010539515607961
- Yoeung, R., & Kleinitz, P. (2013). *Analysis of the Rehabilitation Sector Situation in Cambodia*. Retrieved from
- Zhou, Z.-P., Liu, Y.-S., Wang, W., & Zhang, Y. (2013). Multinomial Logit Model of Pedestrian Crossing Behaviors at Signalized Intersections. *Discrete Dynamics in Nature and Society*, 2013.
- Zoysa, P. d., & Wickrama, T. (2011). Mental Health and Cultural Religious Coping of Disabled Veterans in Sri Lanka. *Journal of Military and Veterans Health*, 19(3), 4-12.

Appendices

Appendix 1: Check list for field observations

1. The physical setting:
 - What is the physical environment like
 - What is the context?
 - What kinds of behaviours is the setting designed for?
 - How is space allocated?
 - What objects, resources, technologies, are in the setting?
2. The participants: describe who is the scene
 - How many people and their roles
 - What brings these people together?
 - Who is allowed here?
 - Who is not here, who would be expected to be here?
 - What are the relevant characteristics of the participants?
 - What are the ways in which the people in the setting organize themselves?
 - Patterns and frequency of interactions, the direction of communication patterns... (change in these patterns tell us things about the social environment)
3. Activities and interactions:
 - What is going on? Is there a definable sequence of activities?
 - How do the people interact with the activity and with one another?
 - How are people and activities connected?
 - What norms or rules structure the activities and interactions?
 - When did the activity begin?
 - How long does it last?
 - Is it a typical activity or unusual?
4. Conversation:
 - What is the content of conversation in this setting?
 - Who speaks to whom? Who listens? Quote directly paraphrases, and summarize conversations. If possible, use a tape recorder to back up your note-taking. Note silences and nonverbal behaviour that add meaning to the exchange
5. Subtle factors: Less obvious but perhaps as important to the observation are:
 - Informal and unplanned activities
 - Symbolic and connotative meanings of words
 - Nonverbal communication such as dress and physical space

- Unobtrusive measures such as physical clues
- What does not happen – especially if it ought to have happened

6. Researcher's behaviour: Researcher (interviewer) is as much a part of the scene as participants. How is your role, whether as an observer or an intimate participant, affecting the scene you are observing? What do you say and do? In addition, what thoughts are you having about what is going on? These become "observer comments" and important part of field notes

Appendix 2: Interview Schedules

N.	Primary Participants	1st Interview Date	2nd Interview Date	Presence of Family Members
1	BTB01	14.06.2014	04.03.2015	Yes
2	BTB02	14.06.2014	05.03.2015	No
3	BTB03	14.06.2014	05.03.2015	No
4	BTB04	15.06.2014	05.03.2015	No
5	BTB05	15.06.2014	05.03.2015	Yes
6	BTB06	15.06.2014	05.03.2015	Yes
7	BTB07	16.06.2014	06.03.2015	No
8	BTB08	16.06.2014	06.03.2015	Yes
9	BTB09	31.07.2014	04.03.2015	Yes
10	BTB10	30.07.2014	05.03.2015	Yes
11	BTB11	30.07.2014	06.03.2015	No
12	BTB12	31.07.2014	04.03.2015	Yes
13	BTB13	31.07.2014	04.03.2015	Yes
14	BTB14	31.07.2014	04.03.2015	No
15	KCham01	09.06.2014	.	No
16	KCham02	10.06.2014	11.03.2025	No
17	KCham03	10.06.2014	23.02.2015	No
18	KCham04	10.06.2014	11.03.2025	Yes
19	KCham05	10.06.2014	25.02.2015	Yes
20	KChh01	13.06.2014	.	Yes
21	KChh02	13.06.2014	27.02.2015	Yes
22	KChh03	13.06.2014	.	Yes
23	KChh04	13.06.2014	.	Yes
24	KChh05	14.06.2014	.	No
25	KSP01	29.05.2014	.	No
26	KSP02	29.05.2014	.	Yes
27	KSP03	29.05.2014	.	Yes
28	PP01	27.05.2014	.	Yes
29	PP02	27.05.2014	.	No
30	PP03	28.05.2014	27.02.2015	No
31	PP04	30.05.2014	.	Yes
32	PP05	17.06.2014	17.12.2014	Yes
33	PP06	22.06.2014	17.12.2014	Yes
34	PP07	08.08.2014	17.12.2014	No
35	PS01	28.07.2014	03.03.2015	Yes
36	PS02	28.07.2014	03.03.2015	Yes
37	PS03	29.07.2014	03.03.2015	Yes
38	PS04	29.07.2014	.	No
39	SR01	04.06.2014	16.12.2014	No
40	SR02	04.06.2014	.	Yes
41	SR03	04.06.2014	.	Yes
42	TB01	09.06.2014	27.02.2015	Yes
43	TB02	09.06.2014	11.03.2015	No
44	TB03	05.08.2014	24.02.2015	Yes
45	TB04	05.08.2014	24.02.2015	Yes
46	TB05	05.08.2014	24.02.2015	No

Appendix 3: Tables in Chapters 3, 4, 5, 6 and 7

Table A3.1 : Main ministries and their involvement in the NRSAP

Ministry Name	Their Contribution to Pillar(s) in NRSAP
Ministry of Interior	All Pillars
Ministry of Public Works and Transport	All Pillars except Pillar 5
Ministry of Health	Pillars 1, 5 and 7
Ministry of Education Youth and Sports	Pillars 1 and 4
Ministry of Rural Development	Pillars 1 and 2

Table A3.2 : List of non-governmental organisations and their contribution to the National Road Safety Action Plan

Name of Organisations	Their Contribution to Pillar(s) in NRSAP
Advocacy and Policy Institute	Pillars 4, 6
Asia Injury Prevention Foundation	Pillars 4, 6
Asian Development Bank	Pillars 2, 6
Cambodia Movement for Health	Pillar 6
Cambodian Red Cross	Pillars 4, 6
Coalition for Road Safety	Pillar 4
Global Road Safety Partnership	Pillars 1, 4, 6
Handicap International	Pillars 4, 6
Medical Team International	Pillar 5
People's Centre for Development and Peace	Pillar 6
Women's Media Centre	Pillar 4
World Health Organization	Pillars 1, 4, 6

Table A3.3 : Number of casualties recorded by traffic police and health facilities, 2006-2012

Year of Crashes		Recorded By		Total
		Traffic Police ONLY	Health with/without Traffic Police	
2006	Count	8,749	17,397	26,146
	%	33.5%	66.5%	100%
	St.Re	-28.4	25.8	
2007	Count	10,112	17,291	27,403
	%	36.9%	63.1%	100%
	St.Re	-20.6	18.7	
2008	Count	10,637	15,159	25,796
	%	41.2%	58.8%	100%
	St.Re	-9.6	8.7	
2009	Count	10,118	11,401	21,519
	%	47.0%	53.0%	100%
	St.Re	3.8	-3.5	
2010	Count	10,737	7,550	18,287
	%	58.7%	41.3%	100%
	St.Re	27.0	-24.6	
2011	Count	9,379	7,275	16,654
	%	56.3%	43.7%	100%
	St.Re	21.2	-19.3	
2012	Count	8,803	6,812	15,615
	%	56.4%	43.6%	100%
	St.Re	20.6	-18.8	
Total	Count	68,535	82,885	151,420
	%	45.3%	54.7%	100%
$\chi^2 (6) = 5,373.75, p < .001$				

St.Re: Standardised Residuals

Table A3.4 : Number of casualties recorded by traffic police only and health facilities, by severities of injury, 2006-2012

Injury Severities		Recorded By		Total
		Traffic Police ONLY	Health with/without Traffic Police	
Fatalities	Count	10,396	1,483	11,879
	%	87.5%	12.5%	100%
	St.Re	68.5	-62.2	
Serious Injuries	Count	23,781	21,524	45,305
	%	52.5%	47.5%	100%
	St.Re	22.9	-20.8	
Slight Injuries	Count	33,009	54,663	87,672
	%	37.7%	62.3%	100%
	St.Re	-33.5	30.5	
Unknown	Count	1,349	5,215	6,564
	%	20.6%	79.4%	100%
	St.Re	-29.8	27.1	
Total	Count	68,535	82,885	151,420
	%	45.3%	54.7%	100%

$\chi^2 (3) = 13,183.72, p < .001$

Note: Based on the definition in the data collection form, slight injury referred to having hospitalisation less than seven days, and severe injury was defined as staying in hospital at least seven days or required intensive care or surgery.

Table A3.5 : Numbers of health centres, hospitals and police districts participating in RCVIS

Provinces	2008			2009			2010			2011			2012		
	HC	Ho	P	HC	Ho	P	HC	Ho	P	HC	Ho	P	HC	Ho	P
Banteay Meanchey	3	2	8	4	1	8	2	3	9	8	4	9			9
Battambang		1	12	1	1	13	6	2	12		1	12			12
Kampong Cham	5	10	16	5	10	16		9	17	2	9	17	5	10	17
Kampong Chhang		2	7	2	2	7	6	3	9		3	9	1	3	9
Kampong Speu	3	2	8	1	1	7		1	9			9			9
Kampong Thom	2	2	8		3	9		3	8		3	8		2	8
Kampot		3	8		4	8	2	4	9		4	9		4	9
Kandal	2	1	10		2	10	7	2	11			11	4	2	11
Kep		1	2	2	1	2	1	1	2	4	1	2	2	1	2
Koh Kong			6			7			8		1	8		2	8
Kratie			5		1	5	4	1	6	5	2	6	7	1	6
Mondol Kiri		2	5		1	5			5	1	1	5	1	1	5
Oddar Meanchey	1		5	1	1	6	2	1	5			5	1	1	5
Pailin			2			2		1	2		2	2			2
Phnom Penh		6	7		5	8		3	9		4	9		4	9
Preah Vihear	7	1	7	9		6	9	1	8	2	1	8			8
Prey Veng	6	1	12	2	6	12			13			13	14	6	13
Pursat			6			7	2		1			7			7
Ratanak Kiri			9	3	1	7	1	1	8		1	8			8
Siem Reap	1	3	12	1	3	10	1	4	12	1	3	12	1	2	12
Sihanouk Vile		1	3		1	4	1	1	4		1	4		2	4
Steung Treng		1	4		1	5			4	2		4	2	4	4
Svay Rieng		2	7		3	8		3	9		3	9		3	9
Takeo		1	10		1	10		1	11		1	11		1	11
Total	30	42	179	31	49	182	44	45	191	25	45	197	38	49	197

Note: HC: Number of health centres
Ho: Number of hospitals
P: Number of districts reported by traffic police

Table A3.6 : Number of casualties by gender from both data sources

Gender		Recorded by		Total
		Police Only	Health with/ without Police	
Male	Count	51,754	58,915	110,669
	%	75.8%	71.5%	73.5%
Female	Count	16,509	23,478	39,987
	%	24.2%	28.5%	26.5%
Total	Count	68,263	82,393	150,656
	%	100%	100%	100%
$\chi^2 (1) = 355.8, p < .001$				

Table A3.7 : Numbers of casualties by gender and age groups from 2006 to 2012

Age Groups		Gender		Total
		Male	Female	
0 - 14	Count	9,025	6,019	15,044
	%	60.0%	40.0%	100%
	St.Re	-19.3	32.0	
15-29	Count	61,724	18,412	80,136
	%	77.0%	23.0%	100%
	St.Re	11.8	-19.7	
30-44	Count	24,551	7,487	32,038
	%	76.6%	23.4%	100%
	St.Re	6.7	-11.1	
45-59	Count	10,929	5,487	16,416
	%	66.6%	33.4%	100%
	St.Re	-10.3	17.1	
60+	Count	3,497	2,266	5,763
	%	60.7%	39.3%	100%
	St.Re	-11.3	18.8	
Total	Count	109,726	39,671	149,397
	%	73.4%	26.6%	100%
$\chi^2 (4) = 2,968.11, p < .001$				

Table A3.8 : Number of casualties by occupation from both data sources

Occupation		Recorded By		Total
		Traffic Police ONLY	Health with/ without Police	
Child	Count	1,548	3,294	4,842
	%	2.4%	4.3%	3.4%
	St.Re	-14.5	13.4	
Student	Count	12,017	18,195	30,212
	%	18.3%	23.7%	21.2%
	St.Re	-16.2	15.0	
Worker	Count	11,973	14,792	26,765
	%	18.2%	19.3%	18.8%
	St.Re	-3.3	3.1	
Motorbike/Car/ Truck Driver	Count	3,501	2,877	6,378
	%	5.3%	3.8%	4.5%
	St.Re	10.3	-9.6	
Farmer	Count	22,548	20,816	43,364
	%	34.4%	27.1%	30.5%
	St.Re	18.1	-16.7	
Others	Count	14,032	16,720	30,752
	%	21.4%	21.8%	21.6%
	St.Re	-1.2	1.1	
Total	Count	65,619	76,694	142,313
	%	100%	100%	100%
$\chi^2 (5) = 1,703.46, p < .001$				

Table A3.9 : Number of casualties by road types and injury severities, 2006-2012

Road Types		Injury Severities			Total
		Fatal	Serious	Slight	
National Road	Count	7,147	14,325	19,308	40,780
	%	17.5%	35.1%	47.3%	100%
	St.Re	10.66	-0.97	-5.15	
Provincial Road	Count	544	1,893	4,230	6,667
	%	8.2%	28.4%	63.4%	100%
	St.Re	-15.15	-9.63	16.67	
City Road	Count	1,084	3,442	3,270	7,796
	%	13.9%	44.2%	41.9%	100%
	St.Re	-3.47	12.96	-9.06	
Rural Road	Count	1,313	3,461	5,272	10,046
	%	13.1%	34.5%	52.5%	100%
	St.Re	-6.07	-1.62	4.78	
Total	Count	10,088	23,121	32,080	65,289
	%	15.5%	35.4%	49.1%	100%

$\chi^2 (6) = 1,065.69, p < .001$

Note:

National roads: Major country roads link major population centres and provinces in different parts of the county, speed limit of 90km/h.

Provincial roads: Major roads link population centres within a province or they are developed and maintained by provincial public work and transport departments.

City roads: Roads located in the cities with/without double central lines, but which are not national or provincial roads.

Rural roads: Roads connect national/provincial road to village/commune at countryside or road outside urban areas.

Table A3.10 : Number of casualties by injury severities and types of road surfaces, 2006-2012

Types of road surfaces		Injury Severities			Total
		Fatal	Serious	Slight	
Paved road	Count	8,419	18,786	25,036	52,241
	%	16.1%	36.0%	47.9%	100%
	St.Re	3.9	2.3	-4.2	
Unpaved	Count	1,295	3,488	6,095	10,878
	%	11.9%	32.1%	56.0%	100%
	St.Re	-9.4	-5.8	10.1	
Cement	Count	169	443	542	1,154
	%	14.6%	38.4%	47.0%	100%
	St.Re	-0.7	1.7	-1.1	
Construction site	Count	137	245	300	682
	%	20.1%	35.9%	44.0%	100%
	St.Re	3.1	0.3	-1.9	
Others	Count	36	60	69	165
	%	21.8%	36.4%	41.8%	100%
	St.Re	2.1	0.2	-1.4	
Total	Count	10,056	23,022	32,042	65,120
	%	15.4%	35.4%	49.2%	100%
$\chi^2 (8) = 286.87, p < .001$					

Table A3.11 : Number of casualties by injury severities and types of road layout

Types of road layout		Injury Severities			Total
		Fatal	Serious	Slight	
Straight road	Count	8,331	18,585	25,243	52,159
	%	16.0%	35.6%	48.4%	100%
	St.Re	3.1	0.7	-2.4	
Roundabout	Count	72	189	330	591
	%	12.2%	32.0%	55.8%	100%
	St.Re	-2.0	-1.4	2.3	
Curve	Count	970	1,951	2,699	5,620
	%	17.3%	34.7%	48.0%	100%
	St.Re	3.5	-0.9	-1.2	
X-junction	Count	294	1,295	1,944	3,533
	%	8.3%	36.7%	55.0%	100%
	St.Re	-10.8	1.2	5.0	
T-junction	Count	234	878	1,454	2,566
	%	9.1%	34.2%	56.7%	100%
	St.Re	-8.1	-1.0	5.5	
Y-junction	Count	30	149	247	426
	%	7.0%	35.0%	58.0%	100%
	St.Re	-4.4	-.2	2.6	
Bridge	Count	114	207	271	592
	%	19.3%	35.0%	45.8%	100%
	St.Re	2.4	-.2	-1.2	
Slope	Count	235	351	528	1,114
	%	21.1%	31.5%	47.4%	100%
	St.Re	4.8	-2.2	-0.8	
Total	Count	10,280	23,605	32,716	66,601
	%	15.4%	35.4%	49.1%	100%

 $\chi^2 (14) = 343.06, p < .001$

Table A3.12 : Number of casualties by injury severities and types of collisions

Type of collisions		Injury Severities			Total
		Fatal	Serious	Slight	
Head on	Count	3,458	8,204	8,662	20,324
	%	17.0%	40.4%	42.6%	100%
	St.Re	6.2	11.8	-13.5	
Rear end	Count	1,600	3,490	5,231	10,321
	%	15.5%	33.8%	50.7%	100%
	St.Re	.5	-2.8	2.1	
Right-angle	Count	1,472	5,357	8,697	15,526
	%	9.5%	34.5%	56.0%	100%
	St.Re	-18.6	-1.9	12.0	
Overturned /Fell alone	Count	1,241	1,826	2,859	5,926
	%	20.9%	30.8%	48.2%	100%
	St.Re	11.1	-6.0	-1.1	
Hit pedestrian	Count	940	1,608	1,907	4,455
	%	21.1%	36.1%	42.8%	100%
	St.Re	9.9	.7	-6.1	
Other	Count	1278	2629	4776	8683
	%	14.7%	30.3%	55.0%	100%
	St.Re	-1.4	-8.1	7.6	
Total	Count	9,989	23,114	32,132	65,235
	%	15.3%	35.4%	49.3%	100%
$\chi^2 (10) = 1,285.10, p < .001$					

Table A3.13 : Collision types by age groups among persons that are likely at fault, 2006-2012

Type of collisions		Age groups					Total
		0-14	15-29	30-44	45-59	60+	
Head on	Count	94	3,842	1,336	465	108	5,845
	%	1.6%	65.7%	22.9%	8.0%	1.8%	100%
	St.Re	-7.8	5.5	-0.8	-4.7	-5.2	
Rear end	Count	45	1,609	664	267	68	2,653
	%	1.7%	60.6%	25.0%	10.1%	2.6%	100%
	St.Re	-5.0	0.3	1.8	0.3	-1.4	
Right-angle	Count	155	2,920	1,084	564	208	4,931
	%	3.1%	59.2%	22.0%	11.4%	4.2%	100%
	St.Re	-1.4	-0.9	-2.0	3.5	4.8	
Overturned /Fell alone	Count	11	731	432	196	28	1,398
	%	0.8%	52.3%	30.9%	14.0%	2.0%	100%
	St.Re	-5.4	-3.8	5.8	4.9	-2.2	
Hit pedestrian	Count	278	745	248	105	72	1,448
	%	19.2%	51.5%	17.1%	7.3%	5.0%	100%
	St.Re	31.8	-4.3	-4.9	-3.2	4.3	
Others	Count	77	1438	617	256	83	2471
	%	3.1%	58.2%	25.0%	10.4%	3.4%	100%
	St.Re	-1.1	-1.3	1.6	.8	1.0	
Total	Count	660	11,285	4,381	1,853	567	18,746
	%	3.5%	60.2%	23.4%	9.9%	3.0%	100%

$\chi^2 (20) = 1,408.16, p < .001$

Table A3.14 : Nature of injuries among long term impairments

Nature of Injuries	Number	Percentage (of 422)
Abdominal	17	4%
Cervical-Dorsal	10	2%
Concussion-Neck	179	42%
Cut-Wound	151	36%
Facial	66	16%
Fracture	173	41%
Thorax	25	6%

Table A3.15 : Types of long term impairments

Types of Long Term Impairments	Number	Percentage
Seeing	6	4%
Hearing	8	5%
Learning	19	13%
Moving	100	68%
Feeling	8	5%
Psychological	7	5%
Total	148	100%

Note:

Seeing: Difficulty in seeing around, eyes are not working properly
Moving: Limited ability in moving from place to place, or difficulty in moving any part of the body
Feeling: Difficulty to feel things around, when the person touches those things
Hearing: Difficulty in hearing
Learning: Intellectual impairments
Psychological: Mental disorder

Table A3.16 : Summary of the risk factors selected for the Multinomial Logit Model

Risk Factors	Injury Severities								Total
	Died		Long Term Impairments		Transferred		Fully Treated		
Year of crash									
2006	298	2%	67	0.4%	1,498	9%	14,041	88%	15,904
2007	277	2%	50	0.3%	1,675	11%	13,381	87%	15,383
2008	262	2%	93	0.7%	1,403	11%	11,288	87%	13,046
2009	246	2%	102	1.0%	1,427	14%	8,461	83%	10,236
2010	115	2%	66	1.0%	791	12%	5,643	85%	6,615
2011	114	2%	29	0.5%	883	15%	4,703	82%	5,729
2012	62	1%	9	0.2%	672	15%	3,771	84%	4,514
Day of Crash									
Weekday	857	2%	288	0.6%	5,558	12%	40,659	86%	47,362
Weekend	517	2%	128	0.5%	2,791	12%	20,629	86%	24,065
Gender									
Male	1,045	2%	292	0.6%	6,033	12%	43,319	85%	50,689
Female	323	2%	120	0.6%	2,282	11%	17,669	87%	20,394
Unknown	6	2%	4	1.2%	34	10%	300	87%	344
Age group									
0 - 14	95	1%	18	0.2%	698	8%	8,187	91%	8,998
15-29	626	2%	227	0.6%	4,267	12%	31,383	86%	36,503
30-44	296	2%	94	0.6%	1,888	13%	12,771	85%	15,049
45-59	220	3%	50	0.7%	1,017	13%	6,362	83%	7,649
60+	117	4%	20	0.8%	411	15%	2,111	79%	2,659
Unknown	20	4%	7	1.2%	68	12%	474	83%	569
Transport mode									
Motorbike	949	2%	312	0.6%	6,321	12%	46,857	86%	54,439
Bicycle	49	2%	14	0.4%	298	9%	2,886	89%	3,247
Passenger vehicle	93	3%	16	0.6%	518	19%	2,092	77%	2,719
Goods vehicle	65	4%	13	0.8%	290	18%	1,265	77%	1,633
Agriculture vehicle	32	3%	7	0.7%	150	15%	784	81%	973
Pedestrian	132	2%	34	0.6%	571	10%	5,226	88%	5,963
Other	24	2%	6	0.5%	122	10%	1,010	87%	1,162
Unknown	30	2%	14	1.1%	79	6%	1,168	90%	1,291
Road User Type									
Pedestrian	132	2%	33	0.5%	565	9%	5,273	88%	6,003
Driver	701	2%	242	0.6%	4,707	12%	33,613	86%	39,263
Passenger	440	2%	116	0.5%	2,652	12%	19,839	86%	23,047
Unknown	101	3%	25	0.8%	425	14%	2,563	82%	3,114
Collision counterpart									
Motorbike	430	1%	154	0.5%	3,755	11%	29,440	87%	33,779
Passenger vehicle	328	4%	62	0.7%	1,197	13%	7,395	82%	8,982
Goods vehicle	183	6%	29	0.9%	540	17%	2,355	76%	3,107
Stationary object	35	3%	13	0.9%	217	16%	1,115	81%	1,380
Animal	13	1%	13	0.5%	218	9%	2,149	90%	2,393
Single vehicle crash	200	2%	66	0.5%	1,490	11%	11,514	87%	13,270
Other	60	1%	17	0.4%	374	9%	3,798	89%	4,249
Unknown	125	3%	62	1.5%	558	13%	3,522	83%	4,267
Transport to Hospital									
Ambulance	652	4%	143	0.8%	2,968	17%	13,278	78%	17,041
Other	471	1%	202	0.4%	4,499	10%	41,843	89%	47,015
Unknown	251	3%	71	1.0%	882	12%	6,167	84%	7,371
Total	1,374	2%	416	0.6%	8,349	12%	61,288	86%	71,427

Table A3.17 : All results of MLM

Risk Factors	Long Term Impairments			Fatalities			Transferred (to other hospitals)		
	Coef.	Sig.	RRR	Coef.	Sig.	RRR	Coef.	Sig.	RRR
Intercept	-6.633	0.000		-5.466	0.000		-1.924	0.000	
Crashes in 2006 vs 2012	0.744	0.038	2.104 (1.04, 4.25)	0.284	0.052	1.328 (0.99, 1.17)	-0.571	0.000	0.565 (0.51, 0.62)
Crashes in 2007 vs 2012	0.615	0.093	1.850 (0.90, 3.79)	0.363	0.013	1.438 (1.08, 1.91)	-0.414	0.000	0.661 (0.59, 0.73)
Crashes in 2008 vs 2012	1.377	0.000	3.964 (1.98, 7.92)	0.474	0.001	1.607 (1.20, 2.14)	-0.428	0.000	0.652 (0.58, 0.72)
Crashes in 2009 vs 2012	1.723	0.000	5.605 (2.81, 11.16)	0.664	0.000	1.944 (1.45, 2.59)	-0.129	0.014	0.879 (0.79, 0.97)
Crashes in 2010 vs 2012	1.633	0.000	5.123 (2.54, 10.33)	0.307	0.058	1.36 (0.99, 1.86)	-0.293	0.000	0.746 (0.66, 0.83)
Crashes in 2011 vs 2012	0.913	0.017	2.492 (1.17, 5.28)	0.349	0.031	1.419 (1.03, 1.94)	0.004	0.946	1.004 (0.89, 1.12)
Weekend vs Weekday	-0.139	0.195	0.870 (0.70, 1.07)	0.165	0.004	1.18 (1.05, 1.32)	-0.014	0.574	0.986 (0.93, 1.03)
Female vs Male	0.077	0.502	1.080 (0.86, 1.35)	-0.344	0.000	0.709 (0.62, 0.81)	-0.06	0.031	0.942 (0.89, 0.99)
Unknown vs Male	0.266	0.623	1.305 (0.45, 3.77)	-0.607	0.160	0.545 (0.23, 1.27)	-0.265	0.160	0.767 (0.53, 1.11)
0-14 vs 15-29	-1.234	0.000	0.290 (0.17, 0.48)	-0.435	0.000	0.647 (0.50, 0.82)	-0.359	0.000	0.698 (0.63, 0.76)
30-44 vs 15-29	0.027	0.830	1.027 (0.80, 1.30)	0.143	0.047	1.154 (1.00, 1.33)	0.072	0.017	1.074 (0.01, 1.13)
45-59 vs 15-29	0.027	0.867	1.027 (0.75, 1.40)	0.539	0.000	1.715 (1.46, 2.01)	0.150	0.000	1.162 (0.07, 1.25)
60+ vs 15-29	0.200	0.404	1.221 (0.76, 1.95)	1.019	0.000	2.772 (2.24, 3.42)	0.366	0.000	1.443 (0.28, 1.61)
Unknown vs 15-29	0.521	0.207	1.683 (0.75, 3.77)	0.744	0.002	2.105 (1.30, 3.39)	0.096	0.480	1.101 (0.84, 1.43)
Pedestrian vs Driver	-1.505	0.147	0.222 (0.03, 1.69)	0.633	0.505	1.884 (0.29, 12.10)	-0.703	0.050	0.495 (0.24, 1.00)
Passenger vs Driver	-0.072	0.572	0.931 (0.72, 1.19)	0.065	0.359	1.067 (0.92, 1.22)	-0.025	0.406	0.976 (0.92, 1.03)
Unknown vs Driver	-0.185	0.485	0.831 (0.49, 1.39)	0.638	0.000	1.893 (1.46, 2.45)	0.265	0.000	1.303 (1.15, 1.47)
Passenger vehicle vs Motorbike	-0.156	0.562	0.856 (0.50, 1.44)	0.182	0.127	1.200 (0.94, 1.51)	0.443	0.000	1.557 (0.39, 1.73)
Goods vehicle vs Motorbike	0.360	0.231	1.433 (0.79, 2.58)	0.598	0.000	1.820 (1.37, 2.40)	0.526	0.000	1.692 (0.47, 1.94)
Agricultural vehicle vs Motorbike	0.342	0.386	1.407 (0.65, 3.04)	0.808	0.000	2.245 (1.54, 3.27)	0.470	0.000	1.601 (0.33, 1.92)
Pedestrian vs Motorbike	2.042	0.045	7.710 (1.04, 56.87)	0.097	0.919	1.102 (0.17, 7.06)	0.749	0.036	2.115 (0.05, 4.26)
Bicycle vs Motorbike	0.105	0.709	1.110 (0.64, 1.92)	0.156	0.307	1.169 (0.86, 1.57)	-0.053	0.948	0.835 (0.83, 1.07)
Others vs Motorbike	-0.193	0.645	0.825 (0.36, 1.87)	-0.086	0.689	0.918 (0.60, 1.39)	-0.099	0.906	0.747 (0.74, 1.09)
Unknown vs Motorbike	0.101	0.773	1.107 (0.55, 2.19)	-0.835	0.000	0.434 (0.27, 0.68)	-0.913	0.401	0.311 (0.31, 0.51)
Counterpart passenger vehicles] vs Counterpart motorbike	0.423	0.006	1.527 (1.13, 2.06)	0.964	0.000	2.623 (2.25, 3.04)	0.145	0.000	1.156 (0.07, 1.24)
Counterpart goods vehicle vs Counterpart motorbike	0.880	0.000	2.411 (1.59, 3.63)	1.519	0.000	4.566 (3.78, 5.51)	0.459	0.000	1.583 (0.42, 1.75)
Hit Stationary vs Counterpart motorbike	0.811	0.006	2.251 (1.26, 4.01)	0.755	0.000	2.127 (1.48, 3.04)	0.311	0.000	1.364 (0.17, 1.59)
Hit animal vs Counterpart motorbike	0.296	0.311	1.344 (0.75, 2.38)	-0.697	0.014	0.498 (0.28, 0.86)	-0.186	0.012	0.830 (0.71, 0.96)
Single vehicle crash vs Counterpart motorbike	0.157	0.311	1.170 (0.86, 1.58)	0.219	0.017	1.245 (1.03, 1.49)	-0.039	0.263	0.962 (0.89, 1.03)
Others vs Counterpart motorbike	-0.126	0.625	0.882 (0.53, 1.46)	0.081	0.563	1.085 (0.82, 1.42)	-0.289	0.000	0.749 (0.66, 0.83)
Unknown vs Counterpart motorbike	1.156	0.000	3.177 (2.26, 4.45)	0.769	0.000	2.158 (1.70, 2.73)	0.204	0.000	1.226 (1.10, 1.36)
Transport to Hospital by Ambulance vs Others	0.727	0.000	2.070 (1.65, 2.58)	1.346	0.000	3.843 (3.39, 4.35)	0.648	0.000	1.912 (0.81, 2.01)
Transport to Hospital by Unknown vs Others	0.776	0.000	2.172 (1.62, 2.90)	1.260	0.000	3.524 (2.98, 4.16)	0.183	0.000	1.201 (1.10, 1.30)

Note: The grey cells indicate nonsignificant results
Numbers in brackets are lower and upper bounds of RRR

Table A3.18 : Numbers of records by all variables in PRC dataset (selected for the study)

Variables	Numbers of records	Percentage
Registration date	97,650	100%
Age (at the time of registration)	97,467	100%
Gender	97,650	100%
Types of impairments	92,173	94%
Location of residence (Provinces)	90,944	93%
Causes of impairments	76,198	78%
Occupation (at the time of registration)	69,249	71%
Living areas: rural/urban	60,069	62%
Year of impairments	44,065	45%
Provinces where injuries occurred	32,743	34%

Table A3.19 : Numbers of clients in all eleven PRCs from 1986 to 2011, by years

Year	Physical Rehabilitation Centres										Total	
	Battambang	Kampong cham	Kampong Chhnang	Kampong Speu	Kien Khleang	Kratie	Phnom Penh	Prey Veng	Siem Reap	Sihanouk Vile		Takeov
1990	-	-	-	-	-	-	-	-	9	-	1	10
1991	653	-	-	-	22	-	-	-	73	-	-	748
1992	1,338	-	-	25	505	-	97	-	158	-	131	2,254
1993	1,188	157	-	307	1,044	-	256	-	371	293	95	3,711
1994	872	64	-	222	1,294	-	255	-	280	274	126	3,387
1995	735	128	28	338	1,077	-	217	573	294	413	311	4,114
1996	838	83	59	220	1,361	-	326	351	222	227	226	3,913
1997	934	80	93	322	1,129	-	304	284	200	213	371	3,930
1998	634	59	216	584	1,055	-	419	623	166	227	213	4,196
1999	1,230	61	411	1,281	1,282	-	569	352	223	248	251	5,908
2000	1,070	181	323	1,797	912	117	795	313	381	246	527	6,662
2001	769	124	244	1,665	990	270	669	470	553	170	489	6,413
2002	1,016	149	254	1,248	977	234	425	421	426	156	622	5,928
2003	937	278	291	1,252	788	274	450	249	419	317	360	5,615
2004	797	546	277	233	621	195	463	215	585	304	405	4,641
2005	1,309	622	207	1,381	544	240	372	237	564	230	392	6,098
2006	1,141	646	303	1,638	673	165	351	199	567	197	294	6,174
2007	1,306	573	303	1,551	651	98	683	222	386	195	267	6,235
2008	974	426	397	793	741	165	305	273	344	179	233	4,830
2009	697	383	285	793	932	168	321	300	332	153	274	4,638
2010	593	433	187	712	948	166	271	339	292	99	240	4,280
2011	496	186	196	746	1,005	192	311	389	192	93	158	3,964
Total	19,527	5,179	4,074	17,108	18,551	2,284	7,859	5,810	7,037	4,234	5,986	97,649
%	20%	5%	4%	18%	19%	2%	8%	6%	7%	4%	6%	100%

Table A3.20 : Occupation of clients in the PRCs from 1986 to 2011

Occupation	Frequency	Percentage
Child	5,464	5.6%
Child/Student	2,643	2.7%
Student	7,926	8.1%
Farmer/Fisherman	29,770	30.5%
Housekeeping/Servant	153	0.2%
Monk/Nun	82	0.1%
Motor taxi driver	69	0.1%
Employee (in Office)	602	0.6%
Police/Soldier	3,216	3.3%
Retired	1,107	1.1%
Teacher	195	0.2%
Technician/Professional	667	0.7%
Vendor/Small business	829	0.8%
Worker	2,343	2.4%
Other government employee	59	0.1%
Others	1,845	1.9%
Unemployed	10,254	10.5%
Disabled-Unemployed	2,025	2.1%
Unknown	28,401	29.1%
Total	97,650	100%

Table A3.21 : Causes of long term impairments of clients in the PRCs from 1986 to 2011

Causes of Long Term Impairments		Gender		Total
		Male	Female	
Domestic accident	Count	528	363	891
	%	59.3%	40.7%	100%
	St.Re	-4.4	7	
Professional accident	Count	331	168	499
	%	66.3%	33.7%	100%
	St.Re	-1.4	2.3	
Road crash	Count	1,368	522	1,890
	%	72.4%	27.6%	100%
	St.Re	0.3	-0.5	
Mine/UXO	Count	31,373	3,776	35,149
	%	89.3%	10.7%	100%
	St.Re	38.6	-61.6	
Gun shot	Count	675	109	784
	%	86.1%	13.9%	100%
	St.Re	4.7	-7.5	
Other Accident	Count	1,280	679	1,959
	%	65.3%	34.7%	100%
	St.Re	-3.4	5.4	
Ageing	Count	1,177	906	2,083
	%	56.5%	43.5%	100%
	St.Re	-8.2	13.1	
Congenital	Count	4,073	3,053	7,126
	%	57.2%	42.8%	100%
	St.Re	-14.6	23.3	
Infectious	Count	3,005	2,124	5,129
	%	58.6%	41.4%	100%
	St.Re	-11.2	17.8	
Neurological	Count	373	296	669
	%	55.8%	44.2%	100%
	St.Re	-4.9	7.8	
Vascular	Count	566	432	998
	%	56.7%	43.3%	100%
	St.Re	-5.6	9	
Other traumatic	Count	4,159	1,508	5,667
	%	73.4%	26.6%	100%
	St.Re	1.4	-2.3	
Illness	Count	6,180	5,029	11,209
	%	55.1%	44.9%	100%
	St.Re	-20.8	33.2	
Others	Count	1,471	674	2,145
	%	68.6%	31.4%	100%
	St.Re	-1.8	2.8	
Unknown	Count	13,548	7,904	21,452
	%	63.2%	36.8%	100%
	St.Re	-14.9	23.8	
Total	Count	70,107	27,543	97,650
	%	71.8%	28.2%	100%

Table A3.22 : Number of road crash clients reported by all PRCs, by the provinces of having injuries

Provinces of having injuries	Physical Rehabilitation Centres											Total
	Battambang	Kampong Cham	Kampong Chhnang	Kampong Speu	Kien Khleang	Kratie	Phnom Penh	Prey Veng	Siem Reap	Sihanouk Ville	Takeo	
Banteay Meanchey	45	2			2			1			1	51
Battambang	65				2		1	1	2		1	72
Kampong Cham	3	39			15	2	9	2				70
Kampong Chhnang	2				2		2					6
Kampong Speu	2	1		3	5		6				2	19
Kampong Thom	1	3			4		4		19			31
Kampot	2				4		1				7	14
Kandal	4				33		39	4			3	83
Koh Kong	1			2	4		1	1				9
Kratie	1	2			2	4						9
Mondol Kiri		2										2
Oddar Meanchey	1			1					1			3
Pailin	2			1								3
Phnom Penh	8	5			60		66	9	4		6	158
Preah Vihear		1							2			3
Prey Veng	1				6		1	12				20
Pursat	35				4		3					42
Ratanak Kiri		1			0	2						3
Siem Reap	9	1			1			1	29			41
Sihanouk Ville					1		6				4	11
Steung Treng					0	2						2
Svay Rieng					2			4				6
Takeo					7		1	0			19	27
Others	7						2	1			1	11
Unknown	0	106	173	132	61	0	246	5	135	185	151	1,194
Total	189	163	173	139	215	10	388	41	192	185	195	1,890

Table A3.23 : Causes of long term impairments of clients in the PRCs by years injury occurred

Year of having injuries	Road crash	Mine/ UXO	Gun shot	Other Accidents	Congenital	Illness	Others	Total
1980	6	293	5	14	32	47	34	431
1981	2	281	12	8	34	45	13	395
1982	1	748	13	16	37	77	32	924
1983	4	1,066	7	20	30	76	50	1,253
1984	5	1,455	11	17	38	100	47	1,673
1985	4	1,681	22	29	53	133	49	1,971
1986	6	1,460	29	21	56	100	64	1,736
1987	8	2,071	29	31	70	100	78	2,387
1988	12	2,137	34	28	63	110	81	2,465
1989	9	2,287	23	35	79	107	87	2,627
1990	7	2,403	39	42	92	188	126	2,897
1991	13	1,855	37	30	68	177	63	2,243
1992	16	1,094	20	40	84	153	58	1,465
1993	21	1,178	30	54	76	190	57	1,606
1994	16	1,035	23	35	87	177	41	1,414
1995	12	1,200	20	54	88	172	49	1,595
1996	24	1,265	12	62	69	129	60	1,621
1997	21	858	21	73	75	125	47	1,220
1998	24	718	22	59	89	120	47	1,079
1999	30	309	12	71	78	110	62	672
2000	46	229	9	93	100	183	63	723
2001	26	183	5	93	97	141	61	606
2002	35	183	5	105	99	162	74	663
2003	67	148	2	140	138	187	51	733
2004	93	136	5	101	176	213	52	776
2005	103	146	2	99	171	217	56	794
2006	149	81	1	109	185	200	67	792
2007	93	50	1	80	205	202	46	677
2008	82	41	1	76	153	165	50	568
2009	95	40	2	56	188	112	52	545
2010	58	39	-	58	106	89	52	402
2011	37	16	-	30	47	44	29	203
Total	1,154	27,683	544	1,942	3,311	4,982	1,889	41,505
1980 -2011	3%	67%	1%	5%	8%	12%	5%	100%
Total	365	186	4	300	699	612	229	2,395
2007-2011	15%	8%	0%	13%	29%	26%	10%	100%

Table A3.24 : Number of clients due to road crashes by provincial address and provinces where injury occurred

Name of provinces	Number and percentage of clients			
	Provinces where injury occurred		Provinces where they live	
Banteay Meanchey	51	7%	55	3%
Battambang	72	10%	86	5%
Kampong Cham	70	10%	200	11%
Kampong Chhang	6	1%	165	9%
Kampong Speu	19	3%	39	2%
Kampong Thom	31	4%	62	3%
Kampot	14	2%	72	4%
Kandal	83	12%	229	12%
Koh Kong	9	1%	50	3%
Kratie	9	1%	8	0%
Phnom Penh	158	23%	305	16%
Prey Veng	20	3%	46	2%
Pursat	42	6%	58	3%
Siem Reap	41	6%	134	7%
Sihanouk Ville	11	2%	125	7%
Takeo	27	4%	196	10%
Other provinces	33	5%	55	3%
Total	696	100%	1,885	100%

Note: Table A3.24 illustrates only the top 16 provinces that have numbers of clients more than 5, for the purpose of doing the Chi-square test. The remaining provinces are included into “other provinces”.

Table A3.25 : List of physical rehabilitation centres in Cambodia

Name of Physical Rehabilitation Centres	Name of Managing Organisations	Year Started
Siem Reap	Persons with Disabilities Foundation (PWDF)	1990
Takeo	Persons with Disabilities Foundation (PWDF)	1992
Kampong Cham	Handicap International (HI)	1993
Phnom Penh	Cambodia Trust (CT)	1992
Sihavouk Ville	Cambodia Trust (CT)	1993
Kampong Chhnang	Cambodia Trust (CT)	1995
Battambang	International Committee of the Red Cross (ICRC)	1991
Kampong Speu	International Committee of the Red Cross (ICRC)	1992
Kien Khlang	Veterans International (VI)	1991
Kratie	Veterans International (VI)	2000
Prey Veng	Veterans International (VI)	1995

Table A3.26 : Number of non-governmental organisations contributing to the disability action plan

National Disability Strategic Plan	Number of NGOs	
	Number	% (of 53)
Action 1: Poverty reduction through increasing employment opportunity, improving living standards and empowerment for persons with disabilities	23	43%
Action 2: Provision of health and rehabilitation services	26	49%
Action 5: Education, vocational training	29	55%
Action 6: Expression of opinion, access to information, participation in political life	1	2%
Action 9: Rights and empowerment of women and children with disability	5	9%

Table A3.27 : Definition of key terms in Chapter 6

Key Term	Definition
Provincial hospital	Referral hospitals (as named by the Ministry of Health), based in provincial towns and managed by the government
Health centre	Lower level of health facilities than the provincial hospitals, managed by the government
Private service	Health facilities run by individuals and not managed by the government
Traditional healer	Individuals who provided traditional treatments to the primary participants (I)
Emergency hospital	Name of a hospital in Battambang provincial town.

Table A3.28 : Presence of family members in the first and second interviews

Types of Interviews	First Interview	Second Interview
Interviews with P(I) and P(II) together	27	14
Interviews with P(I), while P(II) was present but did not talk	3	2
Interviews with P(I) without presence of P (II)	16	16
Total of Interviews	46	32

Note: P (I) : Primary Participants (I)
P (II) : Primary Participants (II)

Table A3.29 : Transport modes for the primary participants (I) in rural and urban areas to the first health facilities

Transport Modes to the First Health Facilities	Living areas		Total
	Urban area	Rural area	
Ambulance	10	6	16
Motorbike	1	8	9
Small Passenger Car	5	3	8
Small Goods Vehicle	0	2	2
Local transport	1	5	6
Unknown	0	5	5
Total	17	29	46

Table A3.30 : Cost of the primary participants (I) during their treatment

Cost During the Treatment	Types of Long Term Impairments				Total
	Amputee	Functional Limitation	Paraplegia	Tetraplegia	
Less than USD1,000	1	3	3	1	8
USD1,000-2,000	4	1	3	0	8
USD2,000-3,000	3	0	1	1	5
USD3,000-5,000	3	0	1	1	5
Over USD5,000	3	1	0	1	5
Free services	3	3	0	2	8
Not mentioned	3	3	0	1	7
Total	20	11	8	7	46

Table A3.31 : Duration of absence from work/school by types of long term impairments

Duration of Absence from Work/School	Types of Long Term Impairments			Total
	Amputee	Functional Limitation	Paraplegia/Tetraplegia	
1-3 months	2	1	0	3
3-6 months	7	0	1	8
6-12 months	5	1	0	6
1-2 years	1	2	1	4
Over 2 years	2	2	2	6
Never back to Work/School	3	5	11	19
Total	20	11	15	46

Table A3.32 : Changes in careers or education of the primary participants (I)

Changes after road crashes	Types of Long Term Impairments				Total
	Amputee	Functional Limitation	Paraplegia	Tetraplegia	
Drop school-stay at home	1	0	0	1	2
Drop school-get job	2	0	1	0	3
Continued the study	2	0	0	0	2
Keep the same job	3	4	0	0	7
Lost job - get a new one	7	2	2	1	12
Lost job - stay at home	3	5	5	5	18
Lost job - vocational training	2	0	0	0	2
Total	20	11	8	7	46

Table A3.33 : Frequency of travel by types of long term impairments

Frequency of Travel	Types of Long Term Impairments				Total
	Amputee	Functional Limitation	Paraplegia	Tetraplegia	
Every day	11	2	3	1	17
Sometimes	7	5	1	1	14
Rarely	2	4	4	0	10
Never	0	0	0	5	5
Total	20	11	8	7	46

Table A3.34 : Daily transport modes of the primary participants (I)

Travel capacity	Types of Long Term Impairments				Total
	Amputee	Functional Limitation	Paraplegia	Tetraplegia	
Have their own transport	9	4	2	2	17
Go out with others	10	7	1	0	18
No transport/not going out	1	0	5	5	11
Total	20	11	8	7	46

Table A3.35 : Level of participations of the primary participants (I) by disability types

Participation in Society	Types of Long Term Impairments				Total
	Amputee	Functional Limitation	Paraplegia	Tetraplegia	
No issue of participation	12	5	1	1	19
Participate sometimes	8	5	2	0	15
Just stay at home	0	1	5	6	12
Total	20	11	8	7	46

Table A3.36 : Factors that might link to participation in society

Items	Participation in Society		
	No issue of participation	Participate sometimes	Just stay at home
Shame	10	12	6
Environmental barriers	8	4	2
Attitude of people around	16	9	5
Cannot ride/drive	0	1	10
Can ride/drive own vehicle/wheelchair	12	3	1
Still can go out with others	7	11	1

Table A3.37 : Influencing factors of knowledge use

The form and nature of the knowledge	The user's context	The nature of the problem	The form of the decision making process
- Readable presentation	- User's vision	- Aim of the solution	- Centrality
- Usefulness of knowledge	- User's needs	- Actors involved	- Actors involved
- Quality of research	- User's opinion	- Political consensus	- Political sensitivity
	- Correct moment		- Distributing efforts
	- Contacts		- Engagement of intermediaries
	- Reputation		
	- External evaluators		

Table A3.38 : Summary of participants' working background

Types of participants		Number of participants
National vs Community work	National	20
	Community	19
	Total	39
Road Safety vs Disability Sectors	Road Safety	18
	Disability	17
	Both	4
	Total	39
Governmental vs Nongovernmental organisations	Governmental	19
	Nongovernmental	20
	Total	39

Table A3.39 : Recommendations from the secondary participants to improve the PRC data system and its services

Recommendation to improve	
PRC Data System	PRC Services
- Develop standardised patient management system in all PRCs - Centralize the PRC data under the PWDF - Build capacity of related stakeholders in data system	- Service promotion - Financial support to cover cost of transport, meals and accommodation of poor patients - Strengthen collaboration and cooperation for smooth and on time referrals

Table A3.40 : Recommendations from the secondary participants to improve RCVIS and road safety

Recommendation to improve
RCVIS
- Improve data collection procedure - Disseminate reports to relevant policy makers - Build capacity of participating teams - Conduct an assessment to evaluate the current system and pilot an online data entry system

Table A3.41 : Data sources for data collect on persons with severe disabilities

Name of Data Sources
- Disability structure: PRCs, SCRC, MoSAVY, DAC
- Health structure: hospitals, health centres, private clinics, RCVIS
- Local government: commune / district local authorities
- Other government structure: Police, National Institute of Statistics
- Nongovernmental structure: community teams, media

Table A3.42 : Key findings classified into crash, long term impairment, disability and impact

Types of findings in the presentation	Findings in the presentation	
	Number	Percentage
Crash	13	25%
Long term impairment	15	28%
Disability	11	21%
Impact	14	26%
Total	53	100%

Table A3.43 : The top ten key findings with the highest numbers of recommendations from the secondary participants

Topics of main key findings	Number of recommendations
Cause of road crashes	14
Transport mobility for persons with disabilities	12
Transport mode to health facilities: 40% by ambulance	10
First aid at the scene	9
80% were travelling by motorbike	7
Issues of Hit and Run	8
Vehicle safety and road condition	6
Helmet: 86% of motorbike riders did not wear a helmet	5
PRC services and community rehabilitation	4
Vocational training	4

Table A3.44 : Numbers of key findings and recommendations

Types of findings in the presentation	Findings in the presentation		Recommendations from the secondary participants	
	Number	Percentage	Number	Percentage
Crash	13	25%	49	42%
Long term impairment	15	28%	27	23%
Disability	11	21%	24	21%
Impact	14	26%	17	15%
Total	53	100%	117	100%

Table A3.45 : Numbers of participants and recommendations in Workshop 3 by types of their working organisations

Types of participants	Number of participants	Numbers of recommendations for:		Total
		NRSAP	NDSP	
RS-Government	7	42	3	45
RS-NGOs	5	21	3	24
Disability	6	23	25	48
Total	18	86	31	117

Table A3.46 : Numbers of recommendation by types of findings and action plans

Types of Findings in the Presentation	Number of Recommendations in:		Total
	NRSAP	NDSP	
Crash	49	0	49
Long term impairment	25	2	27
Disability	10	14	24
Impact	2	15	17
Total	86	31	117

Table A3.47 : Numbers of contact details by type of projects

Organisations	Type of projects	Numbers of Contact Details	
		Gathered	Recruited
Handicap International (HI)	Rehabilitation	22	10
	Community based support	31	7
Cambodia Trust (CT)	Rehabilitation	27	7
Persons with Disability Foundation (PwDF)	Rehabilitation	4	3
Veterans International (VI)	Rehabilitation	10	4
Spinal Cord Injury Centre (SCIC)	Rehabilitation	12	4
Disability Development Services Program (DDSP)	Community based support	4	3
Cambodian Spinal Cord Injury Association (CSCIA)	Community based support	6	3
Phnom Penh Centre for Independent Living (PPCIL)	Community based support	4	1
Local Authorities (commune chiefs)		6	4
Total		126	46

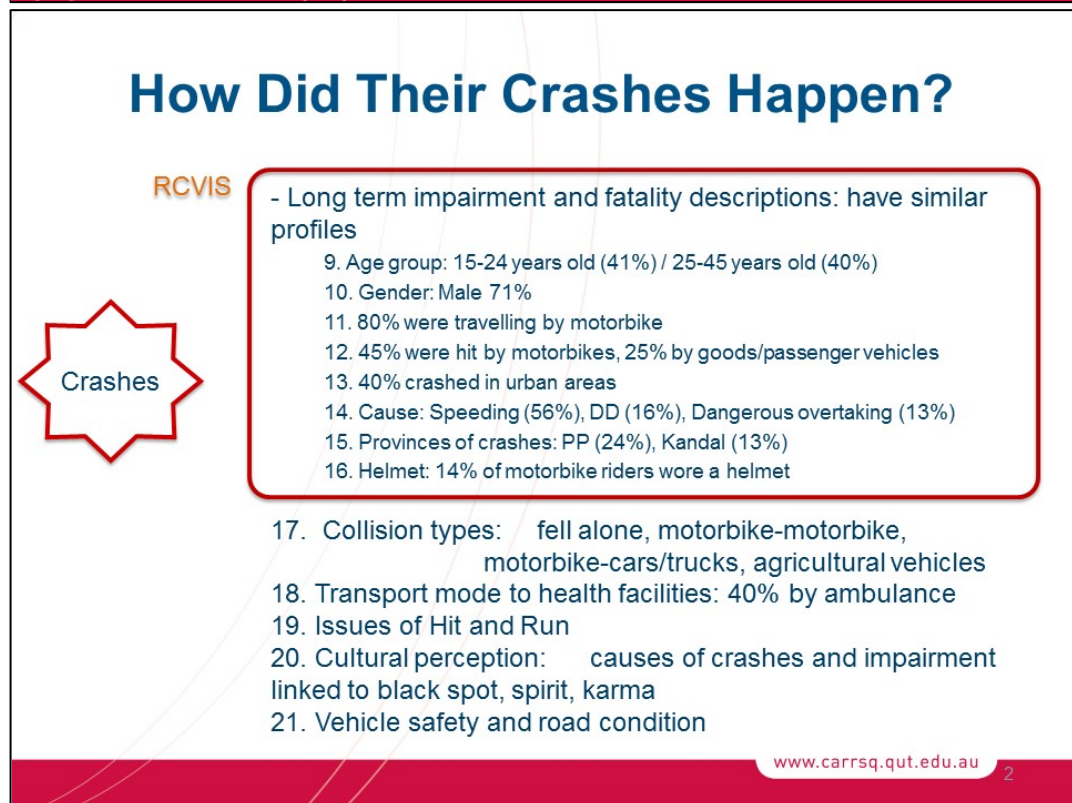
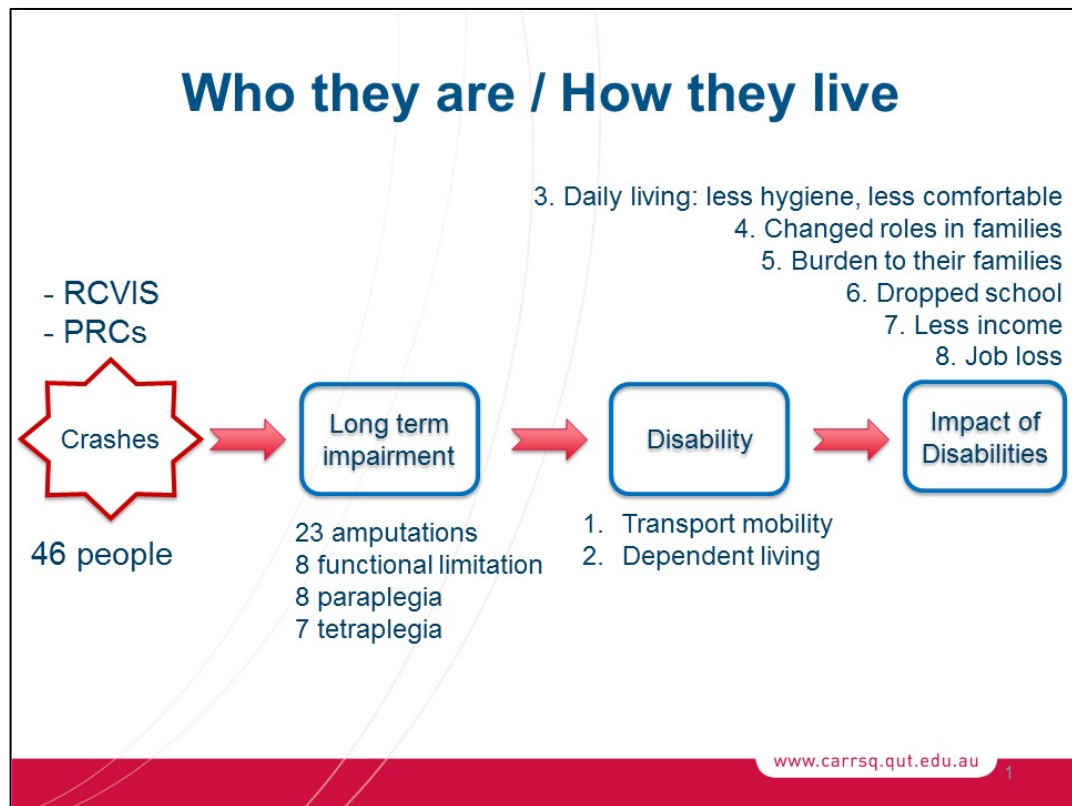
Table A3.48 : Provincial addresses of the primary participants (I)

Address (Provinces)	Organisations that referred the primary participants for interviews									Total
	HI	CT	PWDF	VI	SCIC	DDSP	CSCIA	PPCIL	Local Authority	
Battambang	7				3		3		1	14
Kampong Cham	5									5
Kampong Chhang		5								5
Kampong Speu									3	3
Phnom Penh		2		4				1		7
Pursat					1	3				4
Siem Reap			3							3
Tboung Khmum	5									5
Total	17	7	3	4	4	3	3	1	4	46

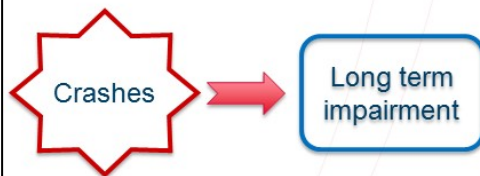
Table A3.49 : Occupations of the primary participants (I) before and after road crashes

Occupations	Number of Primary Participants (I)	
	Occupation before Crashes	Current Occupations
Government Official	8	4
Worker (factory, construction,farm,...)	6	4
Own a business / Vendor	5	4
Driver (car/truck/tractor)	8	1
Farmer	8	4
Student	9	1
Stay at home	0	22
Technician	2	4
NGO staff	0	2
Total	46	46

Appendix 4: Summary of Key Findings, Presented in Workshop 3



How Did Their Long Term Impairment Happen?



POSITIVE FEEDBACK

- 34. Ambulance services
- 35. Hospital services
- 36. Family support

- 22. Transport modes and vehicle safety
- 23. Hit and Run
- 24. Transport mode to health facilities
- 25. Waiting time to health facilities
- 26. First aid at scene
- 27. Hospital services – no proper care
- 28. Advanced payment
- 29. Delayed treatment due to multiple referrals
- 30. Traditional practices
- 31. Counseling services
- 32. Believed in medication, but NOT physical therapy
- 33. Delay of service accessibility

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3

How Long Term Impairment Became Disability?



- 37. Transport mobility
- 38. Physical environmental barriers
- 39. Behaviors of people around them / Discrimination
- 40. Long term impairment = NOT ABLE
- 41. About “walking”, but not “ability to do things”
- 42. Perception of family members - discouragement

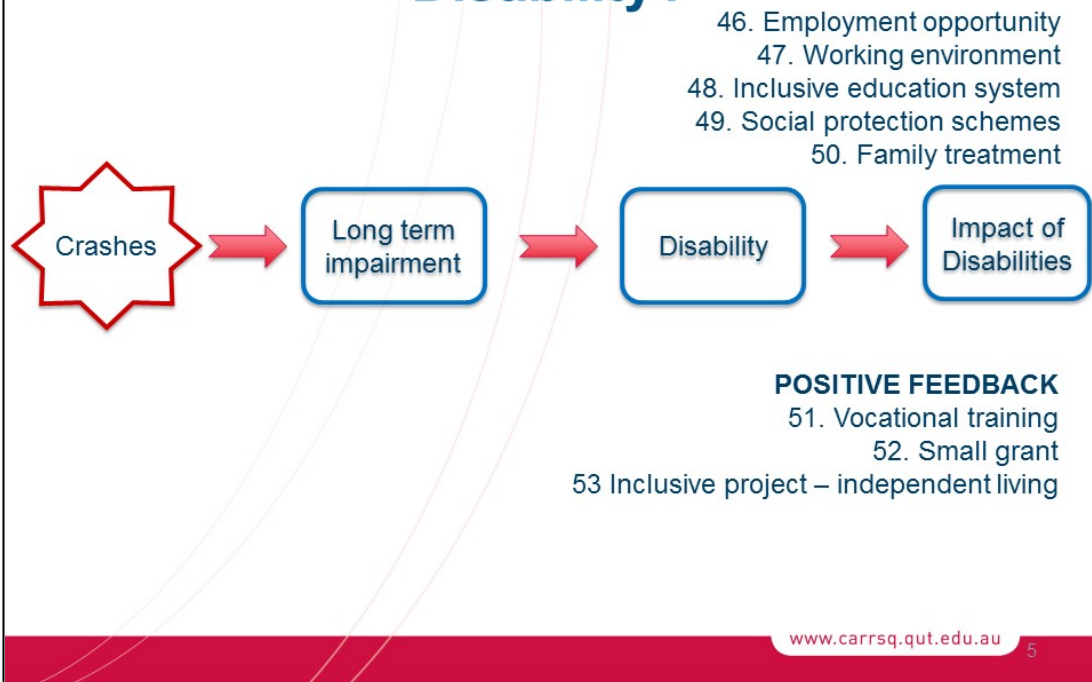
POSITIVE FEEDBACK

- 43. PRC + Community rehabilitation
- 44. Spinal cord injury centre
- 45. Family support

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What Contributes to the Impact of Disability?



Appendix 5: Traditional Healers in Cambodia

Overview of Traditional Healers

In Cambodia, traditional healers (*Krou Khmer*) work in an informal context and are found throughout the country (Richman, Nawabi, Patty, & Ziment, 2010). They provide their treatment services for various types of diseases and injuries. Although only 1.2% of the population seek traditional health care services, as estimated in a recent national survey, conducted by the National Institute of Statistics (2014), the Ministry of Health provided an estimate that 40% to 50% of the population still access traditional medicine (WHO, 2012). However, there is no official registration requirement from the government that covers traditional healer services. Because of this, the number of traditional healers has not been identified. It was estimated by WHO (2012) that there is at least one traditional healer in every village. Traditional healers were identified as first responders, but not considered into the formal and referral network (Nakahara et al., 2010). Previous attempts to include them failed (Nakahara et al., 2010).

Although traditional medicine and treatment have existed for a long time in Cambodia, an extension of its practices might be linked to the Khmer Rouge Regime (1975-1979). At this time, Western medical practices were banned and traditional treatments were the only health care option (WHO, 2012). Two out of four traditional healers who were interviewed in this study mentioned that they learnt this skill from other people during the regime. At that time, there were no proper health facilities and a lack of health care and medical practices. Without any other choices, people needed to find natural remedies from the plants, roots, and leaves around them to cure their injuries or diseases. The traditional practices, using available natural resources, were passed from one to another and used to save people's lives.

In 2009, the Cambodian government set up the National Centre of Traditional Medicine, which delivers training courses on traditional medicine and provides official accreditation to their participants as traditional doctors. Graduates can also open private clinics and sell traditional products or raw materials for traditional medicine (Globinmed, 2010; WHO, 2012). Prior to this, in 1998, the government

issued a regulation to require traditional healers to obtain official certificates and register their business, either selling traditional medicine products or providing traditional services. However, non-licensed practitioners are still observed (WHO, 2012). All four traditional healers interviewed in this study had not registered their services with any government institutions.

Visible and Invisible Treatment for Road Crash Injuries

There are two main types of traditional healers for injuries and long term impairments due to road crashes, based on their particular skills. This includes visible and invisible treatments. Both practices might also include various activities such as using incense to burn the skin, especially on an injured part of the body, or organising a heated platform to put patients on to heal the injuries or to discharge any spirit possession.

Visible traditional healing provides treatment mostly for broken bones and dislocation of legs or arms. The treatment process might involve different activities and traditional medicines, depending on each healer. Some of them introduce a series of exercises. Khmer traditional medicine includes various types of roots, leaves, herbs and others minerals or ingredients. In general, pieces of bamboos are used as a wooden splint to support broken parts of the body and keep them still. Every day, the healer provides traditional medicine to patients to take or put on the broken part, with some kind of holy water, which has been blessed by the healer. Spiritual healing practices might also be adopted by some of the traditional healers through praying during their treatment in addition to taking traditional medicine. Patients usually need to stay at the healer's house for around one to two weeks for the treatment.

Invisible treatment involves the practice of praying to protect or help people from spirits/ghosts, possession or evil spells. From the point of view of this traditional healer type, road crashes are caused by the bad luck of individuals that is linked to:

- their birthday and the current year, which brings fortunate or unfortunate things to the persons during the whole year
- actions of individuals that make evil spirits, ghosts or spiritual authorities (who spiritually take care of the area) angry

- being spelled/cursed by someone (an enemy of the individual)

People in Cambodia, especially in rural villages, still believe in the influence of spirits in their lives (Globinmed, 2010). They believe that those spirits might have an ability to cause accidents and prolong their long term impairments. This type of traditional healer declares themselves as having the ability to prevent bad luck, including road crashes, and able to provide treatment to heal injuries or impairments. Through their spiritual processes or skills, they can communicate with those haunting and possessing spirits and might ask the spirits to advise them on methods of prevention, diagnosis and treatment. In addition to praying, the healers also provide showering to their clients as part of either the prevention or treatment process. In some practices, the healers offer a set of meals and fruits to spirits, through praying over the meals, as an exchange to replace bad luck and heal the injuries or impairments. Sometime, those packages of meals might be left at the places where crashes have taken place, or specific cross roads, as a symbol of getting away from any other crashes. Monks are also involved in this type of practice to pray and provide showers to people to wash away bad luck and bless them for good luck.

Usually, this type of traditional healer with invisible treatment has a small shrine or specific spiritual facilities in their house for worship. Before treatments, they usually burn incense to pray to their ancient/spiritual teachers. Some of them have tattoos on their bodies that are considered as protective ancient scripts.

Some spiritual healers might also provide something that is considered as magical materials to protect patients and bring good luck for a whole year. It is believed that the materials contain magical diagrams and ancient scripts, which have magical power. People keep them at home or wear them as talismans. This type of healer might claim to be a fortune teller, who can see the future of their patients or clients. It is believed that they can advise about fortunate or unfortunate periods in the coming year and arrange some type of spiritual intervention to avoid unfortunate events.

Service Accessibilities

People can visit traditional healers at their houses and access their services mostly through word of mouth at any time. Although phone calls might be made to check for the availability of a traditional healer, appointments are mostly not

required. The operations of the traditional treatment services vary. Some traditional healers open their services as a full time business, with advertising tools such as names, logos and banners in front of their houses. Others might operate the services as part-time jobs. They accept patients when they come to their houses for the services, but they do not officially advertise their roles as they also have other jobs such as farmers or vendors.

As noted above, most traditional healers provide their services at their houses. Patients can stay in traditional healers' houses for the treatment for up to two or three weeks, depending on how injuries need to be treated. Beds and rooms are prepared inside or in separate shelters next to the houses. In some cases, traditional healers might also visit a patient's house when they cannot travel (in case of serious injuries such as paraplegia and tetraplegia) or to carry out some spiritual ceremonies such as blessing or praying to protect patients and their families from spirit possession.

According to the Cambodian-Australian Welfare Council Inc. (2010), traditional practices and medicine are mostly chosen because of the cost factor and limited health care facilities in Cambodia (especially in rural areas). People are referred to traditional healers mostly when there are broken bones or other injuries without any bleeding. Additionally, based on interviews with health professionals and traditional healers, it is generally agreed that open-wound injuries would be transferred firstly to hospitals. Traditional healers accept patients after open-wound injuries are treated at hospitals. The services of traditional healers are provided to all kind of patients and clients, not specifically for road crash casualties.

There is no standard procedure to check the severity of injuries or impairments before providing the services, but traditional healers pay a lot of attention to making sure they only accept clients who will not die at their houses. Any case of fatality in their houses would ruin their reputation. Therefore, only patients or clients with no bleeding injuries and who are not in an emergency condition are accepted. Some traditional healers may reject potential patients, while some clearly refer serious cases to hospitals rather than trying to treat the cases themselves. In some cases, traditional healers dismiss their patients after initially commencing treatment when they observe that their patients' conditions are getting worse.

Some traditional healers respect their traditional practices and are not allowed to request money from patients or clients. They depend on patients to donate an

amount of money after the treatment. The donation can be as low as USD1 to USD20 according to how rich or poor the patients are. Other traditional healers might have specific prices for different types of services. The price can be as much as USD200.

Traditional practices are mostly transferred among generations in families, for instance, husband to wife, parents to children. In some cases, they also accept outsiders as students. On the other hand, three out of four traditional healers that were interviewed mentioned that their children were not interested in this practice and might not learn from them. One of them gave the reason as the limited income generated from this service.

Mixed religious practices are observed among those traditional healers. Some of them claim that they followed Buddhism, while others might adopt Hinduism. In addition, one out of four interviewed traditional healers expressed his disappointment in praying/blessing practice, as he did not believe in such practice at all. He only applied traditional medicine with some modern techniques he learnt. To him, praying practices are an excuse and a cheat that has been used by some traditional healers. He believed that traditional treatment did not require praying phrases at all. It only depended on the quality of the medicine as well as the process of the treatment.

Quality of the Services

The quality of the services from traditional healers is not documented well, because they operate informally without any official registration. There is no documented guideline to control the quality of traditional medicine products (WHO, 2012). Some traditional healers accuse other healers of ruining the reputation of traditional healers in general as they cheat their clients and do not have any real qualification. Although traditional healers might provide a good service on broken bones with no open-wounds, there are still some issues related to their treatments. Bones might be reconnected, but might not be as straight as normal. The re-knitted bones might be shorter on the injured side than on the uninjured side. Additionally, after receiving a traditional treatment, the healed bones might cause another issue by blocking the veins, which then reduce body function. All interviewed hospital staff members mentioned that they needed to provide treatment to many patients who went to traditional healers and did not receive proper treatment.

It is important to note the role of traditional healers in healing people via psychological procedures. Following interviews with health professionals in hospitals, health centres, physical rehabilitation centres and other non-governmental organisations, and persons with disabilities, it has been observed that people still have a belief in traditional healers, especially their invisible treatment procedure. They tend to respect and follow advice from the healers. This more or less has affected their perception and motivation to recover from their disappointment and hopelessness. For example, after the spiritual event, they believe that they are free of spirit possession, and they have refreshed their living activities by going back to work and doing their daily tasks. Some traditional healers advise their clients to do more exercises (physiotherapy) as part of their treatment procedure. This also helps a patient to be able to recover from their long term impairments.

More findings related to traditional practices from interviews with persons with disabilities, primary participants (I), are shown in Chapter 6: Lived Experiences and Impacts of Disabilities. Those primary participants (I) and their families knew the traditional treatment and some of them received the services and had different points of view on the quality of the services.

Appendix 6:

Description of Support Services for Persons with Disabilities in Cambodia

Education and Vocational Training Programs

According to the Council of Ministers (2011), vocational training centres (for the general population) have provided their services to cover almost all provinces in Cambodia, except Preah Vihear and Mondol Kiri provinces. However, the Council of Ministers (2011) also highlighted the challenges in terms of training capacity, shortage of dormitories, lack of buildings, laboratories and materials for students. Another important issue is the limited link between the training courses offered and the needs of the labour market and people's demands (Council of Ministers, 2011). There is a need to improve productivity and employment opportunities. At the same time, there is no formal report on the number of vocational training centres, as they are operated in the form of registered centres as well as private and small scale businesses without formal registration.

At least, there are two formal vocational training centres in Phnom Penh that have been set up specifically for persons with disabilities. These two centres provide vocational training courses on electronic (TV, radio, mobile phone repair), family agriculture, garment, and machinery repair. The courses have been updated based on the market need and capacity of persons with disabilities. Each course usually takes around one year. General topics are also included into the courses, such as Cambodian law on disabilities, concept of small business, health care, and traffic law. During the courses, recreational activities are also organised, mostly in the evening, such as sports, and during the weekend, such as dances. These enable students to participate in the events and progressively improve their social participation. However, the events are organised in the centre among the students and staff and are not for general communities and therefore limits the scope of participation.

At the end of the course, most students benefit from grant/loan schemes (around \$100 to \$200) to start up their small business. The centres also help to identify relevant jobs for their students, such as in garment factories. After their courses, the centre teams also organise follow up visits at some provinces to monitor the living condition of their students. Some of them benefit from the loan scheme,

which complemented their limited investment cost to start up and continue their business, such as set up mobile phone repairing shops, or raise fish or cattle.

Because of the new disability law, many institutions need to recruit persons with disabilities to fulfil their quota of 1% to 2% of their overall employees. The centres have been contacted by some institutions, such as garment factories, to identify and recruit persons with disabilities. One of the centres claimed that they have a very good network with the local authorities and NGOs in identifying persons with disability for their training courses. However, the centre worked directly in only 10 provinces. Remote areas in those provinces are not covered.

There are some challenges for persons with disabilities to complete the training courses. First, many of them are illiterate and could not read and write Khmer. They need to attend a literacy foundation course before the vocational courses. During the courses, their literacy capacity is still limited to absorb the lessons. For a short duration of one and half year, the knowledge and skill of persons with disabilities that need to start from the foundation course are improved, but might not be sufficient to compete with market labours outside. There are several courses that had to be dropped from the list of one of the centres, such as carpenter and electric courses, because students who graduated from these courses were unable to find a good job, due to their limited skill and challenges in mobility, as required in the job. Additionally, computer skill is essential for an in-office job, but the computer course could not be operated successfully, because of the limited literacy among persons with disabilities. There were at least two centres that dismissed this course.

Another challenge related to daily living in the centre. It has been set up based on a concept of self-care. Students need to share their accommodation, rest rooms and have meals together as a team. They need to be able to take care of themselves, such as toileting, and bathing. This is a challenge for persons with severe disabilities, who need assistance in their daily activities. Family members are not allowed to stay with them. Although there is some support through their centre staff and materials, it is still a challenge for severe disabilities, such as paraplegia. Additionally, the centre provides financial support as a daily allowance of USD5 per day for a group of 10 people to buy meat and vegetable for their three meals. This allowance is sufficient for very basic meals outside urban areas only.

In addition, time and distance are another challenge. Attending the vocational course required time, which could be up to one and half years. This means students need to stay full time in the centre and could not generate any income for themselves and their families. There are many cases where persons with disabilities decided to drop their registration because they have found a job, although it is just a low skill and low paid job. Most of students in the vocational training centres are poor. The training centres are located in Phnom Penh. Some persons with disabilities found it very far to go away from their children and families.

In early 2015, one of the centres identified 140 persons with disabilities to attend their training courses. Within one month, 30 of them dropped out and moved back to their home towns. Since 1991, there were around 3000 students registered in the centre and only 2000 had successfully graduated from the centre. Persons with disabilities who successfully completed the course would learn vocational skills as well as daily living skills. They are able to take care of themselves in daily life, without being a burden to their families for daily care.

PH05: I am proud of my work too. Some parents came to see me and asked how our school managed to train their kids in taking care of themselves.

Poverty Reduction through Small Grant Schemes and Business Set up

There are different types of community based services provided to persons with disabilities to reduce poverty. In general, a common practice among many NGOs is to implement grant / loan programs to support persons with disabilities to set up small scale business and invest in farming or animal raising. Those persons with disabilities are selected and supported based on criteria assessments of individual NGOs. Self-help group programs are also another type of livelihood supporting schemes. Groups of 10-20 people mostly composed of persons with disabilities or their family members are formed with an investment fund from NGOs. Members in the group could borrow the money with a low interest rate and progressively pay it back. The money generated from the interest rate becomes a funding source for the group to do more activities or extend the loans to other members. In some cases, the loans could be in the form of livestock, such as cows or pigs. In addition, three NGOs supported persons with disabilities to produce handicrafts and help to set up markets for them. They could be employed as full time staff or work at home and deliver their products for selling.

Community Rehabilitation Services

In addition to rehabilitation services in PRCs, community rehabilitation services are mostly conducted by PRC staff members in communities. The activities are mostly provided to follow up clients who are discharged from PRCs, such as children with a clubfoot. Reminding messages and refreshing practical exercises are shown during the home visits of the PRC staff. The activities are important to encourage family members to provide regular physical therapy to persons with disabilities. On the other hand, only a small proportion of clients in PRC have been visited and the number of visits is still limited. For example, only selected clients (around 10-20%) are generally visited less than five times a year. More frequent visits might take place during the first few months, if PRC staff identified their clients as in need of follow up, especially among children with Cerebral Palsy and clubfoot.

Grassroots Capacity Building and Advocacy in Communities

The activities aimed to increase knowledge of communities on disability topics. They are mostly organised in selected villages in a form of small scale trainings and meetings among persons with disabilities and their communities. They were mostly facilitated by NGO staff members. In some cases, local authorities were also invited to set up dialogues with villagers. They are considered as a good opportunity for persons with disabilities to express their voices and concerns and propose better actions from local authorities. Although the knowledge increase is observed, behaviour changes of local authorities and communities are yet to be assessed.

Rights Based Approach and Promotion

There are at least four organisations (CT, CDPO, CABDICO, DDSP) working in the communities to provide training courses to persons with disabilities, their communities and local authorities on various topics, including the rights of persons with disabilities. The courses aimed to explain the rights, based on the Cambodia disability law, and encourage them to advocate for their rights to their local authorities.

There are different points of view on the concept of rights versus the need for daily living. In Cambodia, 79% of the population live in rural communities (National

Institute of Statistics, 2013), where the living condition is poor. People needed to work hard to earn for daily living, without having time to consider their rights in participating in any community projects or services from the government. At the same time, asking for their rights might be considered as taking action against the government. This word in Khmer (*Seth*) has been misused and misunderstood by the local government as it was referred to as a sensitive issue that might relate to opposite political parties. Based on interviews with secondary participants, who are NGO staff members working in communities, people in rural areas do not care so much about advocating their rights to the local authorities. They prefer to take their time for their daily work in the farms or small business in their local communities.

On the other hand, the advocacy movement on the rights has led to some changes in the communities because some local authorities accept their role in providing an accessible environment, especially ramps, for persons with disabilities. The accessible ramps and toilets have been observed in commune centres, hospitals and schools. Although the changes are not so significant, they are considered as a starting point for local communities.

Support to Persons with Severe Disability

Among all 53 disability NGOs, only three organisations have been identified as focusing their community based support to persons with severe disabilities (paraplegia and tetraplegia). One of them initiated a personal assistant service, which aimed to enable persons with severe disabilities to have independent living. The project recruited volunteers, who mostly were students, and provided training courses to them on how to assist persons with severe disabilities in daily activities. They then were appointed to assist a person with severe disability at home. The concept of “independent living” was introduced firstly in California. Then, a group from Japan visited there and adopted the concept into Japanese society. In 2009, the concept was transferred to the Phnom Penh Centre for Independent Living, with support from the Japanese organisations. The concept aimed to empower persons with severe disability to be able to have what they want, either to do it by themselves, or through other means, such as personal assistants. The centre developed this project as their showcase to advocate for better assistance and services to persons with severe disabilities.

The spinal cord rehabilitation centre in Battambang is the only formal centre that provides rehabilitation services for persons with spinal cord injuries in Cambodia. The centre was established in 1993, with the joint effort of the Cambodian Government and Handicap International. The centre is located in the provincial town of Battambang and can accommodate up to 40 patients. Since 2009, Handicap International completed its mission and withdrew its support from the centre, which then has been under the full management of the Persons with Disability Foundation, which also manages the PRCs. Since the withdrawal, the numbers of staff and patients has reduced by 50%.

The centre provides services free of charge, in addition to the coverage of meals, accommodation and transport costs. It delivers rehabilitation services after the patients completed acute care in hospitals. Inpatient services required around a one year stay in the centre for each patient. Before 2010, the centre also dispatched its teams to communities for follow up and to provide community rehabilitation services. The centre also worked with other non-governmental organisations to provide other community based support as well as vocational training courses to its patients.

Appendix 7: Description of the RCVIS Database

RCVIS was initiated in 2004 by Handicap International, an international non-governmental organisation. It has been progressively transferred to the National Road Safety Committee since 2007, with a full completion of the handover in 2010. The system has been developed to *‘provide government and civil society with accurate, continuous and comprehensive information for planning, legal norms, policy development, and evaluating impact of past, current and future initiatives’* (National Road Safety Committee, 2012, p. 1).

Data Management

Since 2010, RCVIS has been managed by the general secretariat team of the National Road Safety Committee, in collaboration with the Ministry of Health (MoH) and Ministry of Interior (MoI). The general secretariat team compiles the data from both ministries to produce the final annual report on road crashes and casualties. The two ministry teams generally play an important role to gather data through their provincial networks, as summarised in Figure A7.1.

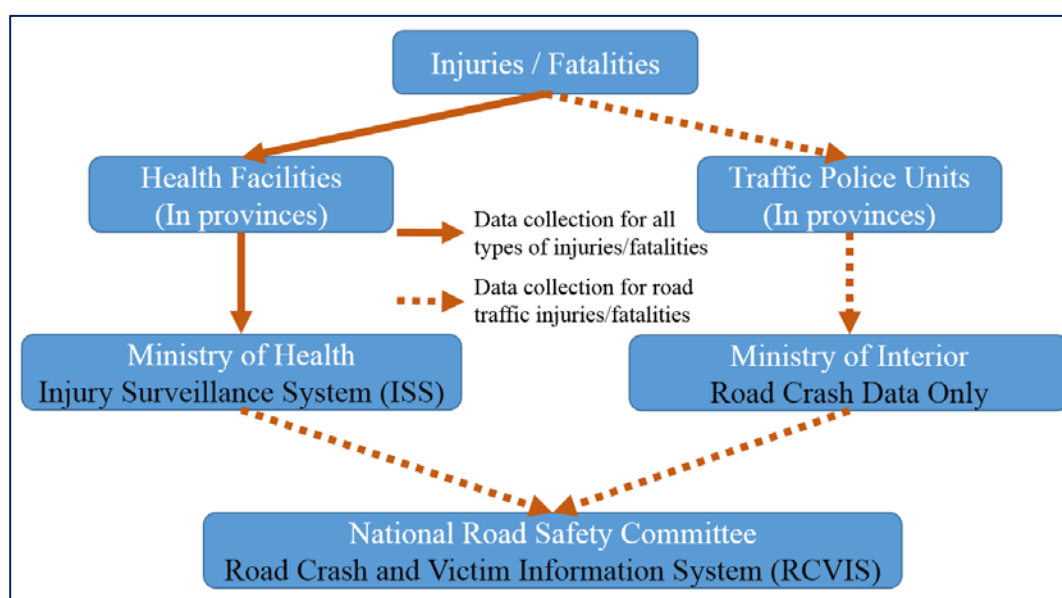


Figure A7.1: Data collection flow of ISS and RCVIS in 2010

During the handover process, Handicap International supported the Ministry of Health to extend the data collection system into the Injury Surveillance System (ISS).

This new system aims to collect information on individuals who were injured in any type of incident (and admitted to any health facility), including road traffic crashes. An ISS form was introduced (to replace the RCVIS form) in the health facilities (hospitals and health centres) at the end of 2009, after nationwide data collection training on the new form. The ministry team appointed their focal points in all provinces to coordinate the data collection in all health facilities, especially the provincial hospitals. As shown in Figure A7.2, the forms were filled in at the emergency sections of the health facilities, and attached to in-patient documents and completed at the discharge sections. Every month, the provincial health departments collected the filled forms from those health facilities. Then, they sent them from the provinces to the ministry head office in Phnom Penh, where road traffic casualty forms would then be sent to the general secretariat team of the National Road Safety Committee (as hard copies). At the same time, the head office team of the MoH centralised and conducted data entry for other injury forms into their ISS database.

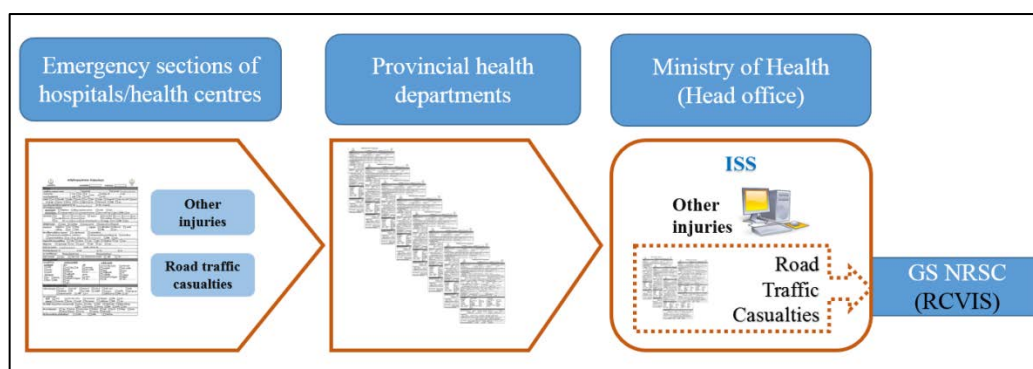


Figure A7.2: Data collection flow under the Ministry of Health

In a similar process to the health facilities, district traffic police units in provinces filled in the RCVIS form for road crash casualties at crash scenes or in their district offices. Then, provincial traffic police departments gathered all filled forms from their districts and sent them to their head office in Phnom Penh. Since 2009, after the handover, the MoI has taken ownership of the system by having a set of computers and a team to collect data from all provinces and managing their police database in the Ministry compound. They then transfer their data in soft copies to the general secretariat team of the National Road Safety Committee, as shown in Figure A7.3.



Figure A7.3: Data collection flow under the Ministry of Interior, after the handover

As shown in Figure A7.4, the general secretariat team of the National Road Safety Committee arrange the data entry for the filled forms from the MoH. Then, they merge the data from both ministries in their database and conduct data analysis.

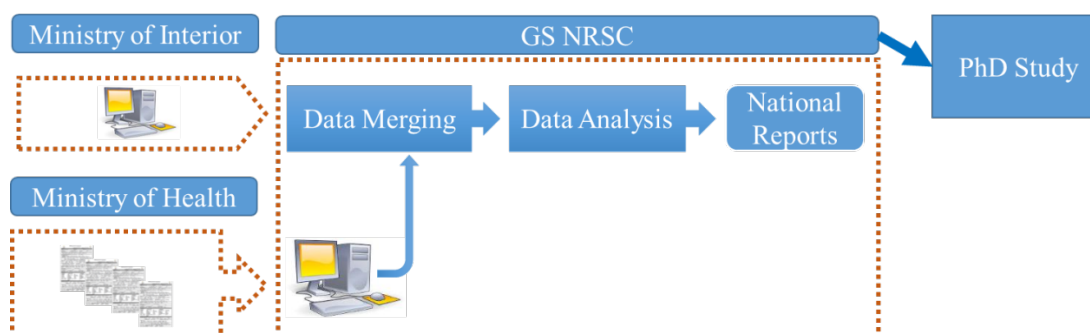


Figure A7.4: Data flow under the National Road Safety Committee

During the merging process, data from both sources (police and health facilities) are sorted and compared manually by the team in the general secretariat, based on key variables, including name, age, gender, crash time and crash location. Through the process, cases that were reported by both sources are identified (Sann, Sem, Ear, & Phan, 2012). Where there was a discrepancy between the values of a variable as coded by police and health facilities, the value assigned by the health facility is selected for the merged data. For example, if the police said a driver was aged 23, while the health facility recorded the driver's age as 25, the merged data give the driver's age as 25.

Once the merging process is completed, a value for "data source" variable is assigned for each case automatically in the system, as below:

- “Traffic Police Only”: forms that were completed by traffic police only, without information from health facilities
- “Health with/without Traffic Police”: forms that were completed by health facilities. Those forms might or might not be reported by traffic police

As a consequence, the data with the value of “Health with/without Traffic Police” could not be disaggregated into those reported by “health facilities only” and those that were recorded by “both data sources”. Therefore, the proportion of RCVIS forms that were completed by both sources could not be identified in the data system.

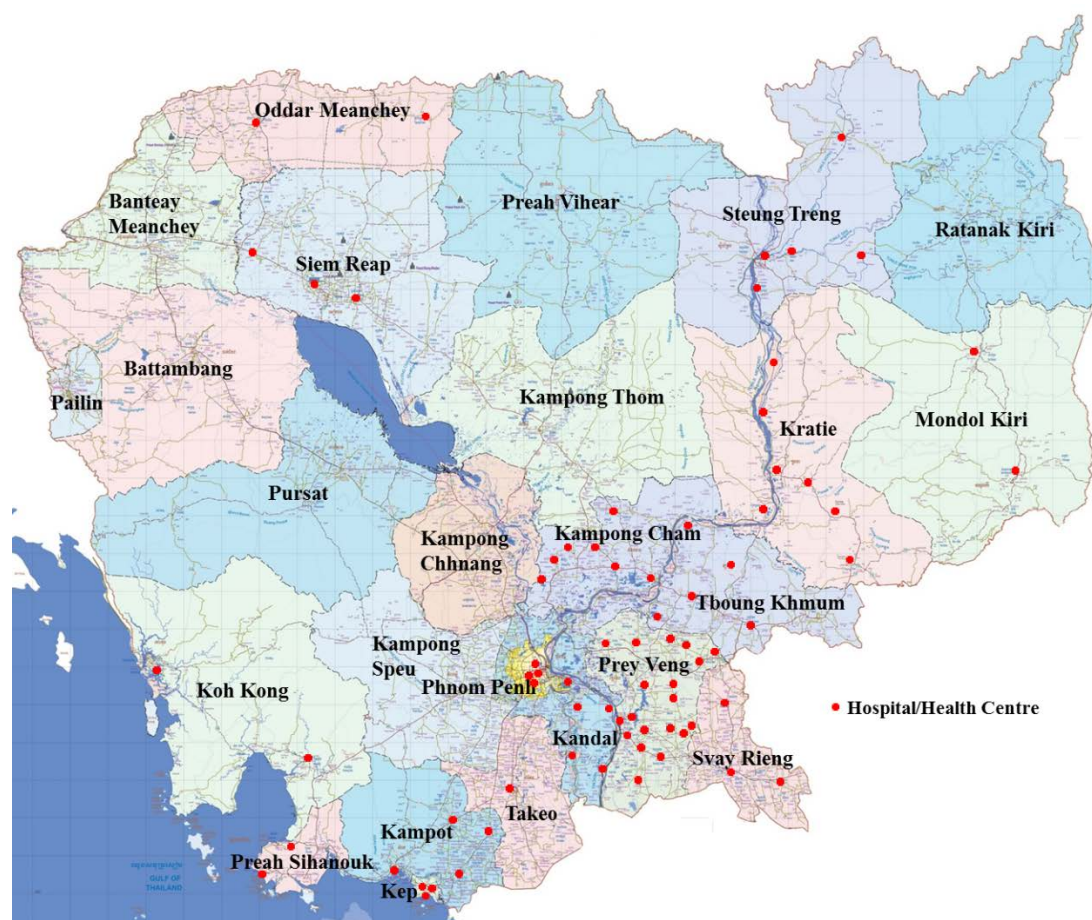
The RCVIS reports are the only national and formal reports from road crashes and casualties in Cambodia. They have been officially recognised by all related ministries: MoI, MoH and NRSC. RCVIS monthly reports were compiled in 2006-2012, summarising key figures during the months. However, since early 2013, monthly reports are no longer prepared. RCVIS annual reports are developed and disseminated in English and Khmer. They are usually ready around 7-8 months after the year of the reports.

An official approval was provided by the general secretariat of the National Road Safety Committee to the researcher to access the data (yearly files from 2006 to 2012) in SPSS format for this PhD study.

Completeness of Coverage

The numbers of participating health facilities and police districts have varied from year to year. All traffic police districts have participated in RCVIS since 2006. New district divisions led to changes in the numbers of police districts in the country. The numbers of participating health centres and hospitals were different between 2008 and 2012 (varied from 30 to 38 and 42 to 49 respectively), see Table A3.3. in Appendix 3 (National Road Safety Committee, 2012, p. 2; 2013, p. 2). Recent data on the number of health facilities in Cambodia is not available. The most recent data from the Ministry of Health (2008a) indicated there were 957 health centres and 74 hospitals in Cambodia in 2007. If this figure is still current, only 66% of hospitals (49 out of 74) and 4% of health centres (38 out of 957) participated in the RCVIS data collection in 2012. There was no participation from hospitals and health centres in seven provinces in 2012.

The system covers all provinces in Cambodia through the national and provincial traffic police network. Figure A7.5 shows the locations of the health centres and hospitals that participated in RCVIS in 2012.



Source: The map was adapted from the Ministry of Public Works and Transport, 2015

Figure A7.5: Map of hospitals and health centres in RCVIS in 2012

There were 151,420 records in the RCVIS in the period 2006-2012, inclusive. Around 45% of the records were collected by traffic police units only, without information from health facilities. Although traffic police units and health facilities were involved in the data collection, their participation significantly differed from year to year as shown in Table A7.1, $[\chi^2(6) = 5,373.75, p < .001]$. “Health with/without Traffic Police” refers to cases where data was provided by health facilities that might or might not been reported by the traffic police. Examination of the standardised residuals showed that the percentage of the cases that came from health facilities decreased over time. In 2006, the health facilities contributed more

than 65% of the overall data. However, in 2012, their contribution reduced to only around 40%.

Table A7.1 : Number of casualties recorded by traffic police and health facilities, 2006-2012

Year of Crashes		Recorded By		Total
		Traffic Police ONLY	Health with/without Traffic Police	
2006	Count	8,749	17,397	26,146
	%	33.5%	66.5%	100%
	St.Re	-28.4	25.8	
2007	Count	10,112	17,291	27,403
	%	36.9%	63.1%	100%
	St.Re	-20.6	18.7	
2008	Count	10,637	15,159	25,796
	%	41.2%	58.8%	100%
	St.Re	-9.6	8.7	
2009	Count	10,118	11,401	21,519
	%	47.0%	53.0%	100%
	St.Re	3.8	-3.5	
2010	Count	10,737	7,550	18,287
	%	58.7%	41.3%	100%
	St.Re	27.0	-24.6	
2011	Count	9,379	7,275	16,654
	%	56.3%	43.7%	100%
	St.Re	21.2	-19.3	
2012	Count	8,803	6,812	15,615
	%	56.4%	43.6%	100%
	St.Re	20.6	-18.8	
Total	Count	68,535	82,885	151,420
	%	45.3%	54.7%	100%
$\chi^2 (6) = 5,373.75, p < .001$				

St.Re: Standardised Residuals

Table A3.4 presents the numbers of casualties recorded by traffic police only and health facilities, by their injury severities. The majority (88%) of fatalities were reported by traffic police only. Relatively, more non-fatal (particularly slight injury) cases were reported by health facilities, rather than traffic police only.

Table A7.2 : Number of casualties recorded by traffic police only and health facilities, by severities of injury, 2006-2012

Injury Severities		Recorded By		Total
		Traffic Police ONLY	Health with/without Traffic Police	
Fatalities	Count	10,396	1,483	11,879
	%	87.5%	12.5%	100%
	St.Re	68.5	-62.2	
Serious Injuries	Count	23,781	21,524	45,305
	%	52.5%	47.5%	100%
	St.Re	22.9	-20.8	
Slight Injuries	Count	33,009	54,663	87,672
	%	37.7%	62.3%	100%
	St.Re	-33.5	30.5	
Unknown	Count	1,349	5,215	6,564
	%	20.6%	79.4%	100%
	St.Re	-29.8	27.1	
Total	Count	68,535	82,885	151,420
	%	45.3%	54.7%	100%

$\chi^2 (3) = 13,183.72, p < .001$

Note: Based on the definition in the data collection form, slight injury referred to having hospitalisation less than seven days, and severe injury was defined as staying in hospital at least seven days or required intensive care or surgery.

The Cambodia Demographic and Health Survey conducted by the National Institute of Statistics et al. (2011) estimated that 1.8% of the population were injured or killed in accidents in 2010. Road traffic crashes constituted 67.5% of overall accidental injuries and deaths. This infers that 175,535 people were injured or killed in road crashes in 2010. However, RCVIS recorded only 10% of that number.

Information Collected and its Quality

RCVIS consists of comprehensive data on casualty information (name, gender, type of road users, injuries, etc.) and crash information (location of crash, causes, collision type, etc.). The raw data from the traffic police units and health facilities were merged to create a single data file for each year by teams in Handicap International (2006-2010) and the general secretariat of NRSC (2011-2012). The merged data files for each of the years (2006-2012) were then provided to the researcher for this study in 2013.

New variables and values were added to the data collection forms over the period 2006-2012. Therefore, the researcher recoded some variables before merging the yearly files into a single SPSS dataset. In total, 48 variables which were available regardless of whether the case was reported by health facilities or police; and which were consistently recorded across years, were analysed in SPSS for this study. Table A7.3 summarises these variables.

Table A7.3 : Information collected by health facilities and traffic police

Type of information	Data collected by Health facilities	Data collected by Police
Casualty information	Gender / Age / Occupation / Provincial Address / Road user type Transport type / Transport-counterpart / Transport to Hospital Severity of Injuries / First aid / Attendance of Authority / Helmet / Seatbelt / Interview Date	
	First aid / Discharge Result Disability type / Hospital arrival date and time	Driving licence / Alcohol / Location of seat in vehicle / Is the person likely at fault
Crash information	Date, time and place of crashes	
	Total fatalities and injuries in a crash	Severity of crash / Type of roads / Urban-Rural / Human errors / Vehicle defects / Road condition / Weather condition / Collision Type / GPS data

The quality of the data was examined by estimating how often the variables in each RCVIS form were completed by traffic police officers and health staff. It was found that:

- 30 of the selected 48 variables were recorded in at least 90% of the RCVIS forms
- 4 variables were recorded by 80%-89% of the RCVIS forms. These were variables:
 - o Was the casualty transferred to a health facility or not
 - o Did crash happen in urban area? Yes/no

- o Hospital discharge: fully treated/disabled/died/referred to other hospital
- o Cause of crash due to human errors
- 5 variables were recorded in 50% to 70% of the RCVIS forms. They were:
 - o Type of long term impairment
 - o Patient received first aid or not (yes/no)
 - o Patient received first aid at crash scene or not
 - o Casualty wore a helmet/seatbelt at the time of crash or not
 - o Casualty was suspected as drink and drive or not
- 9 variables were recorded in less than 50% of the forms:
 - o Persons who provided first aid support to the casualties
 - o Casualties received first aid while being transported or not
 - o Did any authority attend the crash scene
 - o Did casualty have a driving licence
 - o Location of seat in a vehicle of the casualty
 - o GPS data of crash scene
 - o Cause of crashes due to vehicle defects
 - o Cause of crashes due to road condition
 - o Cause of crashes due to weather condition

Where data about a particular factor was missing, it was unclear whether this indicated that the factor was not present, or whether its presence was simply not recorded. For example, when a cause of road crash due to a vehicle defect was not recorded, this might be because the case did not involve a vehicle defect or it did but was not recorded properly by traffic police.

The RCVIS data was collected by traffic police districts and health facilities. Those forms that were completed by health facilities (with or without police records) were entered into the system based on values of variables as coded by health facilities only. This became an issue of missing information for those that were recorded in the system as “Health facilities with/without Traffic Police”. This means that although a case was reported in both police and health forms, only information from the hospital was available in this database and the information from police was

not merged into the database. The missing information from police forms, in the case of those recorded as “Health Facilities with/without Traffic Police” included:

- Collision types
- Hit and run cases
- Location of seat in vehicles: front or back
- Is the person likely at fault

Appendix 8:

Description of the Disability Data Sources in Cambodia

This section reviews data sources in Cambodia that provide information related to long term impairments. Among those sources, the PRC dataset has been identified as the most relevant source for this research study. The guidelines, developed by US Centers for Disease Control and Prevention (2001) were adopted to describe the PRC database and its implementation.

Overview of Disability Data Sources

Hasan (2014) conducted a survey in Cambodia to identify data sources related to disability as part of the Disability Rights Initiative-Cambodia (DRIC) project. He identified the data sources below (Hasan, 2014):

National surveys:

- Cambodia (inter) Censal Population Survey (CCPS): conducted every 10 years under the management of the National Institute of Statistics (NIS). It included one question relating to disability in the latest survey in 2013.
- Cambodia Socio-Economic Survey (CSES): a national household survey, with a small sample size (3,600 in 2013), conducted every year by the NIS. There were four questions relating to disability in the survey.
- Cambodia Demographic and Health Survey (CDHS): another national household survey, with a larger sample size than the CSES. It included six questions to identify disability and has been administered by the NIS.

National administrative databases:

- Identification of Poor Households Programme: to identify poor households in rural areas in Cambodia to inform service providers. The program was led by the Ministry of Planning, in collaboration with the Ministry of Interior. There were two disability related questions.
- Commune Database: collected annually by village chiefs throughout the country on economic, social, environment and admin/security to support the sub-national planning process. The database is administered by the Ministry of Planning. It includes five questions on disability.

- Cambodia Mine / Explosive Remnants of War Victim Information System: collected and stored information on people with physical disabilities that resulted from mines or explosive remnants of war. It is administered by the Cambodian Mine Action and Victim Assistance Authority. The system recruited data collectors in communities throughout the country. Information is collected and updated annually.

Other data sources with limited coverage or disability components:

- Cambodia Childhood Disability Survey: conducted in 2011 in selected districts in seven out of 25 provinces on children aged 2-9 years old. It included 10 screening questions to identify children with disabilities.
- UNICEF Social Service Mapping Tools: employed focused group discussion methodologies to identify the most vulnerable families, including households having children with disabilities, in six provinces.
- Education Management Information System: records basic information of schools, staff, facilities and students. Information on students with different types of disabilities is also included.

These surveys produced different figures on the prevalence of disability in Cambodia as below (Hasan, 2014; National Institute of Statistics, 2013, 2014; Secretariat of Disability Action Council, 2012):

- CSES: 4% in 2004, 8.1% in 2009 and 4% in 2013
- CCPS: 1.4% in 2008, 2.1% in 2013
- CDHS: the result of 2014 CDHS is not available yet, the 2010 version revealed 1.7% of the population as having physical impairment
- The Commune Database: 0.59% in 2011

In addition, the three nationwide surveys (CCPS, CSES, CDHS) have different classifications for long term impairments (Hasan, 2014):

- CCPS: seeing, speech, hearing, movement, mental retardation, mental illness, others

- CSES: seeing difficulties, hearing difficulties, speaking difficulties, feeling difficulties, psychological difficulties (strange behaviours), learning difficulties, fits, others
- CDHS: problem of vision, problem of hearing, problem of walking/climbing, problem of remembering or concentrating, problem of self-care, problem of communicating

Although these surveys provide nationwide disability statistics, they are still limited in terms of information about disability. Only basic types of long term impairments could be disaggregated from the data sources. At the same time, almost all surveys and administrative databases included only information on individual characteristics without information on environmental factors. For example, the CCPS had no further information on severities or causes (such as traffic accidents). The CSES included this information in addition to a question on participation of people with long term impairments in education, housing land ownership, employment, health services and transport (Hasan, 2014). In addition, the latest 2014 CDHS consisted of six Washington Group questions to identify functional issues rather than only impairments (Am & Nguon, 2014).

In addition to ongoing data collection systems on disability, the Ministry of Social Affairs, Veterans and Youth (MoSVY) also started to issue its ID Poor Equity Card to persons with disabilities and process its nationwide registration system in commune levels (Am & Nguon, 2014). At the same time, WHO also introduced its pilot project on the Model Disability survey to gather contextual information on the lives of persons with disabilities (Am & Nguon, 2014). The survey provided much more comprehensive information on the environmental factors, and compared CCPS, CSES, CDHS, but with its limited scope of two provinces (Hasan, 2014).

Upcoming results from the national registration system through the ID Poor Equity Card, the 2014 CDHS and the WHO pilot study will provide much more comprehensive information on persons with disabilities, especially on the environmental barriers of persons with disabilities, not limited to the description of their long term impairments.

Hasan (2014) concluded that Physical Rehabilitation Centre (PRC) databases provide more comprehensive information on persons with long term impairments,

including causes. They are the only available databases that include information on road crashes. It was therefore decided that these PRC databases are useful for this PhD study.

PRC Data Management

There are 11 Physical Rehabilitation Centres in Cambodia, managed by five organisations. Two of them (Siem Reap and Takeo) are currently under the control of the government ministry, while the others are managed by four non-governmental organisations. Most of the centres started providing physical rehabilitation services to their clients (persons with disabilities) between 1990 and 1993.

Each organisation has set up its own patient management system, which is a computerised program for patient registration. Although each centre has its own database to record all clients when they registered for the services, those that are under the same organisation use the same patient management computerised program. For example, the centres in Phnom Penh, Kampong Chhnang and Battambang are under the management of Cambodia Trust (a non-governmental organisation) and have the same computerised program. In general, the objective of the PRC registration database is to facilitate the registration, provide follow up information for their clients and services, and serve as a tool to measure their annual progress in the centres.

In general, persons with disabilities were referred to PRCs for physical rehabilitation services through health facilities after their hospital discharges. Additionally, some of them were identified by their local authorities, PRC outreach staff or other NGO staff who worked in communities. Every client was interviewed on their first visit at the centre to register and to be assessed for service provisions. The registration database included the patient's personal details and medical information.

PRCs that are under the management of the four NGOs transferred their raw data to their head offices in Phnom Penh, where a summary table is produced semi-annually and submitted to the Persons with Disabilities Foundation (PWDF). The summary tables are then combined by a team in PWDF to produce a national figure. The summary includes only the numbers of patients in each centre with limited disaggregated information. The two PRCs in Siem Reap and Takeo submitted their

summary tables to the PWDF directly, as they are currently under the PWDF's management. Summary tables were produced for data from other PRCs and submitted to the PWDF semi-annually and annually.

In 2013, raw data from all 11 PRCs were provided for the study by the four NGOs and two PRC managers in Siem Reap and Takeo. Some of the data files were in SPSS format, while others were in MS Excel format. Official approvals were granted to the researcher by representatives of all centres to access their de-identified data.

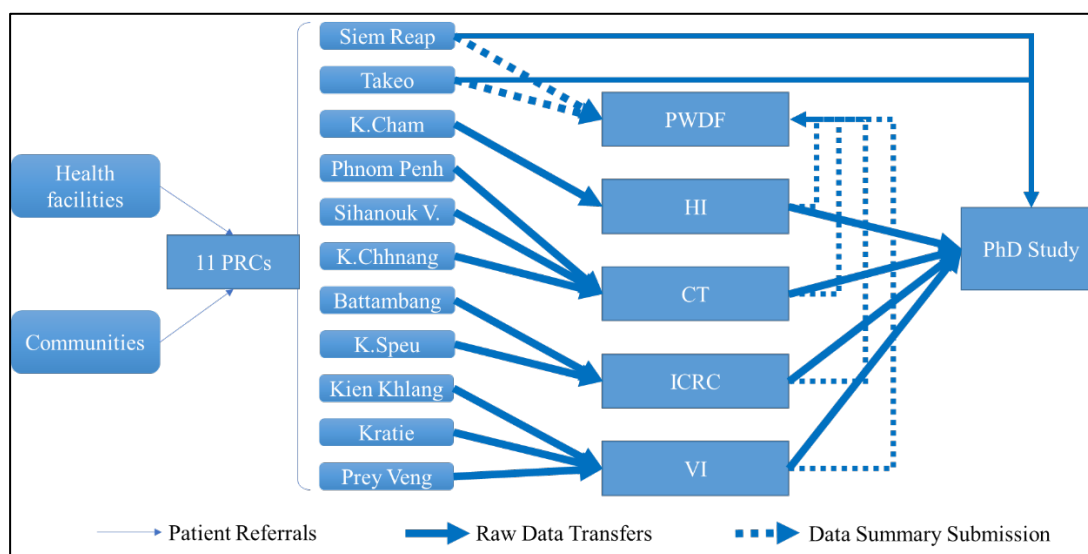


Figure A8.1: PRC Data Flows

Completeness of Coverage

The PRCs are located in nine provincial towns and the capital city, as shown in Figure A8.2. Although the databases are based in their centres in those 10 out of 24 provincial towns and in the capital city, the coverage areas of the services extend throughout the country. The databases in those PRCs include only those clients who visited their centres to access physical rehabilitation services. Persons with disabilities who have never accessed the services are not included in the PRC databases.

impairments (National Institute of Statistics et al., 2011). At the same time, it is important to note that there might be duplicated records among PRC databases, as a person with disability might access the services of more than one PRC (Hasan, 2014).

Information Collected and its Quality

The PRC databases record the personal information of clients and the medical/physical services provided (Hasan, 2014). However, data were provided to the researcher in different formats and scopes of information. Therefore, only variables that were included in all data files were abstracted for the study by the researcher. Then, the values of each variable were compared, classified and recoded from string to numeric. Finally, the 11 data files were merged into a single file for analysis by the researcher.

As summarised in Table A3.18, in Appendix 3, there were 10 variables that were abstracted from the PRC data files, which were merged into a single file in SPSS format. The PRC data recorded more than 90% of their clients on registration, age, gender, types of impairments and location of residence. The other three variables were entered fairly well (between 60% to almost 80% of clients), including causes of impairments, occupations at the time of registration and living areas (rural/urban). Less than 50% of the data provided information on the year of impairments and provinces where injuries occurred.

Appendix 10: **Quotes from the Primary Participants (I) and (II)**

Compensation and Power of Bargaining

I think it (compensation) was not fair. At the beginning, I did not know that I would become disabled. In the hospital, I thought I would recover, but might take time. Then, after a while, we could understand from the doctor that I might not be able to walk. Then, I became hopeless. From month to month, there was no improvement. [BTB11, 38 years old, urban area, paraplegia]

They came to our house and tried to negotiate with us. We were kind and accepted their offer. So, we did not have any official application to the police at all. We just closed the case among us. [Kchh02, 24 years old, urban area, amputee]

Hit and Run Cases

The car dragged me over for around 375m... The car that hit me run away. Police came to ask around 1million riels from me to investigate that car, but finally, they could not find. Actually the licence plate of the car was attached with my motorbike. So, the car driver was not held responsible for anything at all. I did not receive any compensation at all. [KSP02, 50 years old, rural area, functional limitation]

Drink Driving

I heard that if you drink, don't drive. ...Yes, I drank too.... Yes, I regret too. Someone told me not to drive, but I just drove. [BTB03, 45 years old, rural area, functional limitation]

Yes, just one-two glasses of SRA THNAM⁹, I told him (driver) to pay attention, and he said it should be fine, but when we were in the middle of the road, the car also arrived and hit us. [BTB06, 55 years old, rural area, functional limitation]

I think if we drink a little, we still could control ourselves, if we drink a lot, we could not control, it made us losing our concentration, we could only see things in small, seems nothing in front of us, wanted to drive fast... If someone gets used to drinking, they could drink a lot, and still fine (to drive), but because I could not drink well, after one or two cans, I am drunk. [SR01, 21 years old, urban area, paraplegia]

If we drink only one or two glasses, it should be fine, but when we drink more, we could not control our driving, we could not feel how fast it is.... I think it will depend on

⁹ Locally produced wine, with different ways of production and levels of alcohol concentration.

how good person is in drinking, such as me, if I drink two cans, I am bit "soft", as I am not as good as other, If others that are so good in drinking, or called old snake, they drink four-five cans and they are still fine. But me, only two cans, I feel a bit drunk. [BTB07, 42 years old, urban area, functional limitation]

Belief in Karma

When I was so miserable, I thought and considered it as our Karma, to release our stress. [TB02, 35 years old, rural area, amputee]

If we are based on Buddha words, this is our fate, we got it, it is our Karma, we got it. Beside this, this accident occurred because of driver's carelessness and they just enjoy with materialism, new car, new motorbike and they tested it. They never care about the others life.... [BTB04, 60 years old, rural area, functional limitation]

I believe in Karma too, I think I might do bad things in my previous life.... I talked with other persons with disabilities too. We have met difficulties, but now, we got used and we think it probably because of our Karma. Just let it goes and we just need to accept it. [BTB14, 32 years old, rural area, paraplegia]

Some people said that it was Karma, but I actually don't think I did bad thing to create any Karma. [BTB06, 55 years old, rural area, functional limitation]

I told them that I did not do anything wrong but it (crash) was due to a natural cause as I could not foresee and no one could avoid it. [PP07, 43 years old, urban area, tetraplegia]

Belief in Blackspot

(Asked about blackspot) Yes, I think so, as there are accidents there every year. Crashes happened there so often.... I think someone (ghost) waited there to take more people to death. [BTB02, 60 years old, rural area, functional limitation]

I do not believe much about spirit/blackspot...I focused on human behaviour, careless, alcohol, sleepiness, as we can see, along the roads, crashes could happen anywhere.... I do not think ghosts could touch and move our cars. [BTB11, 38 years old, urban area, paraplegia]

Belief in Involvement of Spirits/Ghosts

I also believed in some spiritual belief, I did not respect/prepare well for my spiritual teacher...My spiritual teacher, requested me to prepare stuff at home (for worship), but I did not. It was required to re-arrange for every one-two years, throwing away the old version, and preparing the new version, but I did not do.... I was (spiritually) reminded, but I only

focused on generating income to build my new house, and then, I had the crash. [BTB04, 60 years old, rural area, amputee]

It was (spiritually) prohibited to transport a turtle in a car... The man sat on the turtle died (in the crash). [Wife of PS03, 50 years old, rural area, paraplegia]

Fortune Tellers and Road Crash Prediction

I was told (by a fortune teller) that I should not go to that direction (at the time of his crash) as it was not fortunate for me at that time at that direction. [KCham05, 34 years old, rural area, amputee]

My parents went there (to a fortune teller) and they warned me not to go out much....but, because it is our business.... I needed to travel along the road for living. [PP03, 24 years old, urban area, amputee]

Preventive Measures

When I had this bad dream, I was scared to go to a fortune teller. I told my mother too...she advised me to Sroch Terk.... I did not want...Yes, (finally) I did before the crash. [BTB09, 32 years old, rural area, tetraplegia]

I didn't wear a helmet. My head was just little bit injured, not much....Usually, I don't wear a helmet, because I just travelled in a short distance, from my house to working areas. If we travelled in a far distance, we wear, such as going to provinces. [KCham03, 30 years old, rural area, amputee]

Limited Coverage of the National Emergency Number and First Aid

...we didn't (call for an ambulance) because we were very nervous (because of injury) and it was around 9 or 10pm. We did not know phone number of any ambulance. [KCham05, 34 years old, rural area, amputee]

I was not unconscious, but I could not talk. Some people stepped on my legs, and tried to straighten my shoulder up, then, I could breathe. Since then, I became weaken, sometime my back gets hurt, sometime, my laps get hurt. I was carried by someone – on his back – to my house. [BTB01, 50 years old, rural area, functional limitation]

Inappropriate Transportation

Right after the crash, I was not unconscious, but could not move my legs and arms, I still could talk, I did not feel so much hurt. But, when I was carried up (to the hospital), my neck was bit bent, I suddenly felt so hurt. My colleague carried / moved me quickly to put me up on a truck (2tonne-truck). I kept telling my friend that it was so hurt. [BB09, 32 years old, tetraplegia, rural area]

Somebody helped to transport me to Sala Lerk 5 hospital, by a motorbike, just right after the crash. [KChhn02, 24 years old, amputee, urban area]

I was transported to the Emergency hospital, by a motorbike. I was a passenger, sat in the middle of the motorbike, between another passenger and the motorbike driver.... When I sat on the motorbike (to transport to hospital), I felt so much hurt at that moment. [BTB12, 33 years old, rural area, paraplegia]

I was transported by a motorbike, a passenger carried me and put me in the middle. I told him that do not touch my neck... [PS01, 43 years old, rural area, tetraplegia]

It was not a professional ambulance, it just a vehicle that is used in the area to transport patients. [KSP02, 50 years old, rural area, functional limitation]

I waited for around two hours, they asked us if we have money or not, if it was more severe, I would die already. The crash happened at 3pm, and the ambulance arrived around 5pm. They stressed the need for us to have money. [TB05, 27 years old, urban area, tetraplegia]

Post-Crash Care

The crash was around 5-6pm, I was first transported by a cow cart to my house, in the evening, and I was put on a heated platform¹⁰. Then, at night they transported me to the provincial hospital in Pursat. [PS04, 45 years old, rural area, paraplegia]

I decided to go to Vietnam, left Calmette hospital one day after the operation, because we saw that the staff did not take care of me well. So, my parents hired a passenger car to transport me to Vietnam. [PP03, 24 years old, urban area, amputee]

Because I was transferred so late to the hospital (so many transferred from one to another) doctors could not reconnect my broken vessels. If I was transferred to the (last) hospital on time, my vessels could be reconnected, but I was transferred from one hospital to another, so it was too late. I tried to seek for support from doctor to reconnect, but it still did not work and my leg was finally amputated. [PP02, 26 years old, urban area, amputee]

Doctor requested to amputate my leg. My mother did not agree, so then, I was transferred further to Lork Sang Hospital. [KCham03, 30 years old, rural area, amputee]

¹⁰ A heated platform to put a patient on to heal the injuries or to discharge any spirit possession. Under the platform, there is smoke or a fire to keep the platform hot.

I just stayed around one hour in provincial hospital, before sending to Phnom Penh. We kept asking them, and finally they said they could not treat us. [KCham01, 60 years old, urban area, amputee]

When he stayed in the hospital, we paid for everything, every single of piece of material, we paid 160,000 riels every day (USD40). The hospital did not provide any free material at all. I wondered why I had to pay for everything in this kind of public hospital. I also needed to pay for extra-attention / care to four nurses there when they came to clean his wound (a total \$5/day). [Wife of KSP02, 50 years old, rural area, functional limitation]

I was just kept in the Emergency Room, without proper treatment. I was bleeding till the morning – almost no remaining blood in my body. Doctors said they waited until seeing my parents, who were in a province. They arrived at around 7am next morning. Then, doctors started to provide treatment. Hospital team put bandage around my leg, but it can't fully stop bleeding. It probably because I was bleeding too much, so I was not recommended to be sent to VN. [PP01, 30 years old, urban area, amputee]

His ankle was completely broken. When we transferred our son to Calmette hospital, the doctor/nurse kept our son for a while, until I managed to get some money and pay for the treatment. [Mother of KChhn01, 20 years old, rural area, amputee]

Experiences with Traditional Healers

That time, I actually wanted to send him to a Khmer traditional healer. If he did, perhaps, his leg could be re-connected. [Wife of SR03, 45 years old, rural area, amputee]

At the time of the discharge, the doctor inserted a metal piece in my hand (to re-connect). It made me hurt and I took it out before the appointment, and went to the traditional healer. Finally, it was not properly recovered. ...if I followed the advice from the doctor, my hand would be fully recovered. [BTB06, 55 years old, rural area, functional limitation]

...no, not at all....(why not?) it was a serious injury, and it was at night, it was difficult to find a traditional healer, I also knew that I should not go to a traditional healer, as my leg had to be amputated, so, I just decided to have it amputated. [PP04, 55 years old, urban area, amputee]

...the healer ensured me that he could heal my leg and yes, finally it was healed. [BTB02, 60 years old, rural area, functional limitation]

I stayed at the Calmette hospital, and then went to a traditional healer. Because the traditional healer was not good, I then was transferred to Sihanouk Hospital. [KChh01, 20 years old, amputee, rural area]

The doctor requested to cut his leg. I did not want, so I sent him to a traditional healer. I heard that young children as him might be treated well by a traditional healer. But, the healer did not treat him well – get worse – in the injured part. There were some worms. So, I returned him to another hospital – Sihanouk, to have his leg amputated. [Mother of KChh01, 20 years old, rural area, amputee]

...that organisation did not believe in Krou Khmer (Khmer traditional healer). Because they paid for the treatment, we followed their advice. Actually, Krou Khmer is very good. Krou Khmer is able to re-connect this kind of leg. [Father of SR02, 25 years old, rural area, amputee]

I also asked a traditional healer to help me, after discharging from the Spinal Cord Injury Centre. My dad took him here every morning. He did some kind of praying (Sdos) and give me a type of oil to apply on my legs/hands. He came for more than a month. He said, if I was just recently injured, he could help me, but because it was a long time ago, he could not help much. He is good to help people when they only have broken legs or arms. [BTB09, 32 years old, rural area, tetraplegia]

Benefits and Side Effect of Insurance Services

It was not fair to me. They said, if I died, it would be better, because they would need to pay around USD1,000 only. [PP05, 32 years old, urban area, amputee]

The insurance company paid around \$2000-3000 (to hospital for his treatment), and then provided final compensation.... Without the insurance, it might be difficult for me to claim for compensation. [PP01, 30 years old, urban area, amputee]

Impacts on Physical Well-being

...I cannot bear it and cannot say anything. I want to squeeze it but I do not know where I should squeeze it. I know I feel painful on my leg, but I do not know where exactly I had it. [PP06, 33 years old, urban area, amputee]

I found it hard to defecate. ... I find it hard to sit and I don't dare to eat much, so I do not have more strength...I could eat a lot around three or four times a day. But now, I have meal one or two times a day. I feel hungry but I hesitate (to ask her for help) because my mother is old now. [BTB13, 42 years old, rural area, tetraplegia] His mother is around 70 years old, and has an amputation due to a land mine explosion.

Yes, I take some medication to reduce pain – I bought it from a pharmacy in the market. I did not tell them that I had a problem with my (impaired) hand, because I felt ashamed, I just told that I was not well. [BTB06, 55 years old, rural area, functional limitation]

We buy medicines at Tnol Tor Teng (local pharmacy)... we ask others to buy for us and tell them we feel fever or flu.... There are doctors in the village health centre, but when we take their medicines, we are not better. [Mother of BTB13, 42 years old, rural area, tetraplegia]

...I didn't take any medicine after the hospital discharge, as medicine was not effective. I kept doing exercise. I use this wheelchair every day, to do exercise by travelling around the village. [TB03, 37 years old, rural area, tetraplegia]

When I tried to get up for doing exercising, I felt dizzy, and so, I stopped. Now, I cannot move my legs at all, but my both hands are fine. I cannot get up to sit by myself. Because I have been lying on my bed so long (without exercising), so my back has become too hard to move, it is now just like a piece of log, it cannot move upwards or backwards. [TB05, 27 years old, urban area, tetraplegia]

At the beginning they (hands) were ok, but now they are not, I cannot move them normally, cannot feel things as before. Sometimes, my hands are so itchy. [TB04, 32 years old, rural area, paraplegia]

Impacts on Physical Well-being of Family Members

My mother took care of me at the hospital. She is a farmer. It was a farming season too. So, my mother needed to hire villagers to do farming. [KSP01, 30 years old, urban area, amputee]

We don't have any place to sleep at the hospital. We could rest under his bed. So, after several days, we needed to swap to have a good rest at home. So, his father and I went there (to swap). [Mother of TB01, 19 years old, rural area, amputee]

I went to take care of him at the hospital, but just sometimes only, as I needed to work for living too. We are so poor. So, I left him at hospital alone. [Father of SR02, 25 years old, rural area, functional limitation]

We met a lot of difficulty. When he was just injured, we had small kids, needed to take care of them, including our cows, pigs. I was so tired. My husband asked me to give up some work, but I did not want to – and kept going from month to month. [Wife of BTB01, 50 years old, rural area, functional limitation]

Impacts on Psychological Well-being

I felt useless. I wanted to commit suicide too. Then, when I got some counselling at PRC, I learnt that even though we are persons with disabilities, we should continue living as others. [KSP01, 30 years old, urban area, amputee]

Yes... they could walk, but I could not walk like other people. Then, people talked to me and asked why I wanted to commit suicide, there are other persons with disabilities too, even more severe than me, mostly people at the PRC. And here (vocational training school), people also say this. [TB01, 19 years old, rural area, amputee]

He tried to commit suicide several times. Last time, we called the police to come to talk to him.... When he wanted to kill himself, the police came and blamed me saying that it was because I did not take care of him well. Our son was waiting – watching him, at the river bank, to make sure that he did not kill himself. [Wife of PS02, 60 years old, rural area, paraplegia]

It was so difficult, I used to be able to earn income, but now, I cannot go out, and have become poor, how can I be happy. [BTB04, 60 years old, rural area, functional limitation]

They don't say anything, but I feel shame, I used to have a handsome body, but now, I cannot walk, I just look like an old man, it is difficult, [BTB08, 39 years old, rural area, paraplegia]

I felt I did not want to survive, I wanted to die. My parents kept explaining to me that there are other persons with disabilities who still continue to live. [SR01, 21 years old, urban area, paraplegia]

He still supervises us to do farming. [Daughter of BTB06, 55 years old, rural area, functional limitation]

We became disabled, single, we meet discrimination, it is difficult to find a partner to marry. Some relatives, neighbours used to have high hopes for us, they expected us to have a good income, good position, but now they have changed. [Father of PP01, 30 years old, urban area, amputee]

I have lived with him for four-five years, I look at him and I think he can never work. [Family member of BTB12, 33 years old, rural area, paraplegia]

I cannot take care of myself at all, including going to the toilet, having a bath. I need support all the time. [BTB09, 32 years old, rural area, tetraplegia]

I feel my (physical) strength is reduced, I cannot do any heavy work as before. (KChh03, 32 years old, rural area, amputee]

He is just like a big baby...more difficulty to take care than a normal baby. [Wife of PS01, 43 years old, rural area, tetraplegia]

I could not earn enough. Sometimes, I also lost my hope too, but because of the kids, I kept trying. At the beginning, I lost hope when my husband met such situation, I was so worried, but keep trying for the kids. [Wife of BTB12, 33 years old, rural area, paraplegia]

I might not be able to go to work, because he needs someone to take care of him. I am not sure what kind of job I will do. I am not sure when I will start to work, because he needs someone to take care of him. [Wife of BTB09, 32 years old, rural area, tetraplegia]

...it took two-three years to earn (to cover the cost), and I did not retain anything, as even my finger ring and watch also were lost at the accident scene. [BTB11, 38 years old, urban area, paraplegia]

Impacts on Economic Well-being

He stayed for 18 days. It cost us USD2,000-3,000. Then, we did not have any money left and we needed to bring him back home. We collected this money from our relatives around and borrowed from others. Now, he cannot pay back the debt. [Mother of BTB13, 42 years old, rural area, tetraplegia]

My family met difficulties, needed to spend a lot of money for my treatment, they borrowed money from others – now they needed to pay back the debt. I am not sure when they could fully pay the debt.

My wife worked in the farm with my kids, we also borrowed money. We also sold 4Ha land, and one house, to pay the debt. We just became better during the last two-three years. Both children are construction workers, work together. [PS04, 45 years old, rural area, paraplegia]

It is difficult when we can't do anything, the income is not sufficient. It is difficult for us; we are getting poorer, not richer. [BTB04, 60 years old, rural area, functional limitation]

Loss of Social Well-being

My wife's brother knew that I had the spinal cord injury, so he knew what would happen to me. Just one week later, they knew that I could not be fully recovered. My wife did not take care of me well.... She left me...[PP07, 43 years old, urban area, tetraplegia]

I had three children and she took all the children. Then when she sold the cows, she also took all the money. [TB03, 37 years old, rural area, tetraplegia]

Before crash, I was a student in Grade 9.... After the crash, I dropped school, as I felt a shame in front of my friends.... I did not want to communicate much with friends, when they asked me to join them (visit / party) I could not attend as before...I could not travel, and

also because the classroom were not on the ground floor. [SR01, 21 years old, urban area, paraplegia]

I wished to learn in the University of Health, I want to be a doctor. Because I become disabled, it is difficult to move, even patients feel disturbance to see me moving with the wheelchair. [SR01, 21 years old, urban area, paraplegia]

...yes, I still could do those tasks, they are just administration tasks, not difficult at all. ...if someone else with higher power and network, he would be able to stay in the position. Administration tasks are not difficult... So far, I felt disappointed; I had been doing hard work. [KCham02, 54 years old, urban area, amputee]

Before, he earned a living and supported the family and now I do it. [Wife of KCham05, 34 years old, rural area, amputee]

...people did not listen to us as much as before. When we have strong legs and shoulders we have some power when we talk, but with such legs, they lost their confidence on us. When I asked you to do, you should be able to do it, if you don't do, I would be able to do by myself. Now, when we asked them to do, they did not do, we also could not do, because we became weaker. It hurt our feeling. But, we tried to eliminate to reduce it. [KChh04, 64 years old, urban area, amputee]

Before the crash, my wife just stayed at home and worked around home. After the crash, she needed to go out for the construction work. She has got this job for around two years. [BTB03, 45 years old, rural area, functional limitation]

I don't pay much attention (on people in communities), I don't care, just let them talk, I just focused on our earning. When we had enough to eat, they kept contacting us, but when we become poor, they have not contacted us much... They did not talk with us as much as before [Wife of KCham05, 34 years old, rural area, amputation]

After we left the hospital, I usually met Mr Tork and told him that I would sell our land and house and then buy a pair of buffaloes and cart. Then I lifted my husband up on the cart and lived in the mountain as I felt so shamed.... [Wife of PS03, 50 years old, rural area, paraplegia]

Impacts on Children

When he was injured, I stayed with him at the hospital, left my home and kids. My oldest daughter also helped me to take care of him too. She left her work from the factory to help me. So, we shifted with each other. We took care of him every day, including washing, eating... He could not do anything. [Wife of KSP02, 50 years old, rural area, functional limitation]

Before crash, only I earned for the family. Now, I could not earn at all, and my wife started to earn, my kid also dropped out of school and start to work. She has moved to live with my sibling. [BTB08, 39 years old, rural area, functional limitation]

I used to be a person, who has good respect (from people around). Now, I became less, and all my kids need to find jobs. I used to be able earn enough to support the family and they only went to school. I have five kids, three of them had to drop out of school to get a job. [KSP02, 50 years old, rural area, functional limitation]

Experiencing Societal and Environmental Barriers

Some said I am disabled, could not do anything, they said if they were me, they would choose to die, it is a burden to others. When they were angry with me, they released those words to me. [PP07, 43 years old, urban area, tetraplegia]

If I don't know them, I feel fine. People (I know) keep looking at me, so, I felt a shame, such as someone I met sometimes. [KCham04, 23 years old, rural area, amputee]

I don't like when people look up and down on me when they see me walking with my legs. The way they look at me made me uncomfortable. Usually, when I walk out, people keep looking me in such way, especially those who don't know me. For those who know me well, they don't look at me this way anymore, so, I feel ok with them. I also feel comfortable to go with other persons with disabilities. [KChh01, 20 years old, rural area, amputee]

Mostly, when I meet older people that they do not know about this, they ask me whether I can walk or not and ask me to walk in front of them.....It affects me and I do not like that. [KCham03, 30 years old, rural area, amputee]

Although I think I can still do some work well, but the company still think that I could not and they are afraid that their clients might also don't want to have a disabled security guard. [PP01, 30 years old, urban area, amputee]

When they (his relatives) celebrated ceremonies or weddings, and saw me in such condition, they felt ashamed of me. [PP07, 43 years old, urban area, tetraplegia]

When we have strong legs and shoulders, they keep their contact with us, for example, 10 of them. However, when we do not have any more, only five-six keep their relationship with us. [KChh04, 64 years old, urban area, amputee]

They said disabled person could not work, could not earn for living, and could not take care of their daughter (his girlfriend). I felt disappointed. Then, I applied for this vocational training. [TB01, 19 years old, rural area, amputee]

Yes, there is discrimination, they looked down on me, on my capability, as I become disabled. They used some bad words to me. Especially, when I could not earn any income, could not find a job, just stayed at home...So far, I managed to do as good as others.... Nobody looks down on me anymore. [PP05, 32 years old, urban area, amputee]

I observe that people don't discriminate us when we have our own money to pay things we want, when I have such (expensive) wheelchair, they think I am in a good living standard family. ...If we are poor, no proper clothes, they don't talk to us. I observe that people in Cambodia value our property/money that we have. If we have, they still keep talking with us, having party together. They discriminate when we are poor. [PP07, 43 years old, urban area, tetraplegia]

Our relatives could not help us as they are also poor. They felt pity for us. Neighbours also felt pity of us. But they could not financially support us. [TB01, 19 years old, rural area, amputee]

My relatives brought me to visit a place, I went there with him, but I could not join them for lunch, as I could not sit, so I sat separately, as I needed to sit with my leg straight on the floor. [BTB03, 45 years old, rural area, functional limitation]

The salary here is a little, but we don't have any other choices, so, we just keep working here, especially, it is easy because of ramps, and toilets. If I go to work in other places, it might be difficult. It would be good if they arrange for me (as in this place). [BTB11, 38 years old, urban area, tetraplegia]

Before the crash, I could participate with them, but now, I could not participate. They asked me to participate, but I felt a shame, so, I did not participate. [KCham04, 23 years old, rural area, amputee]

I still need to worry for my battery – not enough energy for travelling a long distance. The charger is so heavy, so I could not bring it with me. I used to lose the charge along the road, and I called my relative to help me back home. [PP07, 43 years old, urban area, tetraplegia]

When I arrived home, after leaving the PRC, I still could not walk, it was hurt. Then, step by step, I could walk with it. Before having the prosthesis, I just stayed at home, look after my cows. [KCham05, 34 years old, rural area, amputee]

I stayed for one week to practise this limp at the PRC. Then, I spent around four-five months to get fully used of this limp. [Kchh01, 20 years old, rural area, amputee]

At the beginning, I just went there one time, and the prosthesis fit me well. Now, I went three-four times to get it fit. I just visited there in around September. [PP05, 32 years old, urban area, amputee]

If I walk for a long distance, I start to feel hot, after just 5-10m of walking. If I continued, it would get burned. [KCham01, 60 years old, urban area, amputee]

I have a freedom because of this motorbike. Now, I could travel to anywhere I want such as market, sport club, my relative's houses. [BTB14, 32 years old, rural area, paraplegia]

I could not go as I want, I needed someone to pick me up. I participate in an event if it is around here, not far, as I could not drive motorbike, as I don't have transportation. If there is a transportation, I can go, but still a bit difficult, as I could not bend my leg. [BTB03, 45 years old, rural area, functional limitation]

I found it (driving) more difficult, compared to before the crash. So far, I still could drive motorbike – but slower and use my hand brake. [PP01, 30 years old, urban area, amputee]

I think I still can drive a motorbike, but I don't want to do it now, as I still have a feeling of fear. [PP02, 26 years old, urban area, amputee]

Before the crash I liked playing football. Then, (after the crash) I can't, but I played volleyball. [PP06, 33 years old, urban area, amputee]

After the crash, I attended a vocational course, for around one year, on how to repair machinery, such as car, tractor ... I did try to work for around four-five months. But, after that, I could not work, because moving that spare part of the machinery was too heavy for me. [PP05, 32 years old, urban area, amputee]

Teacher use such bad words to me, because I became disabled. He did not use those words to other students because they are not disabled. [KChh02, 24 years old, urban area, amputee]