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**Road traffic injuries in Namibia. A mixed methods study to analyse the trends in mortality and morbidity due to road crashes, and to investigate the long-term effects of road injuries.**

**Mitchel Chatukuta**

**Supervisors: Professor Nora Groce, Dr Maria Kett, and Professor Jennifer Mindell**

**Thesis submitted for the degree of Doctor of Philosophy in Epidemiology and Public Health**

Research Department of Epidemiology and Public Health

University College London



## **Declaration of originality**

I (Mitchel Chatukuta) confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

## Acknowledgements

First and foremost, I would like to praise God, who makes everything in my life possible.

To my supervisors Norah Groce, Maria Kett, and Jenny Mindell, thank you for the unwavering support and dedication. This thesis has been a journey and your guidance and mentoring has been appreciated so much. Thank you for sharing your wisdom and knowledge with me and helping me to grow not only academically but wholly. Thank you so much to my primary supervisor Nora for seeing potential in me and giving me this wonderful opportunity and for your unwavering support. Thank you so much Dr Scholes for your wiz assistance in Stata – it greatly helped me when I was stuck.

To my Mum, I love you so much and you are my greatest inspiration and my fortress. Thank you for being always there at all times. Thank you to my whole family for your love and respect. A big thank you to my beautiful family of friends especially Michael M, Ron, Patrick, Nabukenya, Taurai, Michael T, Lin, Peter, Chenge, Duncan for being there for me throughout this journey. To Patrick Walker, thank you so much for being a best friend and an anchor.

Thank you to the MVAf for making the quantitative data available. A special thank you to all the people that participated in the research. Your voices and experiences made this research. Last but not least, I would like to dedicate this research to the many millions of people across the world who have been affected by road injuries.

## **Abstract**

*Background:* Road traffic injuries (RTIs) are a major problem worldwide. In this mixed-methods thesis I investigated the trend of RTIs in Namibia, which is one of the worst affected countries globally. I also investigated the long-term impacts of RTIs and the role of a fuel levy fund - The Motor Vehicle Accident Fund (MVAF) - in enhancing the availability of rehabilitation and counselling services to RTI survivors in Namibia.

*Methods:* Using quantitative methods, I conducted analysis of data sets on RTIs from 2012 to 2014. Descriptive analysis was used to characterise crashes, injuries and deaths, and people affected. Further to this, I conducted multinomial logistic regression in order to investigate the likelihood of having been injured or killed. Using qualitative methods, I conducted semi-structured interviews with RTI survivors in Namibia, and healthcare workers involved in caring for them, in order to investigate the long-term impacts of RTIs and the availability of rehabilitation and counselling services to road injury survivors in Namibia and the role played by the MVAF.

*Results:* The quantitative analysis showed over 2012-2014, the rates of injury and death had risen by 3.9% and 1.1%. Logistic regression identified the road user group had the greatest influence on the risk of being injured and killed. The method of transportation to hospital had the greatest influence on the risk of dying among those admitted to hospital. The qualitative analysis showed that RTIs are associated with long-term physical and mental health sequelae, financial hardships, and various social problems. The analysis also showed the MVAF is effectively helping to enhance access to rehabilitation and other health services for RTI survivors.

*Conclusion:* The present study adds to the knowledge of the long-term impact of RTIs and presents new information from Namibia, where no previous studies of this kind have been done.

## Impact Statement

RTIs are a major global public health challenge and leading cause of death, injury and long-term disability worldwide. However they are neglected and in many countries there is a lack of accurate data on their long-term consequences, information which is essential in facilitating the design of appropriate strategies to assist victims. Sub-Saharan Africa (SSA) is the worst affected global region. Literature indicates that in most countries in SSA, motor vehicle third-party liability (MTPL) insurance is used to pay for the health care costs of those injured in crashes, otherwise they have to pay for the costs themselves. However MTPL has been reported to be problematic in various countries and it has been reported that consequently many people are unable to access adequate medical care and rehabilitation following road injury. This limits their chances of reaching the best optimum functional lives following injury, and increases their vulnerability to developing lifelong disability.

In comparison, Namibia is one of the few countries in SSA that has developed a motor vehicle insurance system funded on a fuel levy. Statistics to be presented in the next sections will show how road injuries in Namibia had worsened at concerning rates. Review of literature also showed that similar to other Lower and Middle Income Countries (LMICs), there had been scarce research on RTIs in Namibia, with no published literature found on the long-term impacts of RTIs. This research uses mixed methods to study the impacts of RTIs to those affected in Namibia and to determine how beneficial the fuel levy insurance was to injury victims. To my knowledge, this was the first study to perform logistic regression analysis to investigate vulnerability of different road user groups in Namibia.

This new evidence adds to the knowledge on RTIs in Namibia and presents new information which can be of use to policymakers in terms of formulating policies to protect groups identified to be more vulnerable. This study was also to my knowledge the first to investigate the long-term impact of injuries - of any kind - in Namibia. Thus, not only does this research help to reduce the knowledge gap on RTIs in Namibia, but it also provides greater understanding of how RTIs impacted on people's lives in Namibia, a LMIC setting, with a different socio-economic and geo-political context to HICs, in which the majority of previous research of this type had been done. I anticipated the information on the fuel levy would be of benefit to other countries in SSA which still have MTPL. I anticipated that in-depth findings from a LMIC could lead to formulations of recommendations to be presented in journal articles and at road safety conferences which could be used by policy makers, academics, public health officials, healthcare workers (HCWs), and civil organisations, in terms of injury prevention and assisting injury victims in regaining independence and building new lives. I also anticipated that these recommendations could also be applicable to countries with similar contexts in SSA and the rest of the world.

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## **Glossary**

AfDB:	African Development Bank
AIDS:	Acquired Immune Deficiency Syndrome
ART:	Antiretroviral therapy
DALYs:	Disability adjusted life years
DPO:	Disable People's Organisation
EMC:	Emergency care
ESC:	Electronic stability control
GDP:	Gross Domestic Product
GRSP:	Global Road Safety Partnership
GNI:	Gross National Income
HCWs:	Health care workers
HICs:	High Income Countries
HIV:	Human Immunodeficiency Virus
Km/hr:	Kilometres per hour
LMICs:	Lower and Middle Income Countries
MIC:	Middle Income Country
MoHSS:	Namibia Ministry of Health and Social Services
MVAf:	Motor Vehicle Accident Fund of Namibia
MDGs:	Millennium Development Goals
MTPL:	Motor vehicle third-party liability insurance
NAPPD:	Namibian Association of People with Physical Disabilities
NCDs:	Non-communicable diseases
NFPDN:	National Federation of People with Disabilities in Namibia
NGO:	Non-governmental organisation
NPC:	National Planning Commission
NRSC:	National Road Safety Council of Namibia
NSA:	Namibia Statistics Agency
PTSD:	Post-traumatic Stress Disorder
RA:	Roads Authority of Namibia

RDR:	Road danger reduction
RTI:	Road Traffic Injury
RTC:	Road Traffic crash
SADC:	Southern African Development Community
SDGs:	Sustainable Development Goals
SSA:	Sub-Saharan Africa
SUV:	Sports utility vehicle
TAC:	Transport Accident Commission
TB:	Tuberculosis
OT:	Occupational Therapist
UMIC:	Upper Middle Income Country
UK:	United Kingdom
US:	United States
UN:	United Nations
UNICEF:	United Nations Children's Fund
UNGA:	United Nations General Assembly
UNDP:	United Nations Development Program
WHO:	World Health Organisation
VCT:	Vocational Retraining Centre

## 1.0 INTRODUCTION

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### 1.1 CONTEXT

Road traffic injuries (RTIs) have dramatically increased and are now a major problem worldwide, greatly contributing to the burden of deaths and injuries. Sub-Saharan Africa (SSA) is the worst affected region globally, with many people sustaining injuries that leave them with permanent impairment and disability (WHO, 2015a). However, due to a lack of research in SSA, a comprehensive understanding of the impact of RTI on society at a national level is largely missing, there is uncertainty as to the numbers of people involved, and what happens to the people who become injured and how their injuries impact on their lives over time (Naghavi et al, 2009; Sharma, 2008). There is also lack of clarity as to what levels of support they receive following these injuries in terms of accessing health care including post-trauma, rehabilitation and psychological as well as social support, particularly in cases where they are unable to return to their previous employment because of the resulting disabilities (Christian et al, 2011). Based on extensive research findings it is accepted that in SSA and other lower and middle income countries (LMICs), lower socio-economic groups are the worst affected by RTIs because the modes of travel they use expose them to greater vulnerability than those from higher income groups (WHO, 2015a). Moreover, in SSA most of those injured (from the lower income groups) do not have medical insurance and as such, in the event of injury are less likely to receive adequate care as they often have to pay out of pocket for medical care and rehabilitation, thus limiting the potential to recover to the best functional level.

In seeking an overview of the impact of RTIs at a national level, it is important to understand a range of issues. In order to do this, this thesis focuses on Namibia. This is because Namibia has one of the highest rates of RTIs globally. As a middle-income country (MIC) – it also provides insight into how lower income countries in SSA may evolve. Namibia is also of particular interest because it is one of five countries in SSA (the others being South Africa, Swaziland, Botswana and Lesotho) that have a system whereby a fuel tax levy Fund has been set up which is meant to provide support for road injury survivors in terms of funding for all medical costs, aids and appliances required, rehabilitation, and in the event of a serious injury, a lump sum payment and a caregiver allowance. In contrast, in most of the other countries in SSA, motor vehicle third-party liability (MTPL) insurance is used to pay for the health care costs of those injured in crashes, otherwise they have to pay for the costs themselves (World Bank, 2009). With MTPL, the injured survivors, including the driver, can claim compensation from the insurance company to settle for their treatment and personal expenditures related to the injury. However this system (MTPL) has been reported to be problematic in various countries and it has been reported that many people are unable to access adequate medical care and rehabilitation following a road injury (World Bank, 2009).

This study also explores the fuel tax levy Fund system in Namibia to establish if it is effective in providing for road injury survivors such that they are able access the health care they need to be restored to their optimum functional level. In order to understand the effectiveness of this Fund, this study examines not only the structure and funding mandates of this Fund, but includes in-depth interviews with individuals who have been recipients of such funding to understand their lived experiences of accessing care and support. It must be

noted however that the study is not a comparison of outcomes of those injured before the Fund was set up and those injured in the years after the Fund had been set up. I could not find any literature related to the fuel levy funds in the other five countries in SSA. Outside SSA, the Australian state of Victoria also operates a similar scheme called the Transport Accident Commission (TAC) which is funded through a levy on vehicle registrations in the state (Gabbe et al, 2014). The TAC provides compensation for treatment, rehabilitation, income replacement and long-term support for services for people injured in RTIs regardless of fault (Gabbe et al, 2014).

It is hoped that findings from this thesis will contribute to discussions about whether the current system is fit for purpose and whether it can serve as an important model to be replicated in other countries in SSA as well as in other LMIC settings. This study will also identify issues in the current MTPL and ask about how improvements can be made.

## **1.2 OUTLINE OF THE THESIS**

This thesis has been divided into eight chapters. The first chapter provides an overview of the problem and a country context, after the aims and objectives of the studies in section 1.3. The second chapter provides a prelude to the literature review and will give a global and regional (SSA) overview before focusing on Namibia itself. The third chapter is a review of literature on the factors associated with the higher burden of RTIs in Namibia and SSA, and what is known of the long-term health and socio-economic consequences. The fourth chapter presents the methods used in this thesis. After that, I present the results of the

quantitative study in the fifth chapter, followed by those of the qualitative study in the sixth chapter. The seventh chapter is the discussion, and includes discussion of result findings from both the quantitative and the qualitative studies. The report's conclusion is the eighth chapter and includes recommendations for changes to related current practice, and recommendations for future research.

### **1.3 AIM AND OBJECTIVES**

#### **Aim**

To use mixed methods to study the impacts of road travel injuries on those affected in Namibia and to determine how the fuel levy funded system titled the Motor Vehicle Accident Fund of Namibia (MVAFA) is affecting their lives.

#### **Objectives**

1. To review the relevant global and Namibian literature on death and injury patterns of RTIs and the effect of injuries on survivors of RTIs in order to establish an overview of the global, regional and national picture.
2. To ascertain the changes in rates of mortality and morbidity over the period (2012-2014), the regional distribution of injuries and deaths, and to identify the most vulnerable groups by age, gender and road user type.
3. To identify the pattern of injury types and severity due to RTIs.

4. To explore the long-term impact of road injury on people's lives and their experiences of accessing rehabilitation and psychologic/counselling services and to understand how the Motor Vehicle Accident Fund operates in its intended role of providing a safety net for those injured in RTIs.
5. To identify gaps and areas for future study especially as Namibia being a MIC might provide a road map for what is needed in a number of SSA countries as they transition from low to MICs over the coming decades.

#### **1.4 BACKGROUND**

For centuries, roads have served as a vital link for economic growth and development (Legarde, 2007). Rapid improvements in road transport have enabled many countries to successfully progress toward their development goals and as a result, transport is often one of the most highly funded sectors in development bank lending portfolios due to ongoing demand from borrowers as well as its role in stimulating economic growth and competitiveness (World Bank, 2014). Thus, roads have been long viewed by International and national development agencies as a key strategy for facilitating not only the economic growth and development of nations, but also improvements in the health and overall well-being of populations (World Bank, 2014).

Establishing reliable road infrastructure can enhance economic and social development in various ways. Within countries, road infrastructure connects remote areas with centres of



trade and also connects centres of industry to global markets, thereby spurring the growth of trade and reducing costs by improving access to goods and services as well as providing for the transport of essential goods (Kessides et al, 2010). Countries that have high-quality road infrastructure, and are therefore able to facilitate efficient logistics, attract greater amounts of direct foreign investments (World Bank, 2014). The extension of new road networks can also lead to the construction of new development projects which draw new businesses into that area, thereby creating new job opportunities and fostering economic and social development.

In terms of improving health care, roads make healthcare and healthcare facilities more easily accessible for populations (World Bank, 2014). For example, rural connectivity helps to decrease maternal mortality as women have better access to maternal care (World Bank, 2008) and it also improves the accessibility of remote places to emergency services such as ambulances and improve opportunities for health staff to conduct health related outreach in these areas. To illustrate this, one recent study on the effects of India's rural roads programme on morbidity found that the provision of a road connection, whether direct or in the neighbourhood, was associated with significant reductions in morbidity (Bell and van Dillen, 2018). For each kilometre of unpaved track replaced with a road, an inhabitant's probability of suffering an episode of incapacitating illness was lowered, with expected duration of such illness reduced by 0.53 days (Bell and van Dillen, 2018).

Rural roads also lead to improved rates of enrolment of girls in school (World Bank, 2008) and this will further promote development as education of girls is crucial for population

health, reducing fertility rates, and improving maternal and child health (Gakidou et al, 2010). Similarly, roads facilitate access to food markets and can promote agricultural development and better nutrition (World Bank, 2008). Roads are also vital for day to day activities. They allow people to travel from one place to the next. Without road networks, there would be great difficulty in accessing places of employment, education, visiting family and loved ones, visiting places of interest, and generally navigating within the environment in a timely way.

However, as with any other system of transportation, roads are also associated with vehicle crashes. As soon as motor vehicles appeared, road traffic crashes, injuries and deaths followed. The first motor vehicle-related traffic deaths were recorded in 1896, in Great Britain, and in 1899, in the United States (US), (Norman, 1962). From these small figures, what followed in the next century was unforeseen (Norman, 1962). By 1951, a million deaths due to road traffic injuries (RTIs) had been recorded in the US alone, with other highly motorized countries also showing similar trends. By 1962, it was estimated that well over 100,000 people were being killed every year globally (Norman, 1962). Since those first fatalities in the 19<sup>th</sup> century, motor vehicle ownership had increased vastly, which had resulted in road crashes becoming more prevalent (WHO, 2004). Construction of better roads and rapid urbanisation brought about concurrently improved technology and faster moving vehicles (Norman, 1962). By 1962, Norman lamented that much attention was being given to improving the performance of motor vehicles, mainly with regards to their acceleration and maximum speed possible, but insufficient care had been given to safety features (Norman, 1962). According to the World Health Organisation (WHO) (2004), road

transport is now the most complex and most dangerous of all the systems that people have to deal with on a daily basis.

RTIs are now a major global public health challenge (Parkinson, 2014), with over 1.2 million people killed and between 20 and 50 million injured annually (WHO, 2013a). They are the eighth leading cause of death globally, and the number one cause of death for young people aged 15-29 (WHO, 2015a). They are also responsible for the largest proportion of unintentional injuries (Zimmerman et al, 2012). It is predicted that without any intervention, RTIs will be the fifth leading cause of death by 2030 (WHO, 2013a). The road injury death toll is estimated to exceed that from diseases such as tuberculosis (TB) and malaria that receive substantially more attention in the global health research and development community (World Bank, 2014). It has been predicted that without intervention, RTIs will rise from ninth (in 1990) to third (in 2020) in terms of the leading cause of loss of disability as measured by disability adjusted life years (DALYs) (Legarde, 2007). In addition to the human costs, the annual direct economic costs of global road crashes have been estimated at US\$ 518 billion (Naci et al, 2009).

LMICs are disproportionately affected by RTIs, sustaining 85-90% of all global deaths and injuries due to RTIs (World Bank, 2014). The magnitude of the problem is such that RTIs are now estimated to cost 15% of the Gross Domestic Product (GDP) of LMICs, thereby undermining efforts to decrease poverty and boost shared prosperity (World Bank, 2014). The total cost of RTIs in LMICs is estimated at US\$ 65 billion annually, surpassing the total annual amount received in development assistance (Naci et al, 2009).

However in the main, despite being preventable, RTIs are neglected in most parts of the world, and many countries have not budgeted for RTI research or prevention (Hyder et al, 2006). Public health practitioners have been slow to be involved in road traffic safety and it continues to be seen mainly as a responsibility of the transport sector (Peden, 2005). In many countries, RTIs have also been generally considered inevitable and a result of random and unpredictable events (Sharma, 2008). Because of this, many countries have made much less effort to understand and prevent RTIs than they have made to understand and prevent diseases that cause less harm (Sharma, 2008). Consequently, the international community's response to RTIs has come relatively late (Legarde, 2007) and there has been a relatively small amount of investment in road safety research and development, compared with other public health problems (Naci et al, 2009). For example, in 1996, global research and development funding for RTIs were estimated to be only US\$ 24 million as compared with US\$ 900 million for HIV/AIDS, and most of this research for road safety has been in high income countries (HICs) (Legarde, 2007).

It is certain that the health sector would benefit tremendously if there were fewer RTIs, with considerably fewer hospital admissions and reduced injury (Parkinson et al, 2014). The health sector would also benefit from people adopting health lifestyle such as walking and cycling without fearing for their lives (Cairns et al, 2015; Naci et al, 2009)

In light of all this, the WHO has mandated that all countries carry out more research and data collection on RTIs (WHO, 2004). In 2010, the United Nations General Assembly (UNGA) proclaimed 2010-2020 the Decade of Action for Road Safety, calling for multi-sectoral action

to increase the number of countries with comprehensive legislation on road safety (WHO, 2010). The principles guiding the Plan for the Decade of Action are those included in the "safe system" approach (WHO, 2010). This approach aims to take into consideration the vulnerability of the human body and develop a road transport system that is better able to accommodate human error. Appendix 1.1 illustrates the principles associated with the approach. The WHO recommended that activities over the Decade to take place at local, national, regional and global levels, but with a primary focus on national and local level actions (WHO, 2010). They also encouraged countries to implement activities according to five pillars of the "safe system" which include; road safety management, safer roads and mobility, safer vehicles, safer road users and post-crash response (WHO, 2010). Appendix 1.2 illustrates the five pillars and the activities recommended by the WHO in line with the Plan for the Decade of Action.

More recently, in September 2015, the UNGA adopted the Sustainable Development Goals (SDGs) which follow on from the Millennium Development Goals (MDGs) (WHO, 2015b). Unlike the MDGs, these now include road safety with SDG target 3.6 seeking to halve road traffic deaths and injuries by 2020, and SDG target 11.2 including a focus on providing safe, sustainable transport systems for all, improving road safety and with special attention to key groups such as children and the vulnerable. WHO (2015b) heralds this inclusion of an RTI target as a significant advancement for road safety.

## 1.5 MORBIDITY DUE TO ROAD TRAFFIC INJURIES

Worldwide, for every person killed as a result of RTI, at least 20 others sustain non-fatal injuries (WHO, 2015a). RTIs are traumatic events and are associated with a considerable burden of physical and psychological illness, yet no current global estimates have been determined (World Bank, 2014). RTIs are also identified as being the leading cause of injury in most countries (Nhac-Vu et al, 2011) with injuries often resulting in chronic pain; stigma (due to disfigurement); and long-term disability such as paraplegia, quadriplegia, loss of eyesight, and brain damage (Hyder et al, 2006). Disability associated with RTIs can also deprive an individual of the ability to achieve even minor goals, and can result in dependence on others for economic support and routine physical care (Hyder et al, 2006). Long-term disability can result in loss of employment, with profound impact not only on individuals but households where loss of income can push families into poverty (Moroz and Browner, 2014). The costs for medical treatment and rehabilitation can be expensive and often continue for indefinite periods, especially with serious RTI-related disabilities (WHO, 2004). The burden of non-fatal RTIs on lost productivity is actually estimated to be far greater than the burden attributable to fatal injury (WHO, 2015a). Despite this, there is a global scarcity of accurate and reliable data on the long-term health consequences of road-injuries, especially as these relate to long-term disability (Ameratunga et al, 2006; Sharma, 2008; WHO, 2015a).

This lack of accurate and reliable data is of special concern because knowledge of the long-term consequences of road injuries is critical in facilitating the design of appropriate strategies and institutional responses to assist survivors in their recovery process (Nhac-Vu

et al, 2014; Tournier et al, 2014). Tournier et al (2014) also report that investigation of the long-term consequences of RTIs is also crucial for building and enhancing organisational capacities to assist survivors to build a new life following injury. The dearth of information on long-term consequences of road-injuries is much worse in LMICs, which already have limited research on RTIs, with most of the research that has been undertaken concentrated in HICs (WHO, 2015a). I thus chose to focus my research on Namibia, a LMIC with one of the highest RTI injury and death rates globally (WHO, 2015c). I also focus on Namibia because despite its LMIC status, it has a fuel tax funded Vehicle Accident Fund providing an insurance system for those injured. This study provides a greater understanding of how RTIs impact those affected and whether/how much the fuel levy insurance is beneficial to injury survivors.

An additional finding to be highlighted in the coming section are statistics which show how RTIs in Namibia have worsened at concerning rates. Review of the literature also showed that, similar to other LMICs, there has been no published research on the long-term impact of RTIs in Namibia. From the outset, I hypothesized that the findings in this study would be different to those made in HICs because of the economic and socio-political differences. I anticipated that in-depth findings from a LMIC could lead to formulation of recommendations which could be used by policy makers, academics, public health officials, healthcare workers (HCWs), and civil organisations, in terms of injury prevention and assisting injury survivors in regaining independence and building new lives. I also anticipated that these recommendations could also be applicable to countries with similar contexts in

SSA as well as other LMICs with similar settings in different global regions. My findings speak to, and largely validate the hypothesis raised.

## **1.6 ROAD TRAFFIC CRASHES, INJURIES, IMPAIRMENT AND DISABILITY**

A road traffic crash (RTC) is defined by the WHO as *“a collision or incident that may or may not lead to injury, occurring on a public road and involving at least one moving vehicle”* (WHO, 2004: p 201). RTIs are non-fatal or fatal injuries sustained as a result of crashes (WHO, 2004). Crashes result from the interaction between a combination of risk factors related to roads, vehicles, road users, and the environment (Agbonkhese et al, 2013).

Risk factors which contribute to RTIs have been traditionally classified into three groups: human, vehicle, and road environment (Chen, 2010). Human risk factors include: speeding, drink-driving, non-compliance with seatbelt use, and driver fatigue (AfDB, 2013). Road environment factors include: poor road layout, poor segregation of traffic types, and weather conditions (Jafarpour and Rahimia-Movaghar, 2014). Meanwhile, vehicle factors include: poor mechanical state, and dangerously loaded vehicles (AfDB, 2013).

According to Chilsholm et al (2012), most RTIs actually involve more than one risk factor. For example, alcohol intake raises the likelihood of speeding dangerously (Chilsholm et al, 2012). Agbonkhese et al (2013) adds that the risk factors could be from one group or a combination of groups. Risk factors vary greatly from country to country (Naci et al, 2008; WHO, 2004), however in both HICs and LMICs, human risk factors account for more than 85%-95% of all RTIs (Hassen et al, 2011). Accordingly, the United Nation General Assembly



(UNGA) recently invited member states to adopt comprehensive legislation to address their key risk factors (UNGA, 2016). It is possible for risk factors to be abated such that most RTCs can be prevented (Peden, 2005). Thus, identification of the risk factors that contribute to RTCs is vital and necessary in order for it to be possible to identify interventions to target them (WHO, 2006).

Following risk factor identification, 'road danger reduction' (RDR) is an important concept used to frame and discuss key risk factors at the national level. RDR is a road safety approach based on diminishing road danger at the source and promoting equity and accessibility for non-motorised road users (Tight et al, 2008). RDR focuses not just on casualties but at a wider range of issues which synthesise more appropriate measures to improve road safety including consideration of casualty rates, the number of trips made by the more vulnerable modes, and the speed and volume of motorised traffic (Tight et al, 2008). *"The danger reduction approach involves the examination of the sources of danger on our roads, and therefore particularly targets motorised users, attempting to make them aware of their responsibilities to others because of the dangers they pose"* (Tight et al, 2008: p 185). Hine and Tight (2017) add that RDR is now well rooted in the work of many road safety organisations and has been a key policy area for over 30 years. The focus on RDR has resulted in a shift from a purely reactive response based on RTI data to the development of policies, practice and research around the development of safety promotion and prevention (Hughes et al, 2016).

RTIs can result in long-term impairment and disability. In the International Classification of Impairments, Disabilities and Handicaps report of 1980, WHO defined impairment as *“any loss or abnormality of psychological, physiological, or anatomical structure or function”* (WHO, 1980: p 27), and disability as *“any restriction or lack (resulting from an impairment) of ability to perform an activity in the manner or within the range considered normal for a human being”* (WHO, 1980: p 28).

## **1.7 SUPPORT SYSTEMS AVAILABLE TO ROAD INJURY SURVIVORS IN NAMIBIA**

The Motor Vehicle Accident Fund (MVAf) is fuel levy fund that was set up as a government parastatal in 1991, in Act 30 of 1990, with the aim to compensate people injured in motor vehicle crashes or the dependents of people killed in such crashes (MVAf, 2018). Then, as the Fund followed a “fault- based” system, compensation was paid if the road crash was a result of negligence or any other unlawful act on the part of the driver (MVAf, 2018).

Following policy review, in accordance with the MVA Fund Act No.10 of 2007, the Fund is now mandated to provide assistance and benefits to all people injured and the dependents of people killed in road crashes regardless of fault (MVAf, 2018). The Fund is also mandated to design, promote and implement crash and injury prevention measures (this will be discussed later in this section). The Fund derives all its income from a fuel levy which is determined annually by actuaries and the National Energy Fund or the Ministry of Mines and Energy. In 2016 this was 47.7 cents per litre of petrol and diesel sold (MVAf, 2018).

Any individual injured in a road crash or a dependent of anyone killed in a road crash in Namibia can claim for assistance from the MVA Fund. Table 1.1 explains the way in which an injured individual is registered within the system. Appendix 1.3 lists the benefits offered by the MVA Fund, in accordance with the MVA Fund Act 10 of 2007.

**Table 1.1: MVA Fund registration process**

- According to the legislation, in the event of a road crash, the MVA Fund call centre has to be notified, following which they will dispatch an ambulance.
  
- Crash survivors are triaged at the scene of crash and individuals with moderate or serious injuries are admitted to either state or private healthcare facilities, with those with minor injuries treated and discharged.
  
- The injured person is issued with an MVA Fund reference number, and an MVA Fund case manager undertakes hospital visits and issues a claim form for submission by the injured individual.
  
- Once the injured person submits the claim form, the MVA Fund assesses the claim based on the individual's injuries and processes payment of an injury grant if this has been deemed applicable.
  
- When complete information has been provided, claims are reported to be processed within 30 days.
  
- Again, according to MVA Fund rules, in terms of rehabilitation, following the injury, the case manager drafts and implements rehabilitation plans in consultation with the injured individual.
  
- The case manager obtains progress reports from specialists/doctors managing the individual to assess whether they need further rehabilitation.
  
- Based on this assessment, the claim is either closed or further rehabilitation is provided.

Source MVA Fund (2018)

For those who have been deemed after assessment to have serious injuries such as paraplegia and quadriplegia, home modifications are also made if they or their parents own the property they want to be adapted. They are also provided with a monthly caregiver allowance. The Fund has also been involved in the Spinalis Unit (the only medical rehabilitation centre in Namibia, based at Katutura Hospital in the capital city, Windhoek), which employs two rehabilitation coaches who help rehabilitation staff in local and regional hospitals to boost the morale of patients admitted with spinal cord injuries unit. The Fund is not involved in any other hospital units/wards.

The benefit accorded under the MVAFA is important as well because of its intersection with a second form of grant that road injury survivors in Namibia can apply for. This is the Disability grant, a monthly social grant of Namibian (N)\$ 1,100 issued by The Ministry of Labour and Social Welfare under the National Pension Act (Act 10 of 1992). Access to the grant is not automatic and there is an application process which involves a medical assessment by a state medical officer to determine eligibility of individuals based on the severity of disability. Table 1.3 highlights the rules related to the grant.

**Table 1.2: Disability grant regulations**

- Any Namibian citizen or permanent resident considering themselves to have a disability can apply for the grant.
  
- Access to the grant is not automatic and there is an application process which involves a medical assessment done by a state medical officer in order to advise on the eligibility of individuals based on the severity of disability.
  
- The Ministry of Labour and Social Welfare is not mandated to approve disability grants and therefore depends on Ministry of Health and Social Services medical officers to do the approvals.
  
- When an individual does not collect their grant for a continuous period of three months, the grant will be stopped.
  
- The disability grant is given to people with temporary or permanent disability and the length of the award is also provided by the medical officer based on the severity of disability.
  
- Once the grant has been approved an individual is still required to visit the pension office at least once a year for verification.

Source (Namibian government, 2018)

I could not find any information as to how RTI survivors are made aware of the grant or any formal processes linking them to the application process following injury. However Chiripanhura and Niño-Zarazúa (2013) report that generally access to the grants is hindered by illiteracy and lack of information; isolation of qualifying individuals; and complex claiming procedures. As will be further discussed later, it is important to note that only individuals disabled through RTIs are eligible for the MVAf and the disability grant. Individuals disabled through other causes are only eligible for the disability grant.

The next sections provide a contextual background to Namibia and will give an overview on the socio-economic status, health systems, disability, and status of road safety.

## **1.8 BACKGROUND TO NAMIBIA**

Namibia is a sparsely populated country in South-Western Africa, spanning 824,116 square kilometres, with a low population density of only 2.8 persons per square kilometre, and a total population of 2,403 million (World Bank, 2015). It is rapidly developing, and has been elevated from Middle Income Country (MIC) to Upper Middle Income Country (UMIC) status, with its Gross National Income (GNI) per capita almost tripling from US\$ 2,110 to US\$ 5,870 between the years 2000 and 2013 (World Bank, 2015). This is compared with an average of US\$ 2,000 for SSA. Despite this rapid development, it is actually a country of great inequality and has one of the largest income inequalities in the world, with a Gini index of 63.9 (UNDP, 2013). In 2015, 39% of the population lived below the US\$ 3,10 per day poverty line (World Bank, 2018).

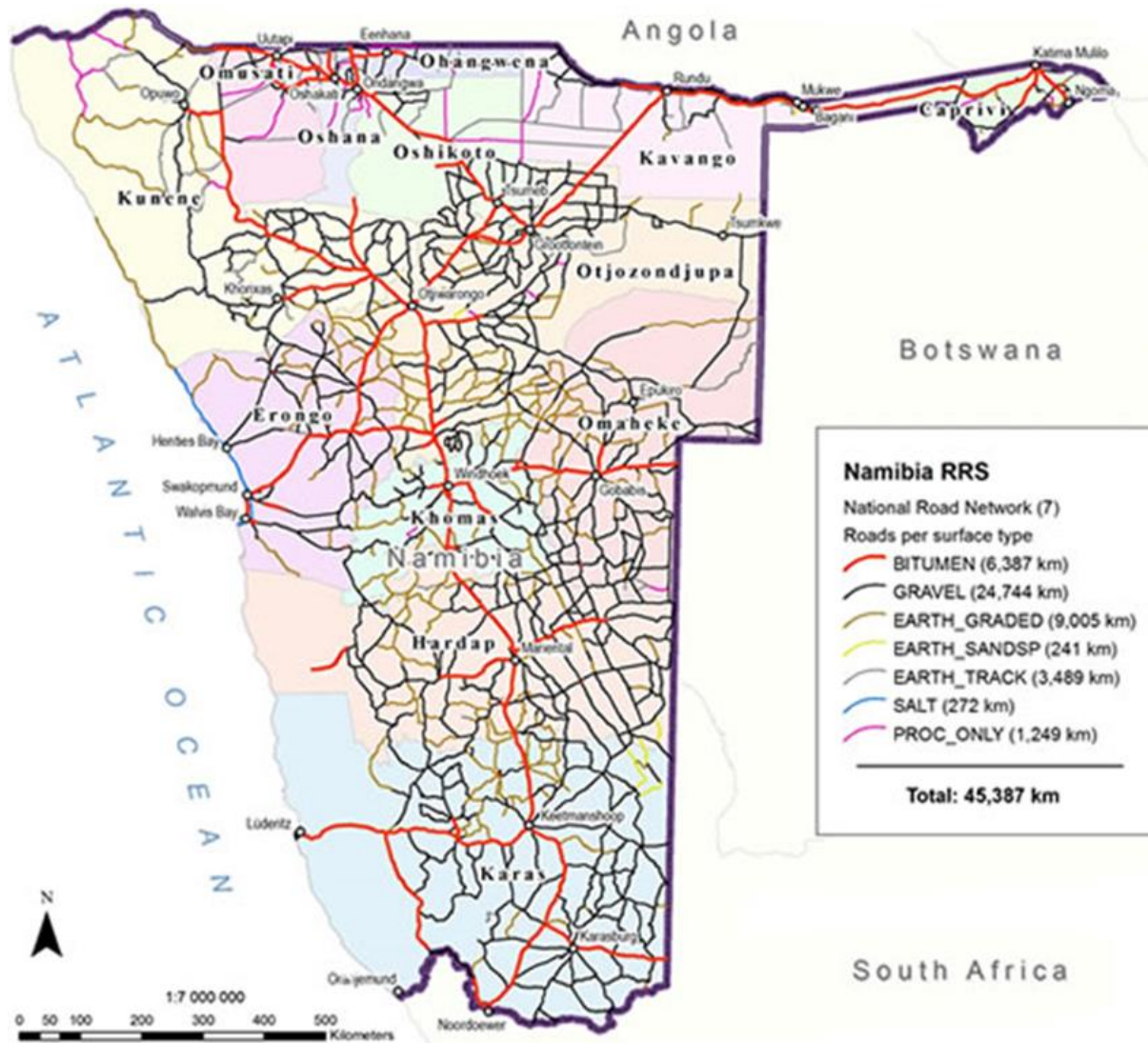


Figure 1.1: Map of Namibia (Source: Roads Authority of Namibia)

Its road networks play a vital part in the movement of people because its inhabitants are dispersed over a wide area (WHO, 2015c). Having a poor railway infrastructure, its roads are the main form of transportation (Fritze, 2013). Currently the road network of Namibia spans a distance of more than 45,000 kilometres; yet only approximately eight percent of the roads are tarred (Fritze, 2013). According to the Namibian National Road Safety Council (NRSC), in 2011, there were 269,907 registered vehicles in Namibia (NRSC, 2015a). The

transport sector is crucial to the delivery of Namibia's development objectives, which are to stimulate economic development, job creation, and poverty reduction (NPC, 2012).

However, the country is hindered in these ambitions by constant challenges in the transport sector. These include inefficiencies resulting from high transport costs, a large number of road traffic crashes and fatalities, unfulfilled transport needs due to inadequate road infrastructure in rural areas, and a lack of public transportation services in urban areas (NPC, 2012).

RTIs are a major problem in Namibia. They are the third largest cause of death, after HIV/AIDS and malaria (Nakale, 2013), and account for 36% of all injury-related deaths (AfDB, 2013). According to a report by the Namibian Statistics Agency (NSA), fatality rates due to RTIs rose from 25.6/100,000 ( $10^5$ ) population in 2010 to 30.1 in 2013 (NSA, 2015). Injury rates also rose over the same period from 243.5 to 276.6/ $10^5$  population (NSA, 2015). More recently, the high number of severe injuries have come to the attention of officials and become a cause for serious concern (Smit, 2016).



## 1.9 DEVELOPMENT AND HEALTH IN NAMIBIA

Although now classified as an UMIC, Namibia still has considerable challenges with development targets. For example, Namibia did not meet the MDGs for under-5 mortality rates, and spending on maternal, child and adolescent health is in fact declining (WHO, 2015c). Emergency obstetric care coverage is not only very low but also inequitable (WHO, 2015c). Inadequate national immunisation coverage has led to some regional outbreaks of illnesses such as measles (WHO, 2015c). Although Anti-Retroviral-Therapy (ART) is now extensive, Namibia is one of the world's worst affected countries regarding HIV, with a prevalence rate of 14%, and also a high burden of other communicable diseases such as malaria and tuberculosis (WHO, 2015c).

In addition, Namibia is in epidemiological transition and faces an increasing burden of non-communicable diseases (NCDs) which, according to Amuna and Zotor (2008), is a common consequence of increasing levels of socio-economic development (the demographic transition). According to the Namibia Ministry of Health and Social Services (MoHSS), Namibia will continue to face this double burden of disease consisting of high rates of both communicable and NCDs (MoHSS, 2015). While the national health system is well organised in Namibia, it is hindered by long waiting times and a critical shortage of healthcare professionals, especially in non-urban areas (Gustaffson-Wright et al, 2011). There is a huge burden on public health facilities as 84% of Namibians are dependent on the public health system (Gustaffson-Wright et al, 2011).

The main implementer and provider of public health services in Namibia is the MoHSS (WHO, 2015c). This operates as a four tier system (listed below in Table 1.4). The private sector is mainly concentrated in the urban regions of Erongo and Khomas with 844 private health facilities in 2015 registered with MoHSS (WHO, 2015c). Almost half of all the nurses and 72% of doctors in Namibia practice in the private sector (WHO, 2015c).

**Table 1.3: Health facilities in Namibia**

Public health services	Private health services
-4 referral hospitals	-13 hospitals
-29 district hospitals	-75 clinics
-309 clinics	-8 health centres
-1,150 outreach points	-754 private practitioner practices

Source (WHO, 2015)

In line with development related to economic growth, car ownership and urbanisation have increased in Namibia (Heidersbach and Strompen, 2013). Analysis of data from NRSC (2015a) shows that from 2002 to 2011, the number of registered vehicles had risen by 50%. This has resulted in increased congestion, especially in the urban areas (Fritze, 2013). Meanwhile, urban areas are rapidly expanding in terms of population and geographical size and the expansion has been associated with significant increase in traffic violations and RTIs (Kashona and Pazvakavambwa, 2014). In 2009, a 7.4% rise in number of registered vehicles

was associated with a 12.4 % rise in crashes and a 7.3 % increase in fatalities (NRSC, 2013). With motorisation predicted to rise over the next decade, the benefits of economic growth are challenged by the associated surge in RTI-related costs such as on-going medical care and rehabilitation (NRSC, 2013). RTIs therefore not only worsen the burden on public health facilities in Namibia, they also divert resources which could be otherwise used in attempts to meet developmental targets, and reduce poverty and inequality.

### **1.10 DISABILITY IN NAMIBIA**

Given that many people injured in RTIs develop long-term impairments and disability, as highlighted in section 1.5, it is important to discuss disability in the Namibian context. The first report on disability based on Population and Housing Census data was the *Disability Report* of 2016 which used data from the 2011 census (NSA, 2016). According to the report, there were an estimated 98,413 people living with disabilities in Namibia, with 51,125 of these being female and 48,288 males (NSA, 2016). The report highlighted people living with disabilities to be one of the most marginalised groups in Namibia, facing the worst forms of stigma in their communities (NSA, 2016). It was reported that this marginalisation had necessitated the establishment of a new office for disability affairs in the Vice-President's office in order to come up with interventions to improve the situation (NSA, 2016). The findings of the report were aimed at providing statistics which could be used by authorities and stakeholders to monitor and evaluate national programs created to improve the lives of people living with disabilities (NSA, 2016). The report presented information on the different types of disability such as deafness, lower limb impairment, blindness. There was

however no information on the causes of specific disability. I was therefore unable to obtain any information in the report on the numbers of people who are documented to have become disabled as a result of RTI.

The interests of and advocacy on behalf of people with disabilities in Namibia are represented by Disabled Peoples Organisations (DPOs). The most prominent DPO is the National Federation of People with Disabilities in Namibia (NFPDN) (VSO, 2016). It has six member organisations which are listed below (Table 1.5) and these are involved in advocating for the rights of their group members. DPOs have not been a major voice in RTI issues. The reason for this may be that, according to Kiek et al (2016), several challenges exist for DPOs in dealing with the concerns of persons with disabilities. One main challenge is a lack of national funding and human resources to carry out this work (Kiek et al, 2016). DPOs in Namibia have been highly dependent on donor funding, however there has been a withdrawal of donor funding from Namibia which came about when Namibia was classified as a UMIC (Kiek et al, 2016). As a result of the donor withdrawal and the lack of national funding, the capacities of DPOs to conduct awareness-raising, lobbying and advocacy work, and to participate and influence political processes, decreased considerably in 2016 due to their limited finances. Additionally, despite DPOs expressing their need for more influence in the process of policy-making with regards to issues affecting people living with disabilities in Namibia and their need for further support from government structures, they have rarely been invited to important stakeholder workshops and meetings meaning they are limited in terms of influencing policy (Kiek et al, 2016).

**Table 1.4: DPOs in Namibia**

-The National Federation of Visually Impaired (NFVI)
-The Namibian National Association of the Deaf (NNAD)
-The National Association of People with Physical Disabilities (NAPPD)
-The National Association of Differently Abled Women (NADAWO)
-The National Association of Parents of Children with Disabilities (NAPCD)
-The National Disabled Youth Council (NDYC)

Source (VSO, 2016)

Despite the lack of linkages between RTI and the disability advocacy community, action within the disability community still has implications for those injured through RTIs. This is important as according to the *Disability Report*, efforts have been made to improve the lives of people living with disabilities in Namibia through legislation and various policies (NSA, 2016). This has included the passing of an Act of Parliament, the National Disability Council Act, 2004 (No. 26 of 2004) (NSA, 2016). The purpose of the act is *“to improve the quality of life through enhancing dignity, wellbeing and empowerment of persons with disabilities. Furthermore the Government of the Republic of Namibia has ratified the United Nations Conventions on the Rights of Persons with Disabilities in 2004 and endorsed the African Decade Plan of Action for Person with Disabilities in 2005”* (NSA, 2016: p 2). Table 1.6 highlights some of the policies outlined in the national disability policy framework of relevance to people disabled through RTIs. However, despite these progressive laws and

policies, low awareness among decision makers and stigma from civil society have been identified as root causes for people living with disabilities not being able to access equal opportunities compared with able bodied people (VSO, 2016).

**Table 1.5: Disability Framework of Namibia**

Education Policy	<p>-The Ministry of Basic Education and Culture’s objective is to ensure that all Namibian children receive basic education.</p> <p>-The ministry is committed to making provision of an inclusive education for all children, including those with disabilities to fulfil this objective.</p>
Employment Policy	<p>-The National Policy on Disability of 1997 states that the government will ensure that persons living with disabilities have equal opportunities to access productive and gainful employment in Namibia’s labor market.</p> <p>-To ensure this, the state is mandated to ensure that there people living with disabilities are not discriminated against by labor related legislation to ensure obstacles to their employment are removed.</p>
Accessibility Policy	<p>-The government is mandated to develop guidelines and standards to make the physical environment including all public buildings and facilities including transport, sport and recreation accessible to all people living with disabilities.</p> <p>-This should be done by ensuring the disability policy and requirements for making the physical environment are available to professionals involved in the design and construction.</p>
Access to Information	<p>-The government shall ensure that people living with disabilities and when necessary their caregivers, have access to full information on their rights, medical records, diagnosis, available services, and services which are generally available to the general public by developing strategies to make information services and documentation accessible to all persons with disabilities.</p>

Source (NSA, 2016)

## **1.11 IMPACT OF ROAD TRAFFIC INJURIES IN NAMIBIA**

RTIs are estimated to cost the equivalent of US\$ 116.9 million per year and are a large burden on the economy of Namibia (Sanzila, 2013). According to the NRSC (2013), besides RTIs being a direct economic burden in Namibia, the death or injury of individuals places a great financial and emotional burden on their families. In their study, Gustaffson-Wright et al (2011) found that health shocks such as RTIs can cause severe suffering in Namibia especially for the poor, who often have no health or life insurance. They often resort to drastic coping strategies to manage the subsequent high expenses and reduction in income, such as selling assets or taking loans, thereby worsening the cycle of poverty (Gustaffson-Wright et al, 2011). The most economically productive age groups (18-45), who represent about 35.8% of the total population of Namibia, are the worst affected in terms of numbers of RTI injuries and deaths, and thereby not only families are robbed of breadwinners, but the economic output of the country is also affected (NSA, 2015). According to MVA (2016), the frequency of injuries and fatalities as a result of road crashes has become a common phenomenon in Namibia and is a threat to economic and social development.

### **1.12 GOVERNMENT ATTENTION TO ROAD TRAFFIC INJURIES IN NAMIBIA**

Despite being preventable, RTIs are a worsening public health problem in Namibia as noted above, – and as the NSA note: *“What is most worrying is the fact that road accidents are on increase despite efforts by the police and campaign by MVA and partners to reduce these incidents”* (NSA, 2015: p 26). Similar to other SSA countries, there has also been very little research on RTIs in Namibia. Although there is solid literature about other key public health concerns in Namibia such as HIV, TB, and malaria, this has not been done with RTIs. For example, while the Namibian government collects data and issues reports through the NRSC, only one study (Iipingene and Owusu-Afriyie, 2014) has been carried out to investigate the effectiveness of road safety campaigns among young drivers and this study found poor awareness of road safety specific campaigns and programmes amongst youths aged 16 to 20.

### **1.13 POLICIES ON ROAD SAFETY IN NAMIBIA**

In section 1.4 I discussed the Decade of Road Safety. In 2010, Namibia launched the Namibian Chapter of the Decade of Action 2011-2020 in response to the UNGA’s call for a Decade of Action (NRSC, 2012). The principles guiding the Plan for the Decade of Action in Namibia also follow the "safe system" approach recommended by the WHO. Since it published the World Report on Road Traffic Injury Prevention in 2004, the WHO has published *the Global Status Reports on Road Safety* and has made road safety recommendations to be followed in line with the principles of the Decade of Road Safety to reduce global injuries and deaths. In the Global Status Reports, the WHO outlines the road



safety practices in individual countries and how these are faring in comparison with the global recommended road safety practices. The report of 2015 shows Namibia does not have any policies to: promote walking or cycling, to encourage investment in public transport, nor to separate road users and protect vulnerable road users (WHO, 2015a). Enforcement of national drink-driving, helmet wearing, seat belt wearing, and child restraint laws is also reported to be poor (WHO, 2015a; WHO, 2018). The national urban road speed limits are currently 60 kilometres per hour (km/h), which is double the speed of 30 km/h which has been recommended by the WHO (WHO, 2018).

Over the last few decades a combination of regulatory requirements and consumer demand has led to increasingly safer cars in many HICs with many of the features that started off as relatively expensive safety “add-ons” (such as electronic stability control, which has been shown to reduce roll-over crashes, and soft bumpers, which can reduce the severity of pedestrian and cyclist injuries) becoming much cheaper and mandatory requirements for all vehicles (WHO, 2015a). Safe vehicles are an important part of road safety as they play a crucial role both in averting crashes and reducing the likelihood of serious injury in the event of a crash for both car occupants and non-motorised road users such as pedestrians and cyclists. As such, the UN and WHO have also issued recommendations to be followed by countries on vehicle standards and features such as frontal impact standards, electronic stability and pedestrian protection (WHO, 2015a). Significantly, Namibia has no laws with regards to vehicle standards on frontal impact, electronic stability control or pedestrian protection (WHO, 2018) and in fact, once registered, vehicles are not subjected to any

mandatory annual test of vehicle safety and roadworthiness until ownership changes

(Mbarandonga, 2013). Table 1.6 presents information to road safety legislation in Namibia

**Table 1.6: Namibia road safety legislation**

Lead agency	National Road Safety Council (NRSC)
Funded in national budget	Yes
National road safety strategy	Yes
Funding to implement strategy	Partial
Fatality reduction target	50% (2011-2020)
<b>SAFER ROADS AND MOBILITY</b>	
Audits or star rating required for new road Infrastructure	No
Design standards for the safety of pedestrians /cyclists	Partial
Inspections / star rating of existing roads	
Investments to upgrade high risk locations	No
Policies & investment in urban public transport	Yes
	Yes
<b>SAFER VEHICLES- Vehicle standards applied</b>	
Frontal impact standard	No
Electronic stability control	No
Pedestrian protection	No
Motorcycle anti-lock braking system	No
<b>National speed limit law</b>	
	Yes
Max urban speed limit	Yes
Max rural speed limit	60 km/h
Max motorway speed limit	120 km/h
Local authorities can modify limits	No
Enforcement	4 out of 10 rating
<b>National drink-driving law</b>	
	Yes
BAC limit – general population	≤ 0.079 g/dl
BAC limit – young or novice drivers	≤ 0.079 g/dl
Random breath testing carried out	Yes
Testing carried out in case of fatal crash	Some drivers
Enforcement	4 out of 10 rating
<b>National motorcycle helmet law</b>	
	Yes
Applies to drivers and passengers	Yes
Helmet fastening required	Yes
Helmet standard referred to and/or specified	No
Children passengers on motorcycles	Not restricted
<b>National seat-belt law</b>	
	Yes
Applies to front and rear seat occupants	Yes
Enforcement	7 out of 10 rating
<b>National child restraint law</b>	
	No
Children seated in front seat	Not restricted
<b>National law on mobile phone use while driving</b>	
	Yes
Ban on hand-held mobile phone use	No
Ban on hands-free mobile phone use	No

National drug-driving law	Yes
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Source (WHO, 2018)

#### **1.14 ECONOMIC AND SOCIO-ECONOMIC FACTORS ASSOCIATED WITH ROAD TRAFFIC INJURIES IN NAMIBIA**

Issues relevant to RTIs, are linked to the entire transportation system - both the public and private. To begin this review, it is important to understand the public transportation in Namibia. According to Madejski et al (2014), Namibia is challenged by a chaotic and poorly regulated public transport system, which leads to poor transport services and low levels of safety. The reported chaotic transport system is characterised by a lack of public transport services, with people in urban areas in Namibia mostly using private taxi as the only reliable means of transport for those who are not able to afford their own cars (Madejski et al, 2014). For example in Windhoek, there is a limited bus fleet, that cannot nearly satisfy peak hour demand and currently runs only during peak hours, has a lack of interchanges connecting different routes, as well as poor route planning which results in irregular frequencies of bus arrivals (GIZ, 2016). However, there are problems with taxis as well. Taxi ranks are poorly allocated, which results in commuters exiting and boarding taxis at random road-spots where they are at risk of being hit by traffic (Madejski et al, 2014; NRSC, 2013).

There have been efforts made to try to improve public transport, such as the joint project in the Khomas region between the City of Windhoek, the Ministry of Works and Transport, and GIZ (The German Development Agency), called the “Sustainable Urban Transport

Master Plan for Windhoek including Rehoboth, Okahandja and Hosea Kutako International Airport". The plan, which aims to enable decision makers in the transport sector to develop an affordable, accessible, attractive and efficient public and non-motorised transport system over the next 20 years, was launched at the end of 2013 and was approved by cabinet in 2014 (GIZ, 2016). However, in mid-2017, the City of Windhoek was reported to be struggling to implement the master plan because of financial constraints (Ashipala, 2017). The head of administration for the plan reported that the majority of the tasks planned in the first phase of the master plan had not commenced as a result of budget cuts (Ashipala, 2017). I could not find any further updates following the report by Ashipala. Madjeski et al (2014) and Riehle (2016) concluded that these shortfalls are because there has been little attention given to adequate provision of non-motorised and affordable public transport. For example, only two percent of the 2012 national road repair and maintenance budget was spent on enhancing non-motorised services such as creating pedestrian crossings and cycle lanes (Heidersbach and Strompen, 2013). The capital city, Windhoek, almost entirely lacks pavements and cycling routes due to neglect of pedestrian and cycling facilities (Heidersbach and Strompen, 2013). This is of particular concern because monthly taxi fares also amount to more than half of the monthly income for about 52% of the population thus a significant part of the population rely on non-motorised forms of transport such as walking or cycling (Heidersbach and Strompen, 2013).

Moreover, as noted in section 1.13, the current speed limit in Namibia on urban roads is 60 km/h and local authorities have no power to set lower limits (WHO, 2015a). This increases the vulnerability of pedestrians and cyclists. When they are hit by vehicles travelling at such

high speeds, the chances of survival are significantly less (Tendekule, 2013). Thus poorer groups face a greater likelihood of injury, since affordable means of commuting such as walking poses higher risks than private car or taxi use (WHO, 2004).

#### **1.15 AGENCIES INVOLVED IN ROAD SAFETY IN NAMIBIA**

*The World Report on Road Traffic Injury Prevention* (WHO, 2004) advocated for every country to have a lead agency on road safety with authority and responsibility to make decisions, control resources, co-ordinate efforts, adopt a multi-sectoral approach, and adopt specific legislation to improve road safety. In line with this, the lead agency on road safety in Namibia is the National Road Safety Council (NRSC) (WHO, 2015a). The NRSC has the responsibility of processing the Namibia Road Crash Forms and subsequent dissemination of the annual RTI statistics in order to show the road safety situation in the country (NRSC, 2016a). Similar to other countries in SSA, this official data on RTIs in Namibia is derived exclusively from police data in the form of road accident forms, which are completed by police officers following a reported crash (NRSC, 2016a; WHO, 2015).

The NRSC's ultimate objective is to promote road safety. It is mandated to collate and analyse road crash data in order to identify the underlying risk factors and to formulate interventions to improve the situation (NRSC, 2015a). Other national agencies involved in road safety include the MVAf and the Roads Authority (RA), the organisation responsible for maintenance of roads, and non-governmental organisations (NGOs) such as the Global Road Safety Partnership (GRSP) Namibia (Iipinge and Owusu-Afriyie, 2014). However, Namibian

agencies involved in road safety have also been criticised for adopting unilateral strategic plans and running separate simultaneous, uncoordinated safety campaigns (NSRC, 2015b), whereas, road safety efforts can be enhanced if a multi-sectoral approach can be adopted and the NRSC and other agencies were to conduct road safety campaigns in unison (Ipinge and Owusu-Afiriye, 2014).

An important related problem is that while road safety falls under seven ministries there is no one ministry in which has primary responsibility and as such there has been no clear communication between the ministries in terms of strategies to enhance road safety (Nhongo, 2016). The WHO reports that when the institutional arrangements for road safety are fragmented such as this scenario in Namibia, road safety funding is overlooked over other competing problems (WHO, 2004). This may explain why the funding for the NRSC and the RA have been cut by the Namibian government (Brandt, 2017; Nhongo, 2016).

Although it receives national funding, the NRSC does not have any legal/regulatory power to enforce traffic laws (WHO, 2015a). In an interview, the NRSC's Chief Executive noted that Namibia's road safety approach is currently under-resourced and poorly co-ordinated due to the lack of regulatory power (Informante, 2014). Furthermore, the Chief Executive reported that current legislation limited the management of road safety problems, rather than enabling them (Informante, 2014).

The next chapter provides a more in-depth perspective on RTIs, first giving a global outlook, then regional (SSA), before focusing on Namibia itself as a prelude to the literature review.

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## **2.0 GLOBAL ANALYSIS OF ROAD TRAFFIC INJURIES**

### **2.1 INTRODUCTION**

Prior to presenting research findings from Namibia, it is important to situate this research in a broader national and international context of RTIs. This chapter is a prelude to the literature review and provides a global and regional (SSA) overview before focusing on Namibia itself. It outlines the epidemiological trends of RTIs including morbidity; mortality; distribution of these by road user type, gender, and age; and highlights the associated socio-economic and geo-political factors to explain why road safety has worsened in some country groupings whilst it has improved in others.

### **2.2 GLOBAL PATTERN OF ROAD TRAFFIC INJURIES**

LMICs are disproportionately affected by RTIs, with 85%-90% of all global deaths and injuries estimated to be in these countries (Naci et al, 2009; Parkinson, 2014). Between 2004 and 2020, RTIs have been projected to increase by 27% in LMICs while decreasing by 83% in HICs because of reasons to be explained in the next paragraphs (Puvanachandra et al, 2013). In many LMICs, the burden of RTIs is so high that almost 40% of urban hospital beds are



taken by RTI survivors (Forjuoh, 2003). Despite this, people in LMICs actually own only about 50% of the world's motor vehicles (World Bank, 2014).

RTIs also negatively impact economic development in LMICs, with potential reductions not only in commerce but also in reduced income from tourism as foreign governments are increasingly warning their citizens against road injury risk in the same way as they warn against infectious disease or terrorism (Legarde, 2007). RTIs are therefore not only affecting the economic and social fabric, but the future development of LMICs (Chen, 2010). In sum, the burden of RTIs will only worsen in LMICs if no steps are taken to address key risk factors in the face of increased motorisation and urbanisation (Sharma, 2008).

HICs previously had high rates of mortality and morbidity associated with RTIs, but a slow and steady decline, attained in the last four decades, is attributable to a combination of interventions with specific strategies and policies (Forjuoh, 2003). For example, despite a significant increase in population and vehicles on the road, many HICs had significant reductions in RTIs after the introduction of coordinated national road safety agencies which implemented various programs instituting more stringent safety standards for roads, vehicles, and road users (World Bank, 2014).

The success of efforts in HICs is attributable to combinations of interventions with specific strategies and policies (Forjuoh, 2003). These interventions did not just come about haphazardly but were introduced after years of extensive research, data collection, analysis

and evaluations of interventions on RTIs (WHO, 2004). The success seen in HICs, where premature death and disability from RTIs have been significantly reduced, demonstrates that it should be possible for this growing problem to be reversed in LMICs (Sharma, 2008); increased attention and research on RTIs is key to this reversal (Zimmerman et al, 2012). Reliable research, demonstrating the magnitude of the problem, can increase the awareness of policy makers, governments, public health professionals, clinicians, civil society, and populations (Ghaffar et al, 2004). Reliable surveillance and monitoring of data also provides an accurate basis for setting and monitoring the effectiveness of interventions (Salifu and Ackaah, 2012).

### ***2.2.1 Factors associated with the high burden of road traffic injuries in LMICs***

The high burden of RTIs in LMICs can be attributed to several reasons. First, there has been increased motorisation and urbanisation in LMICs, which in turn has led to greater frequency of crashes because of poor enforcement of traffic regulations due to lack of resources, corruption and administration problems (Bachani et al, 2012; Naci et al, 2009; Nantulya and Reich, 2002). Analysis of data from many HICs and LMICs shows a clear direct relationship between increasing levels of motorisation and increase in RTIs and fatalities (Sharma, 2008). The surge in volume of traffic in most LMICs has also created greater pressure on roads and has not been associated with complementary programmes to maintain the roads so that they can cope with the increased volumes of traffic (Sharma, 2008). There are also more frequent crashes involving multi-passenger vehicles such as buses, resulting in more fatalities or injured survivors than in HICs. Unlike HICs, in LMICs the

majority of people still do not own cars and thus multi-passenger vehicles are the most affordable means of travel for them when travelling distances that are too long to walk (Nantulya and Reich, 2002). Additionally, unlike in HICs where there has been extensive research on RTIs which has led to positive changes (as reported in Section 2.2), despite the severity of the problem, there has been relatively little research on RTIs in LMICs (Parkinson et al, 2014). This absence of reliable surveillance data and estimates on the current levels of injuries and fatalities, have limited road safety promotion efforts in most LMICs (Sharma, 2008). The lack of scientifically based epidemiological, economic and risk factor data in most LMICs has also inhibited the response of international agencies (WHO, 2003). Also as a result of the poor surveillance on RTIs, there has been poor awareness of the contribution of RTIs to the global burden of disease in LMICs and consequently they have been seriously neglected in research; and policy efforts to reduce them have not been strong enough (Chen, 2010). One possibility for this could be that RTIs disproportionately affect the poorest and most vulnerable in LMICs, who often have little or no influence on policy decisions (Sharma, 2008). In LMICs, the population groups with highest risk of death and injury from RTIs are pedestrians, passengers, and cyclists. These individuals mostly belong to lower socio-economic groups (Naci et al, 2009). Socio-economic factors, especially income, usually influence their choices for mode of transport (Sharma, 2008). For example, motorised two-wheeled vehicles are used as family vehicles in LMICs, in contrast to HICs where they may be used for transport for one or two people but not families (Sharma, 2008). The overlooked impact of RTIs are indeed so great that Forjough (2003) argues that the lack of progress in LMICs can also be partly attributed to a lack of economic resources invested in traffic safety and research compared to competing major health problems such as HIV/AIDS.

In addition to lack of data and lack of resources, policy efforts to reduce RTIs in most LMICs have also not been adequately coordinated (WHO, 2013a). This is because RTIs have often been seen to be the domain of the transport ministries and not a public health issue (Ghaffar et al, 2004). Countries that have been most successful in reducing RTIs have had good political will and embraced a multi-sectoral approach, engaging different sectors including governments (i.e. transportation, public health, public safety), NGOs, civil society, policymakers and the media (Peden, 2005). For example, in the United Kingdom, a policy of allowing local multi-sectoral partnerships led to a 35% reduction in RTCs and a 56% reduction in fatal pedestrian casualties (Gains et al, 2003).

In order to address RTIs, it has been argued that LMICs can adopt the interventions that have worked so well in HICs (Ditsuwan et al, 2011). According to Forjough (2003), this could avoid reinventing the wheel, and also allow transferring the benefits from research and experience from HICs. Peden (2005) adds that there is no blueprint for this; however there are a range of key interventions that have worked well in HICs and are known to work in most settings, which could be applicable to LMICs. Such interventions include legislation, enforcement and education in relation to speed, alcohol, seat-belts, child restraints, and wearing helmets (Peden 2005). Forjough (2003) adds that in addition to these, other proven and promising low-cost interventions or strategies such as installing sidewalks, selected traffic calming designs, pedestrian crosswalks, and public education targeted at motorists are all feasible and could be quickly implemented in LMICs.

Other researchers have, however, argued that it is not a simple matter of adopting interventions as the context has to be taken into consideration. According to the WHO (2003), it was possible to transfer research results and interventions from one HIC to another because these countries are roughly similar. However, LMICs are different from HICs and present unique challenges. They therefore require unique solutions which are appropriate to their particular circumstances (WHO, 2003, Forjough, 2003). Naci (2009) adds that in order to be effective, there is need for policies on road traffic safety in LMICs to be based on local evidence and designed for the specific local contexts (Naci et al, 2009). As an example, successful interventions in HICs have largely focused on drivers, as they are the worst affected group in those countries (Ameratunga et al, 2006, Chilsholm et al, 2012) whereas in LMICs, the worst affected groups are pedestrians, passengers and two-wheeled road users (Chilsholm et al, 2012; Solagberu et al, 2015). Therefore, laws on seat-belt use, which have been very successful in HICs will protect the driver and passengers of cars, but will not have much impact in a country where the most vulnerable group are pedestrians and may even make it worse for non-vehicle occupants if the driver's heightened sense of safety leads to greater risk-taking (Nantulya, 2003). Thus, an intervention focused on making the environment safer may be a much more important consideration in LMICs, where the majority do not drive but are at considerable risk of being hit by a vehicle (WHO, 2003).

Nantulya et al (2003) went further in defining these local contexts and reported that cultural, socio-economic and political contexts in LMICs are different to those in HICs and must be taken into consideration when creating road safety interventions. Also sharing a similar sentiment, Legarde (2008) reported that the public perception of RTIs in LMICs must

also be understood in order for interventions that have proved successful in HICs to be adapted and applied in LMICs. As an example, some researchers have found fatalistic beliefs to be a hindrance to road safety in some LMICs. Zimmerman et al (2012) found people in Dar es Salaam, Tanzania to believe strongly in fate as being a determining factor for RTIs. Similarly in Pakistan, Kayani et al (2014) found fatalistic beliefs to be prevalent at all levels of education, including policy makers, and concluded that misconceptions associated with fatalism held by people in influential positions may act as a barrier to evidence-based policy developments on road safety. Kouabenan (1998) argued that although it would be erroneous to think that the beliefs are unique to people in LMICs, they are probably less tenacious in HICs although they may vary in intensity according to different cultures, but they still guide the behaviour of many in LMICs. Meanwhile, Dixey (1999) added that the transfer of technical solutions from HICs to LMICs also needs to take into consideration the availability of resources, availability of manpower and expertise, and level of development. Finally, it is vital that road safety programs in LMICs be evaluated, if effective and context appropriate interventions are to be implemented (Puvanachandra et al, 2013).

### **2.2.2 Global demographic distribution of injuries and deaths**

Globally, males in the 18-40 age group are disproportionately affected in terms of RTI deaths and injuries (Lonczak et al, 2007; Rhodes and Pivik, 2011). Although the reason for this could be that in LMICs there are fewer female drivers than males, similar findings have also been reported in HICs which have equal ratios of female/male drivers (Lonczak et al, 2007). To add to this analysis, Fekete et al (2018) found higher fatality rates for males

compared with females when having considered the amount of travel conducted. Males have also been shown to be more likely to engage in risky driving behaviour such as speeding (Rhodes and Pivik, 2011), and aggressive driving including 'road rage' (Smart et al, 2004). This is not limited just to drivers: male pedestrians have also been reported to be more likely to cross the road in risky situations than female pedestrians (Holland and Hill, 2007). Similarly, analysis done by Fekele et al (2018) across all age groups also found higher fatality rates for walking, cycling, and driving for males than females for almost every age group.

In HICs, drivers are the worst affected group in terms of numbers of deaths and injuries (Ameratunga et al, 2006, Chisholm et al, 2012), whereas in LMICs, the worst affected groups are pedestrians, passengers and cyclists, and they have the greatest vulnerability to death and injury (Chisholm et al, 2012; Naci et al, 2009; Sharma, 2008; Solagberu et al, 2015). This is likely to be because in HICs, drivers have highest number of RTIs because most journeys and most travel are done by car (Feleke et al, 2018). Whereas in LMICs, due to the unsafe mass public transport systems and poor separation of traffic with vulnerable road users, pedestrians, cyclists and passengers are at greater vulnerability than individual drivers (Onywera and Blanchard, 2014).

Globally, there is direct a correlation between socio-economic status and RTI morbidity and fatality, with mortality and injury rates being higher in lower social classes across the board (Ameratunga et al, 2006; Jafarpour and Rahimia-Movaghar, 2014). For example, recent analysis by Fekele et al (2018) in England found that for cyclists, drivers and pedestrians in

the most deprived quintile had substantially higher fatality rates by distance for all three modes combined than those in the least deprived quintile across all age groups. High-speed traffic is disproportionately found in poorer neighbourhoods, where fewer people own or use cars, thus people from these groups are exposed to more danger and likelihood of being involved in crashes (Cairns et al, 2015). In both LMICs and HICs, higher levels of seatbelt use have been shown to be associated with having higher levels of education and socioeconomic status, with income level being the strongest predictor of mortality and morbidity (Van Hoving et al, 2013). This indicates that if involved in crashes those from lower socio-economic groups are more likely to have adverse consequences (Van Hoving et al, 2013). The lower socio-economic groups, who are worse affected by RTIs, also have limited access to emergency health care when crashes occur (Nantulya and Reich, 2003).

These disparities in the distribution of injury risks, morbidity and mortality rates, and access to emergency care are socially determined, with the key elements being social class and income (Nantulya and Reich, 2003). This inequity needs to be studied systematically, both at the global level and at national levels, to determine where high risks of injury and high morbidity and mortality rates among poor population groups could be substantially reduced, often by low-cost and effective interventions such as speed reduction (Nantulya and Reich, 2003).

Motor insurance companies have been very proactive in promoting road safety in HICs but this has not been the case in LMICs (Aeron-Thomas, 2002). When injured in crashes, the lower socio-economic groups in LMICs are unlikely to be protected by motor insurance

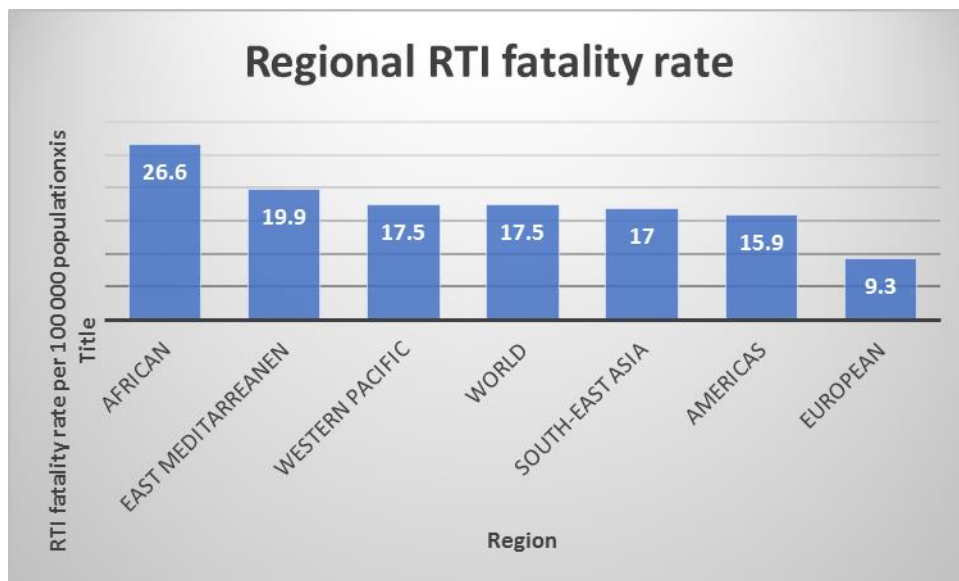


schemes; do not receive adequate compensation; and experience delays which often hinder accessibility to much needed health care and rehabilitation (Aeron-Thomas, 2002).

### 2.3 PATTERN OF ROAD TRAFFIC INJURIES IN SSA

SSA is the worst affected world region for RTIs and has the highest global road traffic fatality rate (Chen, 2010; Bachani et al, 2013; Hassen et al, 2011). The mortality rate has risen from 24.1/10<sup>5</sup> population (WHO, 2013a) to 26.6/10<sup>5</sup> population (WHO, 2015a). It is expected that these statistics will worsen in SSA because of poor investment in road safety (Chen, 2010) and increased ownership of motor vehicles (WHO, 2013b). These statistics are all the more of concern because SSA shows one of the lowest rates of registered vehicles per person in the world (Moroz and Browner, 2014). Figure 2.1 illustrates the regional variations in fatality rates.

Figure 2.1: Global variation of RTI fatality rates



Source (WHO, 2015a)

Though high, these figures in Figure 2.1 are likely to be underestimated due to the high rates of underreporting, which although a global problem, are highest in SSA countries (Legarde, 2007). Due to the underreporting, estimating the economic costs of RTIs in SSA, beyond health care delivered through the formal sector, is difficult, and records of economic activity and other statistics required to calculate economic and social costs are not well documented (AfDB, 2013). For example, large proportions of the population are employed in the informal sector and their contribution to the economy is often unaccounted for (AfDB, 2013) as are the impact of injury or disability within this sector. Thus, the economic burden of RTIs is likely much higher than currently estimated.

Despite this, the problem of RTIs is to a large extent neglected in SSA and governments have not put in strong policies to prevent and reduce RTIs (Legarde, 2007). As a consequence, in most countries in SSA, researchers cannot rely on the data available from government sources to accurately quantify the problem, measure the impact of injury prevention strategies, or appreciate how the patterns of injury evolve over time. Additionally, despite the magnitude of the problem, many countries in SSA do not have a strong lead agency for road safety and responsibility for road safety is divided between numerous government bodies. Moreover, the communication between these different ministries, departments and agencies is poor (Adeloye et al, 2016; Amend, 2016). According to the WHO (2013b), despite the continual increase in RTIs in SSA, policy on road safety is also still lacking and many of the measures recommended by the WHO have not been implemented. For example, only 16 countries out of 44 in SSA use the internationally recommended definition of a road

fatality, as that occurring within 30 days of the crash – which leads to underreporting of fatalities (WHO, 2013b). To illustrate this in context, findings from Ghana showed that some of the underlying problems with accurate data collection included: delays in compilation; lack of a central data management facility; police reluctance to maintain information in situations where court action was pending; unavailability of all relevant details; and decisions to settle out of court without any police involvement (Mock et al, 2004; Kayani et al, 2014; Salifu and Ackaah, 2009).

According to Legarde (2007) and Naci et al (2009), historical data from analysis of RTIs in HICs has shown that without effective interventions, RTI mortality only starts to decrease once a development threshold of GNI per capita of US\$ 8,600 has been achieved. Such a threshold is far from being reached in SSA, which means that unless these countries implement effective interventions road deaths will continue to rise (Legarde, 2007; Naci, 2009)

As noted in section 2.2.1, Borse and Hyder (2009) and Legarde (2007) both assert that more research on the patterns of RTIs needs to be done in SSA in order to facilitate the design of interventions and formulation of policies which are appropriate for the region. Improved road traffic injury surveillance in SSA may be useful in identifying relevant data gaps and developing contextually feasible prevention strategies in these settings (Adeloye et al, 2016). Additionally it is possible that findings from local research can be used to design novel interventions as well as also to identify ways in which HIC interventions can be adapted to suit the local context (Ditsuwan et al, 2011; Hazen and Phiri, 2006). Another

important component of needed research is that of the small amounts of research done in SSA, most has not focused on the most vulnerable road users. For example, despite pedestrians accounting for 55% of fatalities in Nigeria, researchers have not dedicated any studies of RTIs exclusively to them (Solagberu et al, 2015).

Despite this lack of research, existing data clearly shows that the majority of road users in SSA are vulnerable road users, including pedestrians, cyclists, and passengers in overcrowded or unsafe public transport (WHO, 2009). Underreporting of these vulnerable road user injuries and deaths is also a major contributor to the limitations of reported data on RTIs (Adeloye et al, 2016). Without the protection of the metal of the car, these groups of road users are more prone to injury and death than those in vehicles (WHO, 2009).

Income and status determine the choice of transport mode used and poorer people in SSA are likely to choose to walk, cycle or use unregulated public transport, meaning that they are at greater risk of being involved in and severely injured or killed in RTIs (Nantulya et al, 2002; Nantulya and Muli-Musiime, 2001).

Despite this increased vulnerability, for the vast majority of the populations in SSA, who are vulnerable road users, the level of protection given to them on roads has not increased in tandem with the speed of development. They have been largely left to fend for themselves, while the focus of mobility planning has concentrated on vehicles (WHO, 2013b). In the context of the rapidly growing urban centres in SSA, where new dwellings develop alongside highways or as highways are forced through communities, the results can be chaotic and costly with many injuries and deaths related to road crashes (Amend, 2016). The neglect of

pedestrians and cyclists is apparent in the majority of cities in SSA, as can be seen by the absence of footpaths and safe crossings, the poor management or maintenance of those footpaths that do exist, the lack of speed control, and the lack of street lighting (Amend, 2016; Riehle, 2016). Additionally, when road intersections and pedestrian pathways do exist, they are often usurped by motorists using the space as parking, or by street vendors using the space for trading (Riehle, 2016). These factors can explain why, on average at 39% of the total road deaths, (and much higher in some countries), SSA has the highest proportion of pedestrian-related deaths in the world (Amend, 2016). As Amend points out *“It is all too clear that the policymakers travel by car, and care little for those who walk.”* (2016: p 10).

In this next section, I will now focus on specific patterns of RTIs in Namibia.

#### **2.4 PATTERNS OF ROAD TRAFFIC INJURIES IN NAMIBIA**

Only two published studies were found on rates of RTIs in Namibia, indicating the paucity of research in this field, despite the scale of the problem. These two studies focused on specific regions (Modler, 2001) and (Oyefeso et al, 2011). In Khorixas district, Oyefeso et al (2011) sought to identify the types of injury cases seen and admitted for treatment in the District Hospital between January 2001 and December 2004. They established that RTIs accounted for 21% of all injuries admitted (Oyefeso et al, 2011). Meanwhile, Modler (2001) investigated the occurrence of RTIs in an area of the Namib Desert over a one-year period. This study established that there had been 18 crashes, involving two fatalities, nine serious

injuries, 14 minor injuries and 12 uninjured over this period (Modler, 2011). However this study has considerable limitations in that it was based only on survivors that had been treated by the researcher (who was a medical practitioner), and no records were kept of “minor accidents” in which no injuries were sustained.

Analysis of statistics shows that road crashes have risen with increased motorisation in Namibia (Table 2.1). The death and injury statistics are shown in Table 2.2. The sources of this information were all institutional reports; no journal articles were found in my in-depth literature search for any national rates of RTI injury and death.

**Table 2.1: Population, motorisation, and crash trends**

Source	Years analysed	% change in motorisation over years analysed	Crashes per 1000 vehicles	% change in crashes over years analysed	% change in population over years analysed	Crashes per 10,000 population
National Road Safety Council of Namibia (NRSC) (2013)	2002-2009	+27.4	67.6 (for 2009)	+42.3	+13.1	73.9 (for 2009)
NRSC (2015a)	2010	+8.4	69.7	+11.9	+1.9	81.1
NRSC (2016a)	2011	+8.2	66.1	+2.6	-1.4	84.4
NRSC (2016b)	2012	+4.0	63.8	+0.3	+2.0	83.0

**Table 2.2: Mortality and morbidity trends**

Source	Years analysed	Injury total	Total deaths	% change in injuries	% change in fatalities	Injury rate (per 100 000 population)	Fatality rate (per 100 000 population)
WHO (2009)	2007	6,137	594	-	-	296	28.6
NRSC (2013)	2002-2009	3,866 (for 2009)	278 (for 2009)	+9.5	-9.7 (comparing 2009 with 2002)	198	13.2 (for 2009)
WHO (2013a)	2009	-	571	-	-	-	25.0
NRSC (2015a)	2010	4,093	313	+5.3	+12.6	206	14.6
NRSC (2016a)	2011	4,001	406			209	19.2
NRSC (2016b)	2012	3,507	382			180	17.7
WHO (2015a)	2012	-	551	-	-	-	23.9
WHO (2018)	2016		754	-	-		30.4

### **2.4.1 Age distribution**

Young adults in Namibia are at the highest risk of RTI injury and fatality (NRSC, 2013; NRSC, 2015a, NRSC, 2016a, NRSC, 2016b). The NRSC (2013) report found that almost two thirds of fatalities and over 75% of those sustaining serious injuries were aged between 18 and 45, despite, as noted in Section 1.11, making up about 35.8% of the total population of Namibia. The average age of drivers involved in crashes was 37 old years (NRSC, 2013). Similarly, analysis by NSRC (2015a) showed that from age 45 upwards, there was a steady decline in the numbers of drivers involved in crashes. The highest proportions of all injuries were sustained by the 18-45 age group (NSRC, 2015a). These findings are also similar to other SSA countries and global patterns in that the majority of those killed and injured are within this age group (Chekijian et al, 2014). One reason why younger drivers are involved in more RTIs is that they may take more risks. Research by Pashona and Pazvakavambwa (2014) analysed traffic offences in the capital (Windhoek). Their study found that younger drivers (aged 35 and below) were responsible for most licensing violations. They were also responsible for most drink-driving, seat belt and speeding violations. In addition, due to having less experience in handling difficult driving situations like wet road surfaces or night driving, they are also more likely to be involved in crashes (WHO, 2004).

### **2.4.2 Gender distribution**

Similar to the global pattern, males are at greater risk of RTI injury and death compared with females in Namibia (NSRC, 2013; NRSC, 2015a; NSA, 2015). Table 2.3 shows the distribution of fatalities and injuries by gender.



**Table 2.3: Gender distribution of injuries and fatalities**

<u>Injuries</u>	<u>Deaths</u>		<u>Male</u>	<u>Female</u>
	<u>Male</u>	<u>Female</u>		
<i>Source</i>				
NRSC (2013)	74.4%	25.6%	78.9%	21.2%
NRSC (2015a)	74.1%	25.9%	79.7%	20.3%
NSA (2015)	-	-	73.4%	26.6%

### 2.4.3 Road user distribution

Tables 2.4 and 2.5 show the distribution of fatalities and injuries. These statistics highlight that, similar to other LMICs, pedestrians and passengers are vulnerable and are injured and killed in high numbers.

**Table 2.4: Distribution of fatalities by road user type**

Source	Passengers (%)	Drivers (%)	Pedestrians (%)	Cyclists (%)
NRSC (2013)	33.8	39.6	24.5	3.6
NRSC (2015a)	35.9	34	27.2	1.9
WHO (2013a)	16	36	31	1
WHO (2015a)	30	30	32	1

**Table 2.5: Distribution of injuries by road user type**

Source	Passengers (%)	Drivers (%)	Pedestrians (%)	Cyclists (%)
NRSC (2013)	45.1	35.2	16.5	1.9
NRSC (2015a)	48.3	29.5	19.7	1.3

As noted earlier, the reasons pedestrians are more likely to die in crashes is that they do not have the protection of the vehicle, unlike drivers and passengers, and the direct impact of the crash on their bodies can result in more life threatening injuries (WHO, 2014a).

Meanwhile, passengers in Namibia seem to have lower seat-belt wearing rates than drivers and this would leave them more vulnerable in a crash. Analysis in 2009 showed that, of those involved in crashes, 93% of drivers were wearing a seatbelt compared with 53% of passengers (NRSC, 2013), while in 2010, a declining number used seatbelts, with only 44% of drivers and 26% of passengers reporting wearing seatbelts (NSRC, 2015a). It must however be noted that it was not possible to make comparisons between passengers in private cars and passengers in multi-occupancy buses as these statistics did not distinguish between the two groups.

The reason pedestrians take risks in Windhoek could be due to the already highlighted lack of crossings. The lack of convenient crossings and pedestrian paths has been identified in many SSA countries (Sharma, 2008). Analysis by NRSC (2013) also showed that most pedestrians involved in crashes were hit by vehicles while crossing the roadway at sites that were not marked as safe pedestrian crossings. Further analysis by NSRC (2015a) showed that the majority (69%) of pedestrians involved in crashes were hit whilst on the road, while 16% were on the shoulder of the road, and (14%) on the sidewalk (NSRC, 2015a). The reason many pedestrians take risks could be that the safe crossings are not easily accessible or they may be inconveniently located.

According to Heidersbach and Strompen (2013), in the Namibian capital, Windhoek, there is a notorious undersupply of walkways. They also report little coordination between walkways, cycle paths throughout the city. *“Over the last decade, almost no attention has been given to develop interconnected pedestrian and cycling facilities as an option to car or bus usage. By way of consequence, today the City of Windhoek almost entirely lacks walkways or cycling routes”* (Heidersbach and Strompen, 2013: p 37). This lack of walkways/cycling lanes is likely to be even worse in smaller cities, towns and non-urban areas in Namibia.

## **2.5 UNDERREPORTING OF ROAD TRAFFIC INJURIES**

### **2.5.1 Underreporting in LMICs**

Although it is also a concern in some HICs (Alsop and Langley, 2001; Cryer et al, 2001), underreporting is much higher in LMICs and figures for deaths and injuries are likely to be underestimates because underreporting is such a common occurrence (Kayani et al, 2014). Underreporting results from poor enforcement of crash reporting, weak monitoring systems, and lack of comparability of definitions for deaths and their interpretation across data sources (Sharma, 2008). The WHO has recommended that all nations adopt the definition of road fatality as a death occurring within 30 days of an RTC, in order to harmonise surveillance data and allow for universal comparisons (WHO, 2004). However, definitions of deaths still remain inconsistent with only 51% of countries now using a 30-day fatality definition (WHO, 2013a).

In most LMICs, data on deaths and injuries from RTIs is derived from police records (Kayani et al, 2014). However, few police officers have received medical training and thus while mortality maybe reported, morbidity (severity of injury) is not always correctly classified (Osoro et al, 2011). The traffic police may also record the numbers of deaths at the scene of a crash, but will not follow up with hospitals to find out if other survivors died in the hours and days that followed (Amend, 2016). Furthermore, when data has been captured by the police, it has also been found frequently to be incomplete and missing important basic variables necessary for analyses - such as age and sex (Onywera and Blanchard, 2013). Another disadvantage of police reports is that they can often be more concerned with determining fault for legal pursuits rather than impacts on health (Solagberu et al, 2015).

Moreover, according to Abegaz et al (2014), underreporting by the police is substantially higher for non-fatal injuries, especially those affecting vulnerable road user groups such as pedestrians and cyclists. This is because pedestrian and cyclist injuries usually occur near built-up areas (Abegaz et al, 2014). Thus the injured may be transported directly to hospital by family members or bystanders without waiting for police (Naghavi et al, 2009).

Additionally, such groups of road users are usually from poorer socio-economic groups and may negotiate with drivers and decide to reach an agreement without any police involvement (Abegaz et al, 2014).

### **2.5.2 Underreporting in SSA**

High rates of underreporting by both the police and medical authorities pose a major challenge for the response to RTIs in SSA as they result in a lack of reliable information and data that can inform an evidence-based public health response (Adeyole, 2016). The documented fatality rates are actually likely to be worse as official government statistics often report fewer than one-fifth of road injury deaths in SSA (WHO, 2014a). Factors related to this include poor or absent links between reporting agencies, exemptions from reporting, poor sampling techniques, and varying case definitions (Adeloye et al, 2016). Added to this, in many countries in SSA, especially those where there is no lead agency for road safety, it is the traffic police who are the custodians of RTI data (Amend, 2016; Kayani et al, 2014). However, police forces in SSA are often hugely under-resourced. Moreover, officers are often poorly paid, lacking motivation, and can be tempted to seek to supplement their income by being bribed not to report incidences, which can result in lower reported rates of injury and death (Amend, 2016).

Officers are also poorly trained and do not understand the importance of good data, so accurate collection of statistics may be lacking (Amend, 2016). There is also a lack of skilled, trained personnel with the ability to enter, analyse and interpret the data, while basic equipment, including computers and internet access, is often lacking (Amend, 2016). In the rural areas, there is also very little police presence, which results in huge under-reporting because not all the crashes are captured in databases. Additionally, the majority of drivers in rural areas lack driving licenses and insurance and in the event of crashes, including those in which injuries or deaths have occurred, those involved may deliberately avoid contacting

the authorities and the culpable driver will settle the matter with cash at the side of the road or simply flee the scene (Amend, 2016).

### **2.5.3 Underreporting in Namibia**

As noted in Chapter 1, the main agency involved in road safety and in providing official reports on RTIs in Namibia is the NRSC.

According to NRSC (2013), underreporting is a problem and has hindered efforts to produce reliable RTI statistics in Namibia. Reasons to explain underreporting are reported to be similar to the ones given in Section 2.5.2 for SSA above (NRSC, 2013; NRSC, 2015a; NRSC, 2016a; Pashona and Pazvakavambwa, 2014). As an illustration, in 2012, only about 2.5% of the crash forms recorded information about seatbelt use of drivers and passengers in Namibia (NRSC, 2016b).

Similar to other LMICs and countries in SSA (as noted in sections 2.2 and 2.3), deficiencies such as poor record keeping, inadequate training, and lack of understanding of the importance of crash reports have been highlighted as related to the reported ongoing erroneous record keeping by police officers in Namibia (NRSC, 2016b). The police have been slow to send the reports, which has resulted in delays in collation of data and disrupted data analysis (NRSC, 2016b). Some Namibian police stations have also been reported to be either reluctant or unwilling to send the collision reports because of other commitments, which has further delayed the process of data entry and analysis (NRSC, 2016b). It is also

important to note that the data that has been collated from the road crash forms supplied by the police in Namibia has also been based on a classification of a RTI fatality as having occurred within 24 hours of a crash instead of the 30 day period that was discussed in Section 2.3 (NRSC, 2015a; WHO, 2015a). There has also been a reported lack of consistent follow-up on people admitted to hospital with serious injuries, hence the number of fatalities and permanently injured have been underreported (NRSC, 2015a). Given all of the above, it is likely that actual RTI deaths and injuries in Namibia are much higher than current estimates in official reports.

## **2.6 CONCLUSION**

This Chapter has provided a detailed analysis of the pattern of RTIs globally, in SSA, and in Namibia, and has highlighted the various factors that are associated with why over the years, rates of crashes and injuries have reduced in HICs whilst they have increased in LMICs like Namibia. Similar to other LMICs, there has been very little research on RTIs compounded by poor data collation due to underreporting, which has inadvertently led to underestimation of the problem which has resulted in lacklustre efforts to improve road safety. The next chapter is the literature review. This review will focus on the factors associated with the increased likelihood of crashes in Namibia and SSA, factors which are associated with the severity of RTIs, and the long-term health and socio-economic consequences of RTIs and factors which influence the outcome of injury.

## 3.0 LITERATURE REVIEW

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### 3.1 INTRODUCTION

The previous Chapter provided an introductory framework for this Chapter by highlighting the status quo in terms of the patterns of RTIs on Namibia, giving a regional and global contextualisation, and highlighting some of the problems related with road safety in Namibia and other LMICs. This review will explore what is known about the factors (health, economic, social) associated with the higher burden of RTIs in Namibia and SSA. It will also explore what is known of the long-term health and socio-economic consequences of not just RTIs but all unintentional injuries (the reasoning behind this is given in section 3.2). The chapter will begin by describing the objectives and the methods before moving onto the actual literature review itself.

#### Objectives of review

- To identify factors known to be associated with high burden of RTCs and RTIs in SSA and Namibia, to guide the quantitative analyses.
- To ascertain what is already known about the sequelae of RTIs, to guide the qualitative research and identify gaps to be filled.
- To identify what is known about the long-term effects of injuries on those who survive road crashes in Namibia, SSA, and globally.



### 3.2 METHODS

As already highlighted in section 1.13 not much research on RTIs has been conducted in Namibia and SSA. The initial literature search did not identify any peer-reviewed literature on studies conducted in Namibia related to any of the above objectives. As such, it was imperative to expand the literature search to include not only grey literature on RTIs in Namibia, such as institutional reports, policy statements and newspaper articles, but also published studies in the SSA region and other global studies showing relevance to the subject such as global comparisons of rates of RTIs and factors associated with RTIs. To answer the first question above, the preliminary search showed that published studies in SSA were also limited, thus this search was also expanded to include grey literature and there was no filtering of the studies based on the strength of the study design: and unlike in a standard systematic review, all the studies meeting the other eligibility criteria were included irrespective of strength of design.

An expanded literature search was also conducted in order to meet the second and third objectives noted above. For this, no published literature could be found in Namibia and there was very little literature for the rest of SSA. Thus it was necessary to broaden the search to a global level. Although this research is on RTIs, there has been scarce literature on the long-term impact of RTIs but there is comparatively more global literature on unintentional injuries and it is recognised that the consequences are very similar irrespective of the mechanism of injury for a given level of severity such as a broken leg as a result of falling off a ladder or crashing a bike. Thus the literature not only included literature on RTIs but also other unintentional injuries and impact of injuries studies.

The process of searching literature databases was primarily online. The electronic search was conducted on the following databases: MEDLINE, Global Health, Embase, Africa-Wide information, and Web of Science. An electronic search was also done on Google Scholar: this platform was used to perform citation analysis of the studies which met the inclusion criteria. In addition, I manually scanned the reference lists of the articles meeting the inclusion criteria to check for the eligibility of those studies. The grey literature was found by an electronic search on Google and Internet Archive search engines. I examined the studies identified from the searches for eligibility based on the inclusion criteria. The search terms and exclusion/inclusion criteria are listed in Appendices 3.1 and 3.2.

### **3.3 FACTORS ASSOCIATED WITH INCREASED LIKELIHOOD OF ROAD TRAFFIC CRASH**

#### ***3.3.1 Factors associated with increased likelihood of road traffic crash in SSA***

A reason to explain the higher rates of RTIs in SSA than in other global regions is the rapid motorisation and urbanisation resulting in increased exposure levels to risk factors of RTIs such as alcohol and speeding, and exacerbated by inadequate enforcement of traffic safety laws and public health facilities (Bachani et al, 2012; Chisholm et al, 2012; Naci et al, 2009; Sharma, 2008). SSA is rapidly urbanising, with many of its major cities projected to double in size between 2012 and 2030 (Amend, 2016). As the result of a youth bulge, which is already reshaping the demography of countries and is forecast to continue to grow significantly, the populations of these cities are also becoming younger (Amend, 2016). For example, over the next 15 years, the population growth in Niger, Mali and Zambia is expected to increase by 79%, 61% and 60%, respectively (Amend, 2016).

SSA is also currently experiencing an unprecedented sustained economic growth. This economic growth, which has averaged more than five percent for the past decade, is in part spurring the rapid urbanisation (Amend, 2016). The continent has embraced economic transformation as its development agenda, with many of its countries already implementing medium to long-term development strategies that seek to elevate them from low to middle income status. Investment in infrastructure, particularly roads, partly account for the recent economic growth of many African countries (UNECA, 2014). Between 2011 and 2013, spending in the continent's infrastructure grew by an average of eight percent and South

Africa, Uganda and Cape Verde allocated 24%, 28%, and 44% of their national budgets to improving infrastructure (UNECA, 2015). Improvement in the coverage and quality of Africa's roads may have the unintended consequence of increasing road crashes (Amend, 2015).

The rapid economic growth is facilitating increased car ownership (UNECA, 2015); automobile ownership is estimated to have increased from below 50 to 60 cars per 1000 persons between 2002 and 2007 (AfDB, 2013). From 2005 to 2014, the number of vehicles in Africa increased from 26 million to 43 million (Amend, 2016). As African countries develop further and road infrastructure improves, the number of vehicles and vehicle speeds will most likely to continue to increase, resulting in rising rates of RTIs (Bachani et al, 2012; UNECA, 2015). Analysis of data from many SSA countries shows a direct relationship between increasing levels of motorisation and increase in RTIs and fatalities (Sharma, 2008). Using Africa's most populous nation, Nigeria, as an example, whereas before the oil boom, RTIs were not common, the discovery of oil and the oil industry boom has resulted in increased disposable income for many, which in turn has led to increased car ownership associated with a surge in RTIs, (Agbonkhese et al, 2013). The rapid growth in motorisation taking place in SSA means that unless appropriate interventions are put in motion, the problem will only escalate (Sharma, 2008).

The severity of RTIs is also likely to be worse in SSA than the other global regions because the region has many more vulnerable road users (people walking and cycling) compared with other regions and also has poorer transport conditions - such as lack of seat belts in

private and public transport, inappropriate maintenance of vehicles, and poor public transport systems - than other global regions (Abuhamoud et al, 2011, Hassen et al, 2011, Onywera and Blanchard, 2013). Compounding this, SSA has a much lower density of paved roads than any other region of the world (Gwilliam 2011, Abuhamoud et al, 2011). Its roads are also poorly maintained and are thus more hazardous than in other regions (Abuhamoud et al, 2011). The pressure on roads is also likely to be worse in SSA than in other regions because rail networks are not well developed and roads are the main form of transportation, with 80%-90% percent of all travel being on roads (Opeyeoulu and Samuel, 2014). Given that air and rail transport are either expensive or unavailable in many African countries, the only widely available and affordable means of mobility in the region is road transport (Adeloye et al, 2016).

Another reason for the higher burden of RTIs in SSA is political instability. For example, in 2000, SSA had more than 10 major on-going conflicts with more than one-fifth of the total population living in war-torn or unstable countries (Gwilliam, 2011). In such circumstances, transport safety and road maintenance is not a major regional priority (Gwilliam, 2011). Corruption and national complacency are also problems (Sinclair, 2013). Moreover, there is a general apathy regarding road safety – Sinclair (2013) attributes general public indifference to RTIs in South Africa to the lack of public interest on the subject and a lack of convincing leadership on road safety. In Nigeria, Agbonkhese et al (2013) highlight the fact that there is not enough dissemination of statistics on RTIs, with the majority of RTIs not reported by the media. Similarly, Tiruneh et al (2014), identified little mass media interest on RTIs as compared with other national problems in Ethiopia. Amend (2016) adds to this by

reporting that there is a lack of capacity within civil society and the media, who should be holding African governments to account for the inaccurate data that they publish, but they remain largely quiet because sometimes they are suppressed. Even when the official statistics show huge inconsistencies including in some cases, copying and pasting data from the previous year's report, there is no one to question whether the errors in the data come as a result of incompetence or willful manipulation for political reasons (Amend, 2016).

### **3.3.2 Factors associated with increased likelihood of road traffic crash in Namibia**

Human risk factors predominate as the main cause of RTIs in Namibia (NSRC, 2015a), with speeding being a recognised problem (Namibia Economist, 2014; NSRC, 2013; Pashona and Pazvakavambwa, 2014). Non-compliance with seat belt wearing is also a major problem, especially for passengers (Modler, 2001; NSRC, 2013; Winnet, 2009). This is especially worse for long distance commuter buses which convey many passengers (NRSC, 2013). Seat belt use is also much lower in the rural population compared with urban, with compliance rates of 56% (urban females) versus 29% (rural females) and 76% (urban males) versus 43% (rural males) (NDS, 2013). This may be related to educational and socio-economic levels, which are likely better in urban areas. In neighbouring South Africa, Van Hoving et al (2013) found that residents of lower socio-economic areas were less likely to wear seat belts. At 12% for all riders, helmet wearing rates are also very low (WHO, 2015a). This is likely to be due to poor enforcement, which was ranked as low for this in the *Global Status Report on Road Safety* of 2015 (WHO; 2015a).

**Table 3.1: Seat-belt wearing rates**

Source	Drivers (%)	Passengers (%)
Modler (2001)	30	33
NRSC (2013)	93	53
WHO (2015a)	44.6	55.0 (front) 1.0 (back)

In 2011, 30% of RTI deaths in Namibia were attributed to alcohol (WHO, 2015a). Similarly, Oyefeso et al (2011) found 24% of RTIs to be related to alcohol in Xhorixas district. A more recent study carried out by Allianz (2014) found 43% of road fatalities in Namibia were caused by alcohol compared with an average of 8% for the rest of Africa. In the study, Namibia was found to be the second worst affected country globally for road fatalities due to drink-driving (Allianz, 2014). This corresponds with statistics from *the Global Status Report on Alcohol and Health* which indicate that Namibia has one of the highest alcohol consumption rates in SSA (WHO, 2014b).

A survey by Winnet (2009) established that there were high levels of drink-driving not only after hours but also during the early morning and middle of day, which placed vulnerable road users such as pedestrians in Namibia at much higher risk because of high pedestrian movements for work and school journeys during those times. The survey also established that only a very small percentage of drivers knew the legal limit for drink-driving (Winnet, 2009). However, despite this and the NRSC having reported that random checkpoints for breath testing help to reduce alcohol-related collision, alcohol tests for drivers involved in crashes remain low and in 2011 and 2012 only 28% and 30%, respectively, of drivers were

tested for alcohol (NRSC, 2016a; NRSC; 2016b). Another problem with collection of data on alcohol use is that breathalyser results have not always been correctly recorded by the police, with inaccurate completion of forms, which has contributed to the scarceness of this particular data (NRSC, 2016b). According to NRSC (2016a), the data collected on drink-driving has been entirely inadequate for formulating planning strategies to curb this.

Drink-driving not only increases the chances of an RTI, but also increases the likelihood of death or serious injury, therefore the WHO has recommended legislation to enforce limits of 0.05 g/dl, which can significantly reduce alcohol-related crashes. However, although Namibia has a national drink-driving law, the blood alcohol limit is 0.079g/dl (WHO, 2015a). Considering alcohol consumption is high and associated with high rates of RTIs, there is a need to tighten the restriction. However, the government has had an evasive attitude towards alcohol policy discussion (Siiskonen, 1994) and Namibia has no general written national policy or any national-level action plan on alcohol misuse (WHO, 2014b). Additionally, according to the WHO (2015a), the enforcement of drink-driving laws is inadequate. This is probably due to the lack of regular alcohol tests and low traffic police numbers.

While drinking-driving is a well-studied risk factor for RTIs, drug-induced impairment of driving is a growing concern around the world with regards to road safety (WHO, 2015a). Although there is this growing recognition of drug-driving as a problem, there are no global estimates of RTI deaths and injuries related to this (WHO, 2015a). Namibia has a drug-driving law (WHO, 2015a). However there is no clear indication in the law as to what is



considered a drug nor any threshold. According to the WHO (2015a), this makes it difficult to enforce the drug-driving law. I could not find any literature specifically related to drug use and the impact on RTIs in Namibia or any information related to why the law was put in place.

Kazembe and Neema (2015) reported in their study that Namibia has become one of the countries in SSA faced with the biggest problem of increasing drug abuse and drug trafficking. They reported that the Namibian police had issued warnings of this being related to worsening social problems including crime, domestic violence and RTIs (Kazembe and Neema, 2015). These authors also indicated that Namibia because of its geographical position and the availability of ports on its Atlantic coastline, is a transit haven for drugs destined for other lucrative markets particularly in the Southern African Development Community (SADC) region (Kazembe and Neema, 2015).

Analysis conducted by Pashona and Pazvakavambwa (2014) over a three month period established the most prominent cause of traffic violation (47%) in Windhoek to be related to road-worthiness of the vehicles. Namibia does not have any car manufacturing industry and all cars are imported, but cars that are eight years old or older are not permitted for import (Muraranganda, 2013). However once registered, private vehicles are not subjected to any mandatory annual inspection until ownership changes (Mbarandongwa, 2013). This means that cars which may be defective and hazardous, for example having faulty brakes, are not restricted from being on the roads.

Driver fatigue is also a major problem due to long stretches of road between cities and towns, which make driving exhausting, and often dangerous (Fritze, 2013). According to NRSC (2013), this factor had not been well analysed in Namibia, partly because data on driver fatigue is not being collected.

As already highlighted, speeding is a problem in Namibia. However, the country does not have a penalty/demerit system for license holders caught speeding (WHO, 2015a). To date, I have not found any literature on whether motor vehicle insurance sector plays any role on road safety in Namibia.

#### Traffic enforcement in Namibia

A study by Winnet in 2009 established that police in Namibia face a number of problems in enforcing road safety. He conducted an attitudinal study of traffic officers and found that they were knowledgeable about road safety, understood the importance of enforcement, and recognised it as one of their key priorities. This study concluded that although the officers were self-motivated and capable, they were also under-funded and under-resourced with a complement of only 100 officers covering 42,237 km of highway instead of the recommended 400-500 officers (Winnet, 2009). Consequently, the risk of being caught committing an offence, such as speeding, is extremely low, which increases the likelihood of road users being less concerned about committing offences (NRSC, 2015b; Winnet, 2009). Similarly Miyanicwe (2013) reported that a severe shortage of traffic officers, vehicles,

speed traps and breathalysers was hindering the effective management of traffic on Namibian roads, while communication was made difficult in remote areas by the lack of long-range communication devices.

There does not seem to have been any improvement in enforcement over the years.

According to an October 2015 statement from NRSC *“The law enforcement strategies have fallen significantly short and traffic surveillance and patrols are embarrassingly invisible on our public roads. To be clear, the road safety planning and enforcement strategies have become a confluence point of malaise in the State’s service delivery obligation. The law enforcement has been traditionally predictable, seasonal and otherwise unseen”* (NRSC, 2015b: p 5).

Winnet (2009) also established that police were hindered from pursuing the arraignment of road offenders as traffic courts operate only on two days a week in Namibia. In addition, he noted fines were too low (Winnet, 2009). Winnet accordingly concluded that *“The results of this study raise the question, as to whether any national road safety campaigns could be undertaken efficiently and effectively, without addressing the issues that will enable the Police to conduct their duties in a more effective manner”* (Winnet, 2009: p 26). Given these statements, I will return to the subject of enforcement and legislation later in this thesis.

### **3.4 FACTORS ASSOCIATED WITH OUTCOME GIVEN A ROAD TRAFFIC CRASH**

#### **3.4.1 *Factors associated with outcome given a road traffic crash in SSA***

The problem of high rates of RTIs is compounded by factors related to inadequate emergency and healthcare services that significantly increase the possibility of medically preventable deaths and increased rates of disabling sequelae. This is an issue of concern throughout SSA: (Sharma, 2008). The rapid growth of motorisation in SSA has not been accompanied by improvements in healthcare, especially in emergency care (Moroz and Browner, 2014). As Christian et al (2011) reports, in most of SSA, those who allocate resources to trauma care do not also measure the cost of long-term disability and the loss of productive life-years, thus resources are not allocated to prevent it.

One of these factors is the lack of adequate emergency transport services in most of SSA which means that many of the injured are not transported to hospital by ambulance but rather by police or private vehicles (Solagberu et al, 2015; Legarde, 2007). As an example, one study undertaken in Kenya found that 89% of RTI injured patients were transported to hospital by private vehicles or taxis, with only three percent of those injured being transported by ambulance services (Osoro et al, 2011). This is of particular concern because evidence shows that appropriate first aid and transfer of those with RTI injuries can save lives, and reduce complications and the risk of permanent disability (Ghaffar et al, 2004). As Jafarpour and Rahimi-Movaghar (2014), summarise the situation, fatalities resulting from RTIs are dependent on the accessibility and quality of medical care at pre-hospital and hospital levels; the availability of emergency services; timely initiation of resuscitation;

adequate equipment and transport methods; and the clinical capability of the emergency hospital departments or trauma centres. Additionally, if the injured are moved or transported to hospital by non-trained people they may sustain further injuries, and complications, and are at risk of dying or becoming permanently disabled (Osoro et al, 2011).

Trauma services, health staff and specialist training are also lacking (Solagberu et al, 2015; Legarde, 2007). To highlight this, recent WHO estimates found SSA to have the least number of trained nurses and doctors in emergency care compared with all other regions (Moroz and Browner, 2014, WHO, 2013a). SSA also has the least number of orthopaedic surgeons (Moroz and Browner, 2014). SSA also has poorer rehabilitation systems and lower proportions of rehabilitation staff compared with other global regions (Taibo et al, 2016). Therefore there is generally a poorer outcome for those involved in RTIs in SSA compared with other parts of the world: they have less access to rehabilitation, which could facilitate them to reach the best possible functional outcome following a road injury.

Additionally, in most countries in SSA, the hospital and rehabilitation costs following RTIs can be a major burden for families of those affected, and can average US\$50 to \$100 per week for those with trauma injuries (Amend, 2016). Too often, these costs of treatment in SSA will use up a substantial part of family income for an extended period. Some RTI injury survivors in SSA will have to borrow money or sell possessions in order to be able to afford treatment (Tayeb et al, 2015). Others will seek traditional treatment options because they cannot afford the costs of formal medical care (Juillard et al, 2010). Others are forced to

delay treatment whilst waiting to raise enough funds and receiving treatment late will limit the chance for the best potential recovery (Amend, 2016). It is also likely that delaying treatment may make injuries worse as for example, someone may continue to mobilise with fractured bones, without the correct aids, whilst fully weight-bearing. Amend (2016) comments that such situations are common in SSA following a road crash. In instances where finances to pay for treatment are not available, medical teams will wait as long as they can, but in order to deal with the succession of cases they are often forced to make the decision to amputate rather than carry out the more complex and expensive surgery that is needed and would lead to greater chances of optimum recovery (Amend, 2016).

#### **3.4.2 Factors associated with outcome given a road traffic crash in Namibia**

Similar to other countries in SSA, despite the worsening rates of RTIs in Namibia, emergency care services (EMC) have not received adequate attention and there exists an acute shortage of paramedics and other adequately trained personnel to look after RTI survivors (Sankwasa, 2012; Tjivikua, 2010). Figures from 2010 show that there were only 321 paramedics catering to a population of 2.2 million (ratio of 1:69 000), (Tjivikua, 2010). There is also an acute shortage of ambulances to safely transport the injured (Sankwasa, 2012). In addition to the lack of ambulances, a lack of policy and guidelines for ambulance services has also been identified which has resulted in slow responses to emergencies leaving injured people at increased risk of death (MVA, 2012).

Although steps have been taken to enhance EMC and trauma services with the training of more paramedics, trauma surgeons and nurses, a severe shortage of adequately trained EMC and trauma workers is still recognised (Meding, 2016). Estimates from 2015 show that three percent of RTI survivors died while being transported to hospital and 23% died while receiving emergency trauma care in hospitals, a scenario deemed as unacceptable and requiring the capacity building of EMC and trauma services (Meding, 2016).

The lack of paramedics is especially noted in Namibia because of the extensive distances between towns and lack of public transport infrastructure (Fritze, 2013). According to the WHO (2013a), just 50%-74% of those seriously injured in road crashes were transported by ambulance in 2009 in Namibia. Considering the risks of further injury and death when the injured are transported by non-trained professionals, these statistics illustrate a need to enhance emergency services. The literature review could not identify any other studies/research related to the modes of transportation used to ferry injured RTI survivors to hospital in Namibia. Data analysed for this study and presented below however will allow the exploration of these statistics for the years 2012-2014.

Improvements in hospital care, following admission, and rehabilitation, are also associated with reduced fatalities and risk of permanent disability following a road injury (WHO, 2015a). In terms of hospital care, on-going care, and rehabilitation of RTI survivors, literature suggests that RTI survivors of lower socio-economic status and those who reside in rural areas are at a disadvantage in Namibia. Most of the health facilities are concentrated in a few cities and towns, in the centre and north of the country, leaving a

considerable portion of the population far from any rehabilitation resources (Guarigupta et al, 2012). Although the government has made efforts to improve access for services such as rehabilitation in remote areas, it can still be a long distance to travel for many people (Guarigupta et al, 2012). A study by Van Rooy et al (2012) identified transportation as one of the biggest problems people living with physical disabilities face in Namibia. Rehabilitation is not the only issue; for 10% of the population it can take up to 3 hours to travel to the nearest hospital or medical facility (Tjivikua, 2010). This has major implications for RTI survivors, many of whom will have lower limb injuries, spinal and neurological disability with difficulty with mobilising. (Van Rooy et al, 2012).

In addition to what has already been discussed about the health facilities, while the public health system is well organised, it is hindered by long waiting times and a critical shortage of healthcare professionals especially outside urban areas (Gustaffson-Wright et al, 2011). Quality of care is generally accepted to be much better at private facilities, which have much lower doctor-patient ratios (WHO, 2015c). However, this is unaffordable for 85% of the population as they do not have any health insurance (de Beer, 2009; Gustaffson-Wright et al, 2011). For this reason, people from poorer socio-economic groups have lower access to good quality healthcare and have much higher rates of underreporting illness and injury (Gustaffson-Wright et al, 2011; de Beer, 2009). Additionally, the referral system is weak and there are shortages of equipment, leading to poor continuity of care (WHO, 2015c).

Moving to rehabilitation itself, there is a severe shortage in health professionals key to the recovery and rehabilitation of injured road survivors including orthopaedic specialists,



nurses, physiotherapists, orthotists, and occupational therapists (Gustaffson-Wright et al, 2011; McCourt and Awases, 2007). Although the shortage is worse in rural areas, it is also prominent in urban areas and according to McCourt and Awases (2007), has been worsened by the “brain drain” of health staff to HICs and also from the public to private sector. In addition, Namibia has not offered any qualifying entry university courses in rehabilitation professional programmes such as physiotherapy, occupational therapy, or speech therapy, with physiotherapy and occupational programs only being introduced last year and the first cohort expected to graduate in 2022 (New Era, 2017, UNAM; 2018). However there still remains no training facilities for postgraduate specialisation in rehabilitation and medical areas such as trauma, orthopaedics, and rehabilitation medicine. This undoubtedly has worsened the shortages of such professionals and the services they provide meaning that road injury survivors are limited in terms of accessing health professionals who can offer a range of treatment options, which consequently negatively impacts their long-term outcomes.

Many injured road crash survivors will have on-going mobility problems and require the use of orthotic devices (Alemany et al, 2013). The provision of orthotic devices and prosthetic appliances in Namibia has been poor and at independence (1990), there was only one consultant privately providing this service nationally (Lang, 2008). In 2004, it was estimated that approximately 85,000 disabled people requiring orthotic and prosthetic appliances had been unable to access these services (Lang, 2008). This has significant relevance for RTI survivors in Namibia as research indicates that mobility impairments are the most frequent

type of chronic functional limitations for RTI survivors, with most requiring orthotic devices (Alemany et al; 2013; Palmera-Suarez et al; 2015),

Lang (2008) also highlights the gross inadequacy in provision of vocational rehabilitation, counselling services, and a lack of awareness of mental health problems. These services are likely to be essential for a large proportion of those who sustain injuries in road crashes and may no longer be able to do the same work as before the injury. Such individuals could also have on-going post-traumatic illness and cognitive problems resulting from head injuries for which there are few providers.

### **3.5 LONG-TERM IMPACT OF UNINTENTIONAL INJURIES INCLUDING ROAD INJURIES**

This review was focused on the long-term impact of RTIs as well as all other unintentional injuries as all injuries have similar consequences. Despite it being well recognised that non-fatal road and unintentional injuries are a leading source of detriment to population health, there is a global scarcity of data on their long-term consequences (Gabbe et al, 2015; Naghavi et al, 2009; Sharma, 2008). Research has paid much less attention to injuries compared with deaths, despite the fact that the sequelae can have severe impact on survivors and their families (Hours et al, 2013). Most of the research on this has been carried out in HICs, with comparatively much less research in LMICs, especially SSA. In this review, only two relevant studies were identified which were done in SSA (Iteke et al, 2013 and Juillard et al, 2010). There was no academic literature found related to long-term

consequences associated with RTIs for Namibia; this in itself may be indicative of a lack of prioritisation and awareness and highlights the importance of my study.

RTIs and other unintentional injuries are associated with long-term consequences such as chronic pain, activity limitation and psychological distress which can not only result in impaired physical, cognitive and psychological function, work limitations, financial hardships, but also restricted social participation (Kellezi et al, 2017; Kendrick et al, 2013; Palmera-Suarez, 2015). They also can have negative impact on the quality of life of the affected individual (Nhac-vu et al, 2014) as well as those dependent on them or on whom they become dependent on as a result of the injury (Slaney et al, 2014).

These consequences can be in the short-term, but in many cases carry on in the long-term (Kendrick et al, 2013). For example, seriously injured people require in-hospital treatment and ongoing rehabilitation and disability services following discharge which combined with prolonged absences from work, leave them at risk of substantial economic burden (Gabbe et al, 2014; Kellezi et al, 2015). In their United Kingdom (UK) study to estimate costs following injury, Kellezi et al (2015) found that 62% of participants were still dependent on secondary health care services, with 47% dependent on primary care services, for injury related reasons between five and 12 months post-injury (mean cost of £4,691 per injury).

In addition, for those who sustain more severe injuries, significant changes in life circumstances can also create uncertainty about the future which can cause anxiety,

diminish effective responses, and impede preparations for the future (Braaf et al, 2019b). Even after being fully recovered physically, the injured individuals have been reported to also experience loss of confidence related to their injury, either because of the physical impact of the injury or fear or recurrence leading to fundamental changes in their lives as they cease from being able to participate in daily activities which has negative implications on their quality of life, mental well-being and recovery (Slaney et al, 2014). Unintentional injuries also present as economic problems for countries not only due to increased healthcare usage, but also days lost from work (Kendrick et al 2013; Cameron et al; 2006). To illustrate this Kendrick et al (2012) reported on the impact they had on work absence in the UK, with more than 10% of sick notes issued by general practitioners being issued for them. They were also reported as the second common reason for the issuing of a social benefit related to incapacity called the Employment and Support allowance (Kendrick et al, 2012).

### **3.5.1 Health related impacts**

In order to determine the long-term health impacts, several studies have followed-up injury survivors after one year. For example, in France, Hours et al (2013) found that at this stage, many of the injured were still experiencing pain and sequelae which was impairing daily life, especially for those who had sustained serious injuries. Kendrick et al (2017b) reported that injuries requiring hospital admission resulted in substantial and clinically important reductions in quality of life. Hours et al (2013) also identified that even for those with least severe injuries, pain remained frequent. Similarly, Barnes and Thomas (2006) in England, found that 58% of survivors had not fully recovered and had pain and problems with healing

while Kellezi et al (2017) reported two thirds of participants as not being fully recovered. Hours et al (2013) found that half of participants reported their health status was not back to normal, with pain being a dominant factor. In a study focused on children aged 16 and under, Batailler et al (2014) found that 32% of survivors had not fully recovered. Even in those with mild to moderate injury, 25% had not fully recovered to pre-injury status (Batailler et al; 2014). Kendrick et al (2013) found that nine percent of children and young people and 31% of adults and 43% of older people were unrecovered at this stage following injury. In a study focusing on the burden of injuries in the UK, Lyons et al (2011) reported that after one year, 15% of the injury survivors were still affected by the injuries, showing a high rate of residual impairment. Some of these results indicate that even less severe injuries can have long-lasting ramifications. Supporting this premise, Gopinath et al (2014) reported that persistent pain and whiplash-associated disorders are common on-going consequences of RTIs, even when crashes are minor, and can be very costly to public health. It is thus unsurprising that Cameron et al (2006) report that those who have sustained injury show greater health service use in the years following the injury compared to the general population, with this pattern continuing in some cases for many years after the injury.

Other researchers have conducted follow-up more than one year following injury. A two-year follow-up conducted by Tournier et al (2014) found that regardless of severity of injury, a large percentage of the injured surveyed reported unrecovered health status. In Sweden, a 17-year follow-up of survivors who had sustained RTI-related neck injuries identified that about half of the study population had residual symptoms including pain, stiffness and headaches (Bunkertop et al, 2002). The researchers concluded that these residual disorders

contributed to the overall disability of the injured survivors (Bunkertop et al, 2002). Results from analysis of a Spanish national demographic survey on disabilities (Alemany et al, 2013) established that mobility impairment related to RTIs was notably higher than that which was associated to all other causes of mobility impairment such as stroke or joint problems. In this study, 51.5 % of those disabled due to RTIs had major restrictions with mobilising and 43% were found to have difficulty with changing their body position independently (Alemany et al, 2013).

RTIs and unintentional injuries also have short and long-term psychological outcomes for those affected and their families (Hours et al, 2013; Kendrick et al, 2011; Palmera-Suarez, 2016; Sharma, 2008). A variation in prevalence rates could be due to differences in data collection tools, administration methods and timing of data collection (Kendrick et al, 2018), however there is a general consensus that post-injury, the prevalence of psychological disorders is high and may be associated with poorer functional and occupational outcomes (Kendrick et al, 2011; Zatzick, 2003). A review of psychiatric morbidity following an RTI showed the most commonly reported disorders were depression (21-67% across studies), anxiety (four percent to 87%), driving phobia (two percent to 47%) and Post-Traumatic Stress Disorder (PTSD) (zero to 100%) (Blaszczynski et al, 1998). Higher prevalence of PTSD has also been identified in RTI survivors as compared with the general population or control groups (Iteke et al, 2013; Hours et al; 2013; Nhac-Vu et al, 2014) as well as those injured in RTIs compared to falls (Kendrick et al, 2018). Mayou et al (1993) established that within the first year post-injury, about 20% of injured survivors developed an acute stress reaction and about 25% displayed psychiatric problems. Long-term psychiatric problems including mood

disorder (10%), phobic travel anxiety (20%), and Post-Traumatic Stress Disorder (11%) were also identified (Mayou et al, 1993). Hours et al (2013) also identified an increase in usage of psychoactive drug consumption in 15% of those with mild-to-moderate injuries and 27% of the severely injured.

Although some studies have found that survivors with more severe injuries experience higher levels of PTSD (Hours et al, 2013; Nhac-Vu et al, 2014), the WHO (2004) argued that severity of road-injury is not always directly proportional to the psychological manifestations and even relatively minor injuries can have profound psychological effects. As an example, a recent study by Kenardy et al, (2015) found that individuals with minor injuries presented with long-term poor mental health related quality of life. Giving another perspective, Slaney et al (2014) argued that the emotional and psychological impacts are more widespread and varied than will be captured by measures of PTSD or psychiatric illness and they argued for the need of these symptoms to be identified and for injured individuals to be referred to support groups and services.

Some studies have reported that psychological problems following injury can have greater impact on quality of life than the physical injury itself (Davydow et al, 2009; Kendrick et al, 2017b; Michaels et al, 2000). Psychological consequences from RTIs are however often neglected by clinical staff treating patients despite the emotional and psychological consequences being considerable (Brand et al; 2014). This is not only in LMICs but also in HICs. For example, in France, Hours et al (2013) found that only 11% of survivors had received psychological help following the injury and Christie et al (2016) reported that many

injured people in the UK have unmet psychological needs. In contrast, early identification and management of psychological morbidity in the recovery period could improve quality of life following injury. Kendrick et al (2017b) and Slaney et al (2014) argued that considering that so many participants in their studies reported their injury had impacted on their emotional state, it may be important if at the point of discharge, RTI and other injury survivors are made aware that they may experience such symptoms and, if they do, given information about where to seek help. Added to this trauma and rehabilitation services should be alerted to the recognition and diagnosis of psychological problems using standardised tools which are in existence and should refer them to the appropriate services (Slaney et al, 2014). Adding to this, Kendrick et al (2018) report that in the UK, the National Institute for Health and Care Excellence recommends screening for mood problems in populations with chronic conditions such as cancer, heart disease, respiratory disorders, neurological disorders and diabetes and the same should be applied to unintentional injuries. *“The challenge for health care providers is to recognise the importance of psychological morbidity post-injury”* (Kendrick et al, 2017b: p 1247).

The next section will focus on the socio-economic impacts of RTIs.



### **3.5.2 Socio-economic impacts**

At one year follow-up, Hours et al (2013) and Barnes and Thomas (2006) both reported that well over half of injury survivors reported being impaired in activities of daily living, leisure and occupational tasks, and participation in social life while Kendrick et al (2017a) reported one-third of the injured had not returned to work. At two-year follow-up, Tournier et al (2014) also found that a large proportion of their study population surveyed reported financial difficulties, negative impact on work/studies and social life, and restrictions to leisure activities, regardless of injury severity. At three-year follow-up Christie et al (2017) reported of those working prior to injury, over a third of participants had not returned to work. A longitudinal study at three, four, and five-year follow-up by Braaf et al (2019) found that many participants of various ages and gender expressed concerns about persistent pain, physical impairment, and the impact of ageing in the future. A five-year follow-up by Tournier et al (2016), showed that a significant proportion of survivors presented with deteriorated quality of life.

Similarly, Gabbe et al (2014) found that most of the participants in their qualitative study in Australia reported the injury had a negative impact on work including loss of employment, prolonged absence from work, missed job opportunities or promotions, and physical limitations preventing re-employment. In addition, financial burden related to injury was predominantly reported by working age participants and prolonged inability to work resulted in substantial financial impacts for many of them (Gabbe et al, 2014). Many of the injured reported that family members had also needed to take extensive leave or had left their jobs to provide care to them which compounded the financial burden following injury

(Gabbe et al, 2014). In scenarios where individuals had been financial pressured prior to injury, these financial concerns were further exacerbated by the injury (Gabbe et al, 2014). Similarly, analysis in Denmark by Dano (2005) showed that injured survivors with low disposable income pre-injury had significantly lower disposable income in the long-term compared with non-injured persons. Dano (2005) also identified significantly lower employment rates for injured survivors in both the long and short-term and concluded that health shocks related to serious road injuries have large indirect costs with regards to significant loss of production. In Nigeria, Juillard et al (2010) reported that nearly a third of survivors had become disabled, with 17% of these having lost their jobs, 68% unable to perform specific activities of daily living (ADLs), and 89% having reduced income.

Meanwhile, in Spain, the research by Palmera-Suarez (2015) which focused on RTIs found that individuals with disability due to RTIs were more likely to be unfit for work, without any type of allowance, and living in households with lowest income compared to the general population, with only 24% of them gainfully employed. Compared with other causes of disability, RTIs resulted in greater disability in terms of mobility, difficulty with using transportation, and greater need for social and health services (Palmera-Suarez, 2015).

Tournier et al (2014) reported that even in HICs which have good benefit systems for road injury survivors, consequences such as financial problems, and changes in occupational and social life generally persist for the long-term despite the presence of these structures. This situation makes road injury survivors a vulnerable population, with marked social and economic disadvantages (Palmera-Suarez, 2015). Even for those who return to work, employer related barriers have been reported (Gabbe et al, 2014). These include the

employer not listening to the needs of the injured person, not understanding their physical limitations, and placing unrealistic expectations on them such as working hours and lifting loads. Other barriers reported include doctor requests for change of duties being ignored by employers and the employer failing to approve sick leave requests (Gabbe et al, 2014). Added to this, in the event one is no longer able to take up the same employment due to physical limitation related to injury, Gabbe et al (2014) reported that access to work rehabilitation and other return-to-work programs which can facilitate return to work are limited, resulting in a tiered system where return to work is not guaranteed.

### **3.6 PREDICTORS OF OUTCOME**

It is important to understand the predictors of outcome following RTIs and other unintentional injuries (Gabbe et al, 2015). This is because given the substantial contribution of injury as a cause of long- term disability, *“there is a pressing for an improved understanding of injury outcomes, better identification of groups at risk of poor outcomes and new insights into how disability following injury can be reduced”* (Gabbe et al, 2015: p 348). It is also important in that it is necessary to better estimate the burden of injury and to guide provision of rehabilitation services to injured people and inform guidelines for monitoring and evaluating disability outcomes (Gabbe et al, 2015). Ultimately, greater understanding of outcomes of injury is crucial for the evaluation of treatment and resourcing approaches (Polinder et al, 2012). It is however understood that the individual variations in the aftermath of injury are poorly understood partly because of the diversity of

the influencing factors and lack of an overarching model in bringing these variables together (Kellezi et al, 2017).

In terms of factors that are associated with having a poorer outcome following RTI and unintentional injury, injury severity has been identified to be a dominant factor with those with more severe injuries reported to be less likely to recover than those with less severe injuries (Batailler et al, 2014; Fort et al, 2011; Kellezi et al, 2017; Kendrick et al, 2013; Mayou and Bryant, 2002; Nhac-Vu et al, 2011; Nhac-Vu et al, 2014; Tournier et al, 2014). Serious injuries are associated with serious impairment and are a predictive factor for long-term poorer health status (Mayou and Bryant, 2002). They are associated with lower work capacity, increased need for aids, greater functional dependence, the need to move home and need for family support (Palmera-Suarez et al, 2016). Fort et al (2011) identified that a range of factors including having sustained a head injury, admission to intensive care, sustaining multiple trauma, hospital admission, and surgical/medical complication post-injury, which are each associated with more serious injury, were significantly associated with a late return to work and poorer health status. Similarly Kellezi et al (2017) found that longer periods of hospitalisation were associated with significantly reduced odds of recovery.

Hours et al (2013) identified that one year after injury, a significant proportion of those with serious injuries were still on sick leave or had lost their jobs compared to those with less serious injuries. Moreover, road and unintentional injuries often need for an individual to take sick leave, and prolonged sick leave due to more serious injury, which can have harmful

consequences related to possible social and professional marginalisation (Fort et al; 2011; Kendrick et al, 2012). More serious injury is also more associated with depression and pain post-injury (Kellezi et al, 2017). Analysis by Kellezi et al (2017) found that these factors at one month post-injury are important in predicting functional recovery at 12 months. Additionally, the relationship between the two is complex with both being shown to have a strong effect on each other over time (Kroenke et al, 2011). Other studies have shown that depression on its own or a combination of depression and PTSD predicted poorer outcomes following injury (Michaels et al, 2000, Stel et al, 2004). Slaney et al (2014) concluded that since clinicians routinely treating people following unintentional injury are not mental health experts, it would be useful if they can identify injured patients at risk of poor recovery using standardised self-report measures of pain and psychological health. This could help them to manage these conditions and to recognize the need to refer them to appropriate services as necessary (Slaney et al, 2014).

In comparison to these findings showing injury severity to be linked to poorer outcome, Kendrick et al (2012) reported that the factors predicting return to work can vary over time. They noted that non-clinical factors such as deprivation and gender can often be more important in predicting return to work than clinical ones as such as injury severity. Adding to this, Kendrick et al (2013) and Gooberman-Hill et al (2011) reported that predicting recovery from injury is complex with individual, contextual and population-based factors all influencing outcome. In line with this Braaf et al (2019) report that individuals have different coping styles which can influence recovery. These are influenced by resilience, which is *“the ability to positively adapt in the face of a traumatic event and ongoing uncertainty”* (Braaf et

al, 2019: p 7). Braaf et al (2019) report that resilience has been associated with better coping and psychological adjustment following injury and was found in their study - which examined injury survivors perceptions of their future - to support effective coping and adaptation.

Another dominant factor associated with poorer outcomes is site of injury (Batailler et al, 2014; Esiyok et al, 2005; Nhac-vu et al, 2011). Fort et al, (2011) found that RTIs to the head and lower limbs were more associated with late return to work than any other injuries. Kendrick et al (2013) identified that children and adults with upper limb injuries were more likely to recover and those with lower limb injuries were less likely to recover compared to other injuries in the medium to long-term. Similarly Batillier et al (2014) found that one year after a crash, children with lower limb injuries related to RTIs had poorer rates of recovery than those who had sustained other injuries. Palmera-Suarez et al (2016) add that head injuries can cause more long-term severe functional impairments such as cognitive and mobility restrictions.

In terms of gender, there have been conflicting findings. Higher rates of negative consequences of road and other unintentional injuries were reported for females by Barnes et al (2006), Hours et al (2014), Kendrick et al (2012), Kendrick et al (2013), Iteke et al (2011) and Riffat et al (2011). In contrast to this, Valent et al (2002) and Vorko-Jocovic et al (2006) reported higher rates of negative consequences in males, while no gender association was found by Nhac-Vu et al (2011), Nhac-Vu et (2014) and Palmera-Suarez (2016).

With regards to age, it has been suggested that younger and older RTI survivors have poorer outcomes, and have a higher risk of sustaining long-term impairment and disability, because they sustain more serious injuries (Delen et al, 2006; Palmera-Suarez, 2016). Boucher and Santolini (2010) postulated that older people are more prone to more erroneous driving, which is associated with more serious injuries. However, several other researchers have reported that this may be due to frailty related to ageing (Fontaine and Gourlet; 1997; MacLeod et al, 2014; O'Neill, 2016).

Other risk factors which have been cited in literature for poorer outcome include lower educational level (Fort et al, 2011), socio-economic status (Hours et al, 2014), being unemployed pre-injury (Kellezi, 2017), and having a relative involved in the same road traffic crash (Nhac-Vu et al, 2014).

### **3.7 CONCLUSION**

This review has identified the factors associated with RTIs and outcome following injury in SSA and Namibia. Motorisation and urbanisation has increased in the region, but there has not been any matched improvement in the public transport systems such that a large number of the population are vulnerable road users such as pedestrians, cyclists - who are exposed to increasingly fast vehicles due to the increased urbanisation and motorisation - and passengers in unsafe public transportation systems which are often deficient of important safety features such as seat belts and safe road crossing systems. Human risk

factors such as speeding, drink-driving, poor compliance with road laws are prominent in crash causation. In Namibia, laws to address these factors do exist, however because of poor enforcement of traffic laws due to low numbers of traffic police, these factors have not been adequately addressed. Added to this, Namibia is a vast country, with extensive roads often meaning that there are long sections of highway which are not policed so factors such as speeding are not adequately addressed.

The increased motorisation in SSA in general and Namibia in particular has also not been accompanied by matching improvements in emergency, trauma care and rehabilitation, all of which are acknowledged to minimise injury severity, reduce the risk of disability following injury, and reduce deaths (in the case of emergency and trauma care). Currently, there are increasing numbers of RTIs, which are putting a pressure on already strained health services and leaving those injured in RTIs with poorer outcomes than in other parts of the world.

Despite this, there is still a lack of understanding as to the long-term impacts of RTIs and no known research done in Namibia. This highlights the importance of and need for this study.



## 4.0 METHODS

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### 4.1 INTRODUCTION

In this chapter, I present details of the methods used for this research. In doing so, I discuss details (and rationale) for the choice of the research design, data collection tools, methods of analysis, ethical considerations, and the strengths and limitations of the study design. To reiterate, this study was a mixed methods study using both quantitative and qualitative methods. Thus, methods specific to the particular studies are presented in the relevant sections below.

I began this study with a literature review which showed that RTIs are a worsening problem and despite this, there has been a lack of research on RTIs in Namibia, similar to other countries in SSA. The literature review also identified a dearth of research on the long-term impacts of road injuries, especially in LMICs like Namibia. The little that is known with regards to the impacts of RTIs is mainly based on findings from HICs, which have very different contexts to LMICs such as Namibia. Therefore, the ultimate goal of these studies was to determine the trends in RTIs over the specific years (2012-2014) and the actual impacts that the road crash event and injury outcome have on an individual's quality of life in the long-term. In terms of the trends in RTIs, the specific timeline (2012-2014) was used as data prior to 2012 was not available, and data from 2015 and onwards was not yet complete. The combination of qualitative and quantitative data helped to enhance the available information, thereby allowing exploration of the issues at different points in time.

## **4.2 RESEARCH DESIGN**

This study had two components. The first component was quantitative and involved analysis of Namibian data sets on road traffic crashes, deaths, and injuries, in order to identify trends in mortality and morbidity between the years 2012 to 2014. The goal of this analysis was to characterise the crashes, injuries and deaths and the people affected, and also to examine the trends over a three-year period. The data also allowed for analysis to be made on the method of transportation of the injured to hospital and the length of hospital stay following injury.

The second component of the research was qualitative and involved carrying-out semi-structured interviews with road-injury survivors and key people involved in health and disability, policy and advocacy in Namibia in order to establish the long-term impacts of road-injuries and the accessibility of rehabilitation and counselling services to road-injury survivors.

## **4.3 STUDY ONE: QUANTITATIVE STUDY**

### **4.3.1 Data sources**

Electronic access to annual Namibian data sets from 2012-2014 on road crashes, deaths and injuries was granted by the Motor Vehicle Accident Fund (MVAf). These statistics were

collated by the MVAf based on data from the police on RTIs, data from calls made to the national accident call centre, and data from claimants involved in RTIs. As noted in the first Chapter, the MVAf is one of the key agencies involved in road safety in Namibia and is a statutory body funded through a fuel levy provided by the Namibian Ministry of Mines and Energy. To remind the reader, the MVAf is tasked to design, promote and implement crash and injury prevention measures as well as to collate data on all people injured and killed in RTIs in Namibia and provide them and their families with assistance.

The data used in this analysis was therefore much more comprehensive than data which had been compiled before and used in analysis by NRSC (2013), NRSC (2015a), NRSC (2016a) and NRSC (2016b), which was based solely on police reports. The data used in this study was likely to be the most accurate data on RTIs in Namibia and it was anticipated that results from the analysis would provide a more accurate picture of death and injury rates due to RTIs in Namibia over the specified years.

The data sets were presented in Excel and were composed of three reports for each year: the crash standard report, the casualty report and the case hospital report. The crash standard report contained information for each individual on: details of the crash serial number, the date, day and time the crash occurred, the crash type and vehicle type involved in the crash. The casualty report contained for each individual: details of the crash serial number, the region, age, gender, road user type, casualty status (i.e uninjured, injured, or dead), place of death, and method of transportation to hospital. The road user types were classified as cyclists, drivers, motorcyclists, passengers, pedestrians, and others. Passengers

included any non-driving occupants of any motor vehicles involved in crashes. This is also the common definition of passengers given by the WHO, with passengers classified as non-driving occupants of cars, buses, motorbikes or any motorised vehicles (WHO, 2004). The case hospital report contained the details of the injury classification, injury category, and the length of stay in hospital.

#### **4.3.2 *Missing data***

For some of the variables analysed there were instances where some data was not recorded. For each section where this was the case, the percentage of missing data is reported.

#### **4.3.3 *Outline of analyses***

Data sets were analysed using quantitative methods (described in section 4.5.1.1). Analysis of data also identified the most vulnerable groups by gender, age, road user type, and regional distribution of deaths and injuries. The literature review identified a lack of literature on the transfer of RTI survivors in Namibia, following injury. The data sets contained this information and its analysis allow me to present these statistics. Access to corresponding data sets on RTI injury hospitalisations for the specific years was also granted. Quantitative methods were used to analyse this data in order to identify the pattern of injury type and severity of injuries. This data also allowed for calculations of average length of hospitalisation to be made.

Preliminary results from the quantitative analysis were used to help formulate questions used for the qualitative component of the research. The quantitative component thereby fed into the qualitative component of the research.

#### **4.4 STUDY TWO – QUALITATIVE STUDY**

This study involved carrying out two sets of interviews. The first set involved interviews with Namibian RTI survivors while the second set involved interviews with healthcare workers (HCWs) and disability advocates in Namibia. Both sets of interviews were conducted via semi-structured questionnaires with an overall goal of exploring the long-term impacts of road injuries in Namibia and identifying the accessibility of physical rehabilitation and counselling services to road injury survivors in the country. The two questionnaires (Appendices 4.1 and 4.2) were generated based on factors identified in the literature review to be relevant to RTIs and results of the quantitative analysis. Some of these included pain, mobility restriction, mental health, and economic problems. The questionnaires also collected demographic and socio-economic information such as level of education, age, and gender.

The questionnaires were designed to be semi-structured, with some of the questions being closed to elicit information such as “did you receive any rehabilitation? with “yes” or “no” responses. The other questions were open-ended, where more detailed responses were required. An example is: “Can you tell more about your health status since the injury?” This study design and all data collection instruments were submitted for and received Ethical

Clearance through UCL and the Ministry of Health and Social Services in Namibia (The ethical clearance proposal numbers are given in section 4.6).

#### **4.4.1 Study site and setting**

Both sets of interviews were carried out in Namibia. 18 of these were carried out in Windhoek, the capital city, and the rest were done in other parts of the country.

The research was conducted over a period of five weeks. The recruitment processes are described below.

#### **4.4.2 Sampling methods used**

The original plan had been to conduct a population survey using quality of life questionnaires on a sample of injured individuals obtained from the datasets used in the quantitative analysis identified by probability sampling. However, data protection concerns were raised by the MVAFA and permission was not granted for a population survey of such a nature to be carried out. I therefore decided to interview road injury survivors in the general Namibian population.

The exploratory nature of this thesis and the accessibility to the population under study required the use of purposive sampling. Purposive sampling tends to be used in qualitative

research where samples are handpicked to suit the phenomena under study. They are more likely to provide a good representation of the 'key issues' under study rather than provide a representative sample of the country as a whole. Road injury survivors were accessed by establishing contacts with the National Federation of People with Disabilities in Namibia (NFPDN) and the Namibian Association of People with Physical Disabilities (NAPPD). I conducted an internet search of specific service units, to identify individuals involved in the care of RTI survivors or those who had insight or influence on this (HCWs and disability advocates). Once contact had been established by phone and e-mail, individuals were invited to participate in the study. It was anticipated the individuals all had a common denominator of being a) injured in a crash, or b) being involved in the care of those injured in road crashes, and c) having expert knowledge on the life experiences of those injured in crashes and their interactions with the health care system. As the research was exploring the effects of the injuries sustained, it was considered that the sample would reflect the main constructs experienced by survivors of road traffic accidents. The recruitment processes for both sets of interviews and the eligibility criteria are described in greater detail below.

#### **4.4.3 Interviews with road-injury survivors**

It is likely that within the first few weeks and months of an injury, the true magnitude of the impact of injury may not have manifested. For example, a month after injury, an individual may still be on sick leave from their employment. However, after one year, if they are no longer able to carry out their work, they may have been dismissed. Therefore an inclusion criterion was set to at least one year post injury. I endeavoured to have a gender balanced sample: the sample consisted of eight males and six females. I also tried to keep a balance between rural and urban participants, however this was not possible as only two of those in the sample were based in rural areas with the rest in urban areas. I also made an effort to interview people with a range of different injuries. These varied from spinal injuries to lower limb fractures, and soft tissue injuries. I however decided to exclude those with head injuries because of the strong likelihood of cognitive deficits such as memory problems related to head injuries from RTIs. I had set out for all the interviews to be carried out in English and, using translators, in Afrikaans and Oshiwambo. These languages were selected as they are the most widely spoken languages in Namibia, with English being the official language. However, it was unnecessary for any translators to be arranged as all those interviewed were sufficiently fluent in English.



**Table 4.1: Inclusion and Exclusion Criteria for RTI survivors**

Participants were included or excluded on the following basis:

- All participants to have sustained a road injury at least one year before the interview.
- All road user types were included.
- A sound understanding and ability to converse in English, Afrikaans or Oshiwambo.
- Those who had sustained head injuries were excluded due to likelihood of cognitive problems
- All participants unwilling to take part were excluded from the study

Based on the inclusion criteria, estimates of a sample size of 10-20 were projected by the NFPDN and NAPPD. Although this sample size was not large and may have limitations due to the small sample size, and because a few of the individuals that were interviewed were members of NFPDN and NAPPD, and as such may not be representative all road-injury survivors, their voices and opinions were important and gave valuable insight on how road injuries affect individuals in Namibia.

For the interviews, The NFPDN and NAPPD were approached and informed of the study and the inclusion and exclusion criteria. The organisations acknowledged the importance and need for the study and initially identified four possible participants. The four individuals were approached and three of these agreed to participate in the study whilst one declined. The three who agreed to participate were also aware of people in their networks who had

been injured in RTIs and met the criteria for inclusion. They informed the individuals of the study and connected me with four more individuals who were willing to participate. Through these four, an additional seven participants were recruited. Thus, through snowball sampling, 11 participants were recruited. In total, the sample consisted of 14 individuals. Of the 11 individuals recruited through snowball sampling, nine were not aligned to the NFPDN nor to the NAPPD.

The 11 individuals also had additional people in their networks who had been injured in RTIs but by the time the last three interviews had been conducted, it was evident that saturation of data had been achieved and there were no new themes coming up in the interviews.

Participation in interviews was entirely voluntary and this was communicated to the participants in accordance with the UCL and Namibian Ministry of Health and Social Services ethical guidelines (noted above). The participants were also informed that ethical approval had been granted and were shown the ethical approval numbers. A plan was in place that if any participants appeared to become distressed during interviews, or were in need of further support or information, they would be referred to local disabled people's organisations (DPOs) which had been contacted prior to the interview process. This was however not necessary and none of the participants needed any such support following the interviews. It was also suspected that this research could intrude on some personal issues and therefore privacy was guaranteed. Interviews were conducted at the participants' convenience, allowing them to choose their preferred time. Questions were asked to all interviewees to allow for comparability. Participants were given information sheets and

informed that confidentiality would be maintained in accordance with the ethical regulations of the two bodies mentioned above. To ensure there was an understanding of the informed consent procedure, the participants were requested to sign a consent form to the effect that they understood the information given and had the chance to ask questions. The form also ensured that they were aware of their rights to withdraw at any time.

The questionnaire consisted of four sections - Part A: Demographic Information, Part B: Injury, hospitalisation, rehabilitation and costs, Part C: Health status and well-being, and Part D: Employment, loss of income and vocational rehabilitation. For the full list of questions please refer to Appendix 4.1.

Any identifying material was kept separate to any consent forms or data collection sheets in a locked drawer; alphanumeric codes were used as the only identifiers on the database. All personal identifying information was shredded at the end of the study, however consent forms are to be kept for seven years to meet ethical requirements. The interviews were recorded and during the interviews, field notes were also captured. I began to transcribe the interviews during the process.

#### **4.4.4 Interviews with healthcare workers and disability advocates**

Target participants included physiotherapists, doctors, nurses, occupational therapists, hospital managers/directors, disability advocates, orthotists, rehabilitation centre workers, and social workers with experience in caring for and/or dealing with road injury survivors. A sample size of 20-25 had been set in consideration of the shortage of health professionals in Namibia and also because it was anticipated this size would be sufficient to reach data saturation. Purposive (expert) sampling was used to identify participants. This involved an internet search of specific service units, to identify individuals involved in the care of road-injury survivors or those who had insight or influence on this.

**Table 4.2: Inclusion and Exclusion Criteria for HCWs and disability advocates**

- |  |
|--|
| <ul style="list-style-type: none"><li>-All participants to have been health care workers involved in the care of road traffic injury survivors and/or disability advocates with expert knowledge on issues to do with road-injury related long-term outcomes</li><li>-A sound understanding of and ability to converse in English.</li><li>-All participants unwilling to take part were excluded from the study</li></ul> |
|--|

An initial eight were approached directly to participate in the study. They were contacted first by e-mail and then phoned and they were all willing to participate in the study. From these eight, a further seven individuals who were suitable for the study were recruited via snowball sampling. I also had previous experience working as a physiotherapist in Namibia and using my knowledge and some of my networks was able to recruit a further six suitable participants. I endeavoured to have a gender, rural/urban, and regionally balanced sample and had a total sample of 21. An additional seven potential participants had been identified but by the time the last sets of interviews were done, data had reached saturation and no new themes were coming up in the interviews.

The questionnaire consisted of five sections - Part A: Demographic Information, Part B: Magnitude of RTIs and access to rehabilitation following injury, Part C: Aids, long-term impairment and disability, Part D: Employment, loss of income and vocational rehabilitation, and Part E: Psychological and social support. For the full list of questions please refer to Appendix 4.2.

Questions were asked to all interviewees to allow for comparability. All interviews were carried out in English, which is the only official language and used in all government official processes. Similar to the processes described above for interviews with injury survivors, participants were also given information sheets, informed that confidentiality would be maintained and asked to sign consent forms in accordance with the ethical regulations of UCL and Namibian Ministry of Health and Social Services (see below). These interviews were

also recorded and during the interviews, field notes were captured. Similarly, I began to transcribe the interviews during the process.

#### **4.4.5 Interview procedures**

All interviews were performed individually and occurred within a private environment of best comfort to the participants. I carried out all the interviews myself. The interview script was informally piloted with other research students prior to collecting data. As reported above, an interview guide with semi-structured questions was used.

I conducted the interviews iteratively between interviewing, transcribing and initial coding. Iterations consisted of: (a) after each interview, I transcribed the content; (b) I read the transcriptions and performed an initial coding individually (to be discussed below); (c) I reflected on how to align the interview process and direct probing questions in future interviews.

All interviews were recorded and on average lasted 25 to 40 minutes. I was identified by my initials (MC), whilst the participants were identified by random initials. Interviews started with a brief introduction and establishing rapport. Rapport was established by explaining the research goals and obtaining written informed consent. This was then followed by the interview questions. Probing questions included further explorations about key concepts within each response.

Road injury survivors provided detailed personalised accounts of their life experiences following injury and the impact of the road injuries on their quality of life. They also reported on their experiences of accessing rehabilitation and counselling services following the injury.

HCWs expressed their views on RTIs in Namibia and also provided information as to how they impact those affected and their access to rehabilitation and counselling services. The semi-structured interview format enabled participants to expand their responses on the issues they felt were most relevant to RTIs in Namibia.

Similar to other methods of gathering evidence, the interview method has its strengths and limitations. According to Yin (2009, p. 102) even though data collection using the interview method can be targeted and insightful, the method has been criticised for reasons including; poorly articulated questions leading to increased possibility of bias; poor recall by participants leading to inaccuracies; response bias; and “reflexivity – interviewee gives what the interviewer wants to hear”. I therefore undertook several practical steps to diminish these weaknesses. These included:

- re-examining the interview questions before the beginning of the study;
- asking participants follow-up questions; and
- asking the same question but worded differently.

Interviews continued until the condition of data saturation was achieved (14 for the interviews with RTI survivors and 21 for HCWs). Participation in the study was entirely voluntary and there were no monetary benefits or gifts.

## **4.5 ANALYSIS**

### **4.5.1 Study 1**

Stata (StataCorp), a general-purpose statistical software package, was used to analyse data sets (Stata, 2017). The main reasons I chose to use Stata is its ease of use and the use of repeated commands, thereby making it easier to perform repeat analysis. According to Baum et al (2011), Stata is an extremely powerful, yet flexible and easy to use statistical package, and is infinitely extensible and has a large user community discussing how to solve problems and writing new commands on a daily and even hourly basis. It also has several features designed to maximise the user's experiences and makes maintaining a documented research trail an easy accomplishment, whilst being fully portable across computing platforms and fully supported with frequent updates and bug fixing (Baum et al, 2011). I also chose Stata because I needed to use regression analysis. According to Accock (2005), compared with the other two dominant statistical analysis software packages (SAS and SPSS), Stata is extraordinary on regression, complex survey designs, limited dependent variables, epidemiological methods, time series, and diagnostics and looking to the future, may have the strongest collection of advanced statistical procedures.



#### **4.5.1.1 Data management and descriptive analyses**

In terms of the analysis itself, the reports were exported from the Microsoft Excel to STATA for analysis. In order to undertake more comprehensive analysis, the data sets for the crash standard and casualty reports were combined using a common variable (the crash serial number). The case hospital report only contained details for those hospitalised and did not have any connecting variable to the other two reports, so was analysed separately.

From the combined reports, analysis was made to obtain the absolute numbers of crashes, injuries and deaths for each year. From these, the annual rates were then calculated using the population estimates of the corresponding years. The combined reports were appended in order to allow analysis, not just on specific years, but also over the whole period from 2012-2014. Following this, the distribution of crashes, deaths and injuries were analysed by region. This was followed by calculations of the rates for the corresponding periods. In order to ascertain the vulnerabilities of specific groups, I then moved on to analyse the distribution of crashes, deaths and injuries by road user type, gender and age. Following the descriptive analysis, I used national and regional Namibian population data, age-related population data, total registered vehicles numbers, and vehicle kilometres travelled (VKT) as well as numbers of people involved in specific crashes in order to calculate crash, injury and deaths rates for different road users. Data could also not be established for some general national Namibian statistics necessary to perform further analysis. For example, I intended to analyse the rates of injury and death associated with specific vehicle types such as buses, sedans, motorbikes, but data on vehicle kilometers travelled (VKT) were not available by

specific vehicles types. Data also allowed for analysis to be done on the distribution of crashes, deaths and injuries by day and month as well as the distribution of vehicles involved in crashes. Further to this, I also used the Chi-square goodness of fit test, which a test intended to test how likely it is that an observed distribution is due to chance, in order to determine the significance of the findings.

The case hospital data set was analysed to establish the distribution of severity of injuries over the period and for each year; the categories of injuries; and the median length of stay in hospital due to RTIs for the total period and for the specific years. Unfortunately, this data set contained limited information and injuries were not classified by body site but rather by medical nomenclature. For example, instead of upper limb fracture or lower limb amputation, such injuries were classified as orthopaedic, with no indication of the body site affected. This information would have been beneficial to make more in-depth analysis on the types of injuries.

#### ***4.5.1.2 Multinomial logistic regression***

Next I conducted bivariate and multivariate multinomial logistic regression with “uninjured” as the reference category and “injured” and “killed” as the two outcome variables. This was done in order to investigate the effects of predictor variables including: day of the week, age, gender, vehicle type, region, and crash type on the likelihood of having been injured or killed, given involvement in a reported crash. For the multivariate analysis I included all the variables. Following this, I conducted bivariate and multivariate multinomial logistic

regression with “killed” compared with “injured” in order to investigate the effects of the predictor variables and additionally the method of transportation to hospital on the likelihood of having been killed, given transfer to hospital.

In doing the regression analysis, within the factors, I used the category with the lowest risk as the reference. For example, for road users I used drivers as the reference group. The only exception was for gender where I had to do otherwise to maintain consistency of the tables. To explain further, being female was associated with greatest risk when analysing with “uninjured” as the reference category and “injured” and “killed” as outcomes. However, being male was associated with greater risk when doing analysis of “killed” compared with “injured”. I did not include crash types in the multivariate regression as there were over 25 different crash types and the tables would have been too long and difficult to decipher if included. The results are presented as proportions (%) or odds ratios (OR) with 95% confidence intervals (CIs).

#### **4.5.2 Study 2**

Audio recordings were listened to carefully and then transcribed into Word for coding and analysis. All transcriptions were performed by myself within 7 days from the original interview. I decided to do the transcriptions myself as this would be a way for me to become better acquainted with the data. According to Braun and Clarke (2006), while transcribing may be an arduous, frustrating, time consuming, and even boring task, it can be an excellent way for the researcher to start familiarising themselves with the data. Further,

Bird (2005) argues that transcription should be considered within interpretative qualitative methodology as a key phase of data analysis, while Lapadat and Lindsay (1999) add that it should be recognized as an interpretative act, where meanings are created, as opposed to simply being a mechanical act of transferring audio sounds to paper. Based on these reports, the transcription process was part of my analysis of the qualitative research.

All interviews were transcribed verbatim and since they had all been conducted in English, there was no need for translation. Notes and impressions obtained during participant interviews were added to the original transcription as comments. All identifiers were removed from the transcript to ensure confidentiality. Transcribed interviews resulted in a total of 226 pages of typed text, with a range from one to eight pages per participant.

Data from both sets of interviews were analysed using thematic analysis. This is a qualitative method of analysis which involves a process of identifying, analysing and reporting patterns or themes within qualitative data (Braun and Clark, 2006). This method organises and describes qualitative data in rich detail, with an overall goal to identify themes or patterns in the data that are important or interesting and can be used to address the research or say something about an issue (Maguire and Delahunt, 2017). I chose thematic analysis for a range of reasons. These included, as described by Braun and Clarke (2006), its relative ease of use and flexibility. They also add that via its theoretical freedom, it provides a useful and flexible research tool, which can potentially not only provide a rich and detailed, but also complex account of data and can generate unanticipated insights (Braun and Clarke, 2006). Based on the type of research that I was working on, I anticipated that I would need to

develop policy recommendations. According to Braun and Clark (2006), a particular advantage of thematic analyses is that it not only allows for social and psychological interpretations of data, but is also useful for producing qualitative analyses suited to informing policy development.

In doing this analysis, I followed the six-step framework of Braun and Clarke (2006). This framework is arguably the most influential approach in thematic analysis because it offers a clear and usable framework for conducting analysis (Maguire and Delahunt, 2017).

In order to familiarise myself with the data, I read through the transcriptions several times and as reported earlier, I had done the transcriptions myself, which involved listening to the audio tapes multiple times. According to Braun and Clarke (2006), this is a vital step as it is crucial for the researcher to immerse themselves in the data to the extent that they become familiar with the breadth and the content and will involve repeated active reading of the data to search for meanings, patterns before beginning coding, as ideas and identification of possible patterns will be shaped whilst reading through. Thus, at this stage I also started to make notes of early impressions and ideas.

I then moved on to coding the data. Coding is a process by which large sets of qualitative data are reduced into small chunks of data in a meaningful and systematic way (Maguire and Delahunt, 2017). The codes are tags or labels for allocating units of meaning to the descriptive or inferential information compiled during a study and are attached to chunks of

varying-sized words, phrases, sentences or whole paragraphs, connected or unconnected to a specific setting (Basit, 2003). Coding is part of the qualitative analysis (Miles and Huberman, 1994), as you are organising the data into meaningful groups (Tuckett, 2005). The process is used to find the most meaningful parts of the data, and to generate concepts about the data, by manipulating it (Gough & Scott, 2000).

This can be done either manually or using software such as Nvivo (Basit, 2003). I decided to code manually because of the relatively small sample. The coding involved writing notes on the transcripts that I analysed, and using highlighters to indicate potential patterns. I used an inductive approach with no pre-defined themes to guide the coding process. Thus the codes formulated were driven by the data. I carried out line by line coding and this involved identifying as many potential themes/patterns as possible. I applied multiple codes to data extracts where applicable and also coded for minority and contradictory features. Field notes had also been coded on a daily basis. This enabled ongoing analysis and reflection on the purposes and findings of the research. I used an inductive approach to the analysis, meaning that I had gone into the research without any preconceived ideas - the research was driven by the data. Quotes were assigned a unique identifier number, making it possible to trace the quotes to the original interview.

The text formed meaning units, which were condensed, abstracted and labelled with codes. Once I had completed the coding process, I examined the codes to identify the ones that shared commonalities and these were collated into themes. Thus the coding process grouped the descriptions of observations and informal conversations into themes.

Following this, I reviewed, modified and developed the emerging themes. This involved reviewing all the data associated with each theme in order to ascertain if, as recommended by Braun and Clarke (2006), the themes made sense and were supported by the data; if there was any overlap between themes, to identify any themes within themes (subthemes); and to ascertain if there were any other themes within the data. Once this had been completed, I went on to analyse the remaining themes and define and rename them. Part of this process involved conducting a detailed analysis in identifying the narrative being given by each theme and how it fit into the broader overall 'story' that one is telling about the data. Once I had completed this step and has a set of fully developed themes, I then began the final analysis and write-up of the report.

Text from the survivors and HCWs were included in more than one category when necessary. Alongside this coding, a reflective analytical diary was kept, to draw out and justify emerging themes and lines of enquiry throughout the fieldwork process. Emerging themes were then articulated regarding their role in the reasoning process as a whole. I further analysed the various qualitative themes using theme content analysis.

Following analysis, the quantitative and qualitative data were merged in order to identify overarching issues and common themes and this material was then discussed in light of national and global public health and disability related concerns.

#### **4.6 ETHICAL CONSIDERATIONS**

Ethical approval was granted from both the UCL Ethical committee (ethical approval number: 7417/001) and the Ministry of Health and Social Services in Namibia (ethical approval reference 17/3/3).

#### **4.7 CONCLUSION**

This chapter has provided justifications for the thesis research design and the methods used. I have discussed the steps taken to carry out the quantitative study and described the analysis done and justified the rationale for this specific analysis. I have also described the steps taken in conducting the qualitative studies, including the sampling used, the study setting, the methods, and justified the methods of analysis. In addition, I also explained how I maintained ethical standards. In the next chapter I will present the findings from these studies.



## 5.0 QUANTITATIVE ANALYSIS OF NATIONAL REPORTED ROAD TRAVEL CRASH DATA

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### 5.1 MAGNITUDE OF THE PROBLEM

Between 2012 and 2014, there were a total of 12,210 reported crashes in Namibia. These involved a total of 33,395 people, which represents about 1.4% of the total population estimate for 2014 (n= 2,374,725). The casualty status was recorded for 99.1% (n=33,094) of those involved in the crashes. Of these, 6.0% (95% CI 5.7-6.2, n= 1,976) were known to be killed, 61.7% (61.2-62.3, n= 20,429) were known to be injured, and 32.3% (31.8-32.8, n=10,689) were reported as being uninjured. Thus the injury-to-fatality ratio was 10 to 1 in this dataset.

Appendix 5.1 shows the change in the total number of crashes from 2012-14 compared with the registered vehicles by year and total population. It also presents the crash rates by number of registered vehicles, VKT and population. As illustrated, crashes and crash rates all increased over this period. Using the chi-square test statistic, goodness of fit test showed statistical significance for the changes over time in the number of crashes, injuries, and deaths.

Appendix 5.2 shows the number of injuries and deaths over the specific years as well as the corresponding rates when considering crashes, registered vehicles, VKT and population. As illustrated in the table, injury and death rates rose over the corresponding period.

Appendix 5.3 presents the distribution of people involved in crashes, injured and killed for each variable that was used in the analysis.

## **5.2 VEHICLES INVOLVED IN CRASHES**

As previously noted, there was no information available on the total distribution of the specific types of vehicles over this period. Additionally, although the total VKT (vehicle km travelled) was available, there was no information on the VKT for specific vehicles. Both these statistics would have allowed for further analysis on the rates of crashes, injuries and deaths by specific vehicle type.

From 2012-2014, a total of 13,997 vehicles were involved in crashes. Most of these were sedans, and they resulted in the greatest number of injuries. Crashes involving pick-ups, however, resulted in the highest number of deaths. When considering the number of injuries and deaths compared with the number of crashes, buses had the highest injury and deaths rates. Appendix 5.4 illustrates these findings. Appendix 5.5 shows the total distribution of individuals involved in crashes, injured and killed, by vehicle type over this period.

## **5.3 TYPES OF CRASHES**

95% (11,583) of crashes from 2012-2014 were classified. Appendix 5.6 shows the proportions of the different types of crashes in descending order. Pedestrian and rollover crashes were more prevalent compared to other types of crashes as shown.

#### **5.4 DISTRIBUTION OF CRASHES, DEATHS AND INJURIES BY DAY AND MONTH**

##### Distribution of crashes, injuries and deaths by day of week

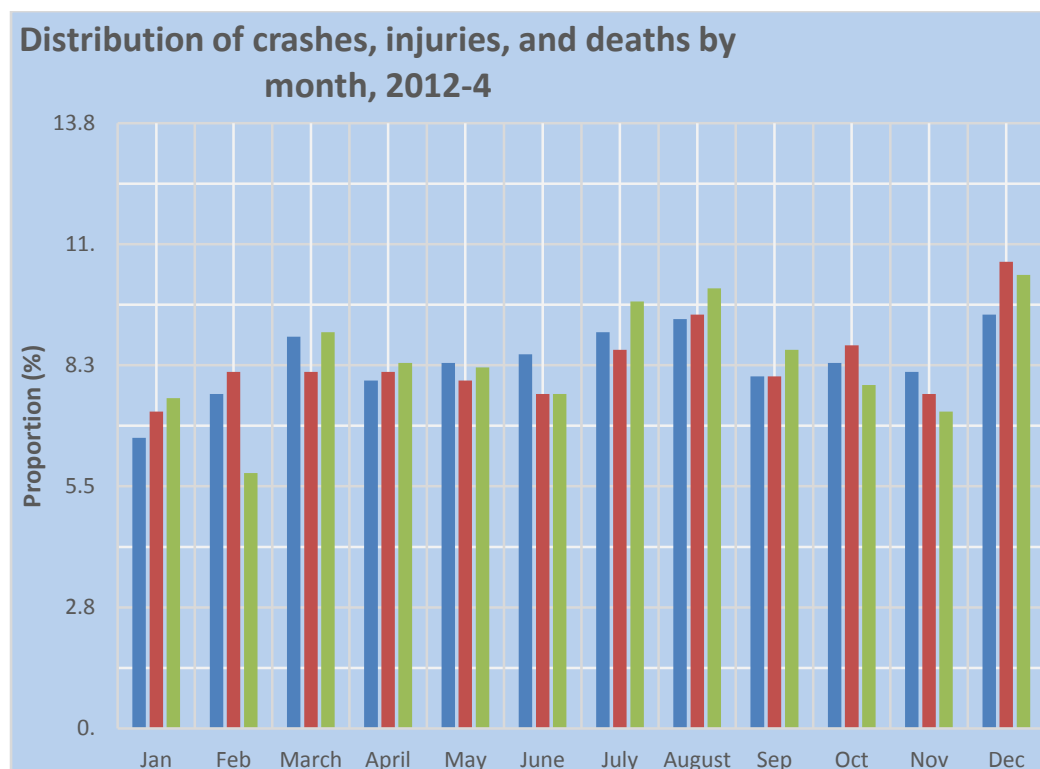
The day of crash was given for 99.7% of crashes (12,168). There were more crashes, injuries, and deaths on Saturdays compared to any other days. Comparing injuries and deaths with crashes, the highest injury rates were on Sundays. Appendix 5.7 also illustrates these findings. Using the chi-square test statistic goodness of fit test showed statistical significance for the occurrence by day in crashes, injuries, and deaths (see footnotes under Appendix 5.7).

When considering road-user groups, more road users (pedestrians etc.) were also injured and killed on Saturdays compared to any of the other days. Appendices 5.8 and 5.9 present these findings.

## Distribution of crashes, injuries and deaths by month of year

In terms of monthly distribution, from 2012-2014, most crashes, injuries, and deaths were reported in December and August. The lowest number of crashes and injuries were reported in January, whilst the least number of deaths were reported in February. When considering the number of crashes, the highest injury rates were in December, followed by January. In comparison, the highest death rates occurred in January, followed by December. Using the chi-square test statistic goodness of fit test showed statistical significance for the occurrence by month of crashes, injuries, and deaths. Appendix 5.10 and Figure 5.1 present the findings.

**Figure 5.1: Distribution of road crashes, injuries, and deaths in Namibia, by month, 2012-2014**

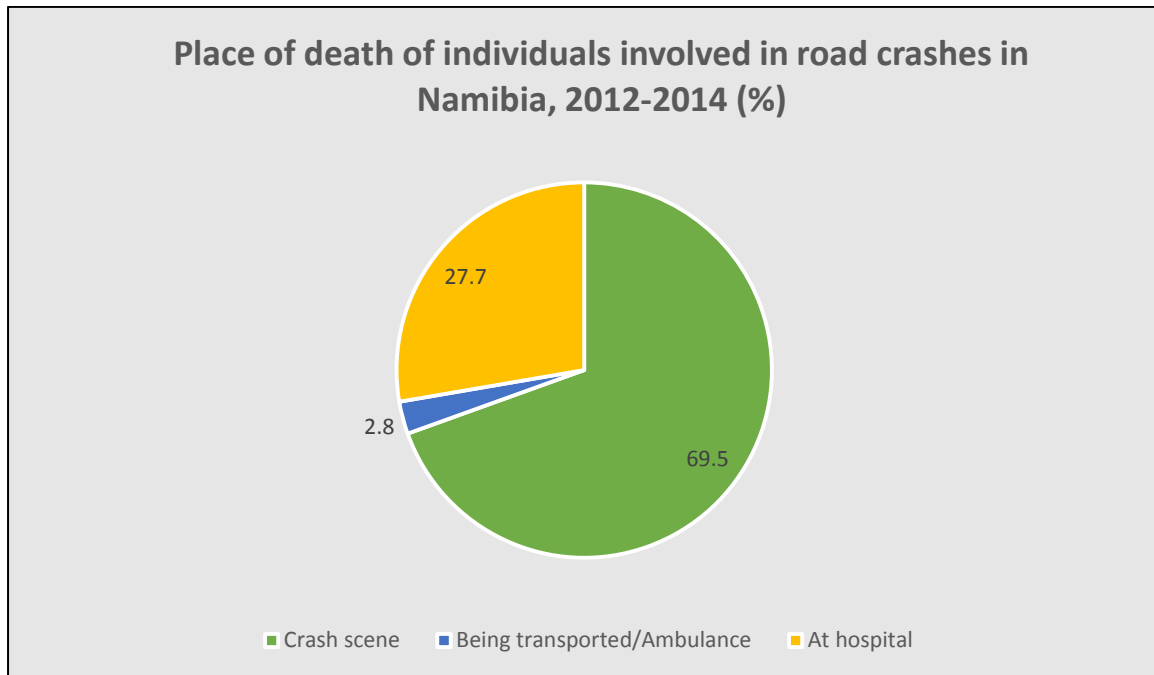


## 5.5 PLACE OF DEATH

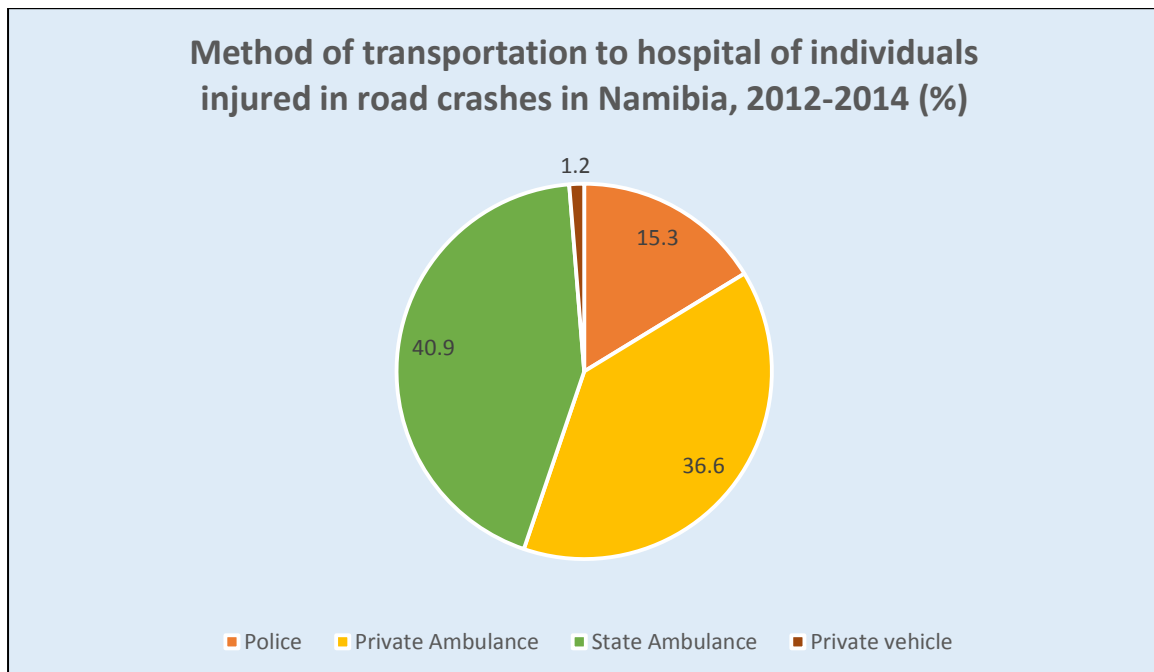
Over the period 2012-2014, most individuals sustaining fatal injuries were killed at the crash scene. Figure 5.2 illustrates these findings. As appendix 5.11 shows, for all road user groups, most people were killed at the scene of the crash. Looking at the method of transportation of injured people to the hospital, more of them were transported to hospital by private ambulance as shown on Figure 5.3. As shown on Figure 5.4, more of those who were being transported by police died before on the way to the hospital compared with the other modes of transportation.

Over 25% of all injured individuals in each road user type grouping were transported to hospital by either the police or private vehicles. This is shown on Appendix 5.12, which gives the method of transportation by road user group. Regionally, more of the injured people transported to hospital by private and state ambulances were in the southern regions of Khomas, Erongo, Karas, and Hardap regions. Meanwhile the northern regions of Caprivi, Kavango, Omusati, and Ohangwena regions had the most injured people transported by police and private vehicles to hospital. These results for all regions are shown in Appendix 5.13. Caprivi, Kavango, Omusati, and Ohangwena rank amongst the most rural and poorest regions in Namibia while Khomas, Erongo, Karas, and Hardap region have the lowest poverty indicators and are the most urbanised. Figures 5.5 and 5.6 illustrate these statistics. Because of how rural and poor they are it is likely Caprivi, Kavango, Omusati, and Ohangwena have lower coverage of EMC services compared with other regions.

**Figure 5.2: Place of death of individuals involved in road crashes in Namibia, 2012-2014**



**Figure 5.3: Method of transportation to hospital of individuals injured in road crashes in Namibia, 2012-2014**



**Figure 5.4: Proportion of individuals injured in crashes who died whilst being transported by method of transportation in Namibia, 2012-2014**

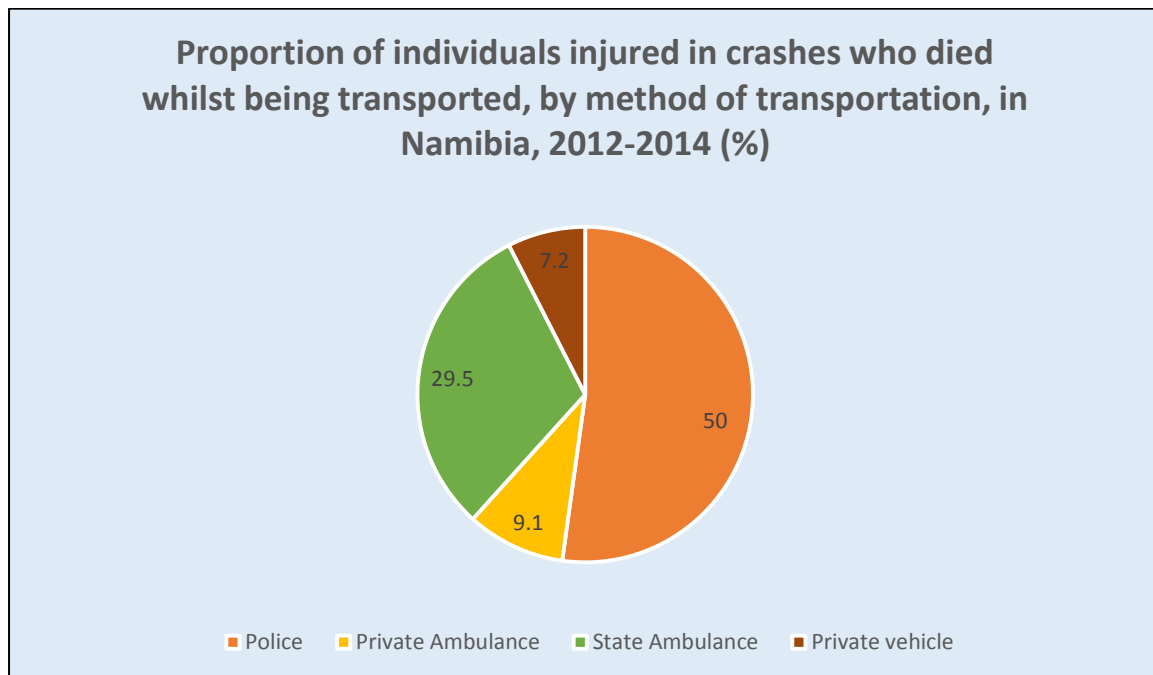
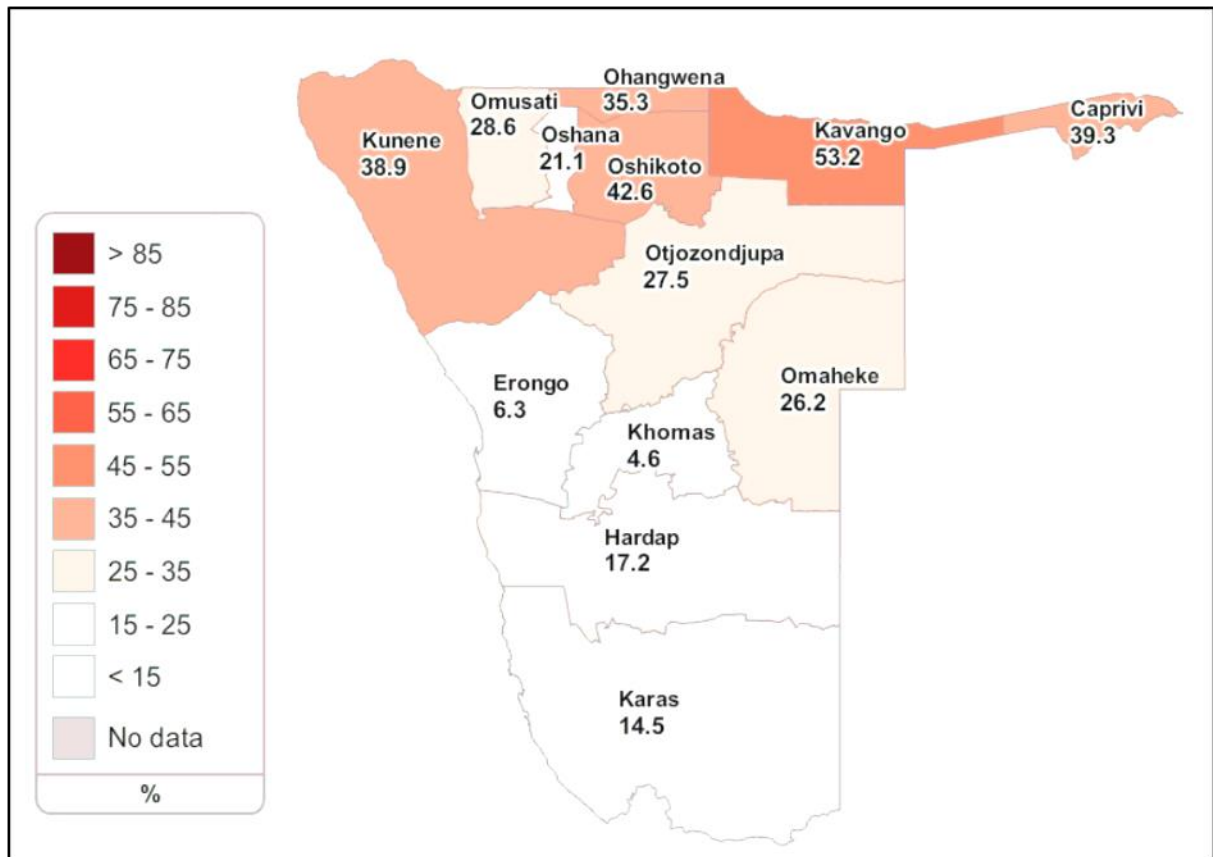


Figure 5.5: Regional headcount poverty rate for Namibia, 2011 census







## 5.6 REGIONAL DISTRIBUTION OF CRASHES, DEATHS AND INJURIES

From 2012 to 2014, the highest percentage of people involved in crashes were in the Khomas region with 30.2% (29.6-30.7), while the lowest numbers were reported in the Caprivi region at 2.0% (1.8-2.1). Khomas region had the highest population whilst Caprivi had the fifth lowest population size out of the 13 regions. In terms of the specific road user groups of people involved in crashes in each region, Khomas region also had the highest numbers for all road users groups. Appendix 5.14 illustrates the total regional variations as well as the distribution of those involved in crashes by road user type.

Similarly, Khomas also recorded the highest numbers of crashes at 37.9 % (37.0-37.8), with the lowest recorded in Caprivi at 1.9 (1.7-2.2). Khomas region had the highest population and highest levels of motorisation compared to the other regions. Meanwhile Caprivi had one of the lowest population densities and levels of motorisation. When considering the size of the region, over the three years, the most crashes per 1,000 square miles were in Oshana (42.8 crashes/1,000m<sup>2</sup>) and the least were recorded in Karas and Kunene (both 0.8 crashes/1,000m<sup>2</sup>). Appendix 5:15 illustrates these findings. Unfortunately, there were no data available on the regional distribution of different road users in Namibia over that specific period, which would have allowed for further analysis.

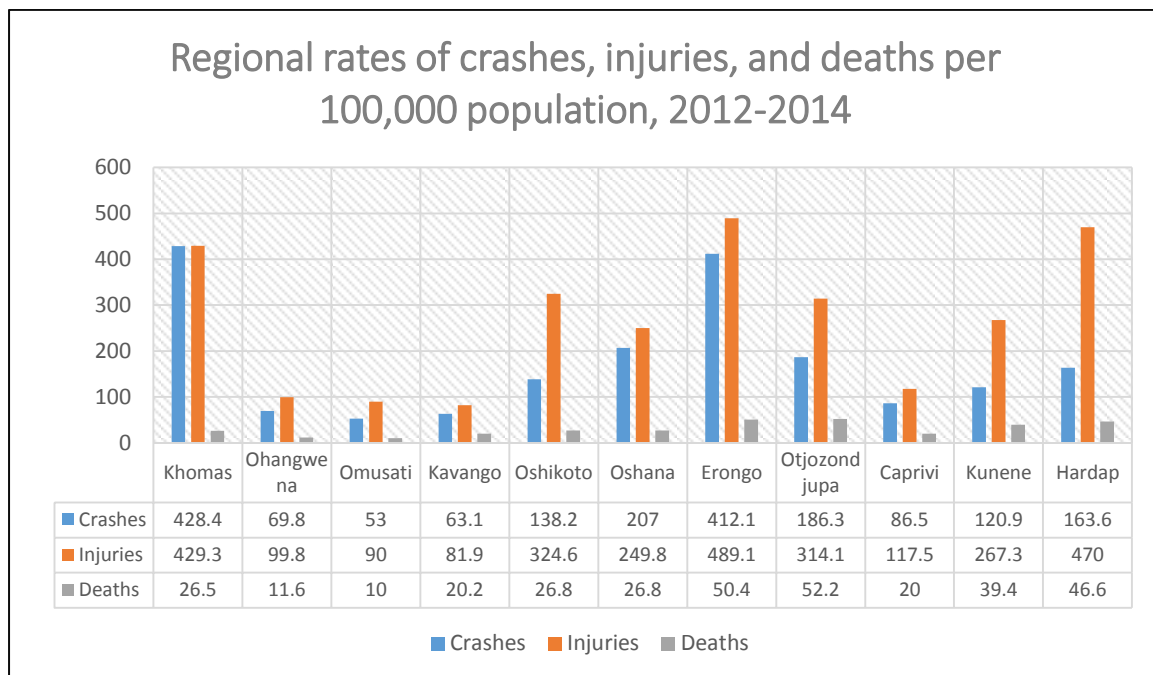
In terms of casualties, the most injuries were reported in Khomas at 29.7% (29.1-30.4%) while the most deaths were reported in Otjozondjupa (14.1%, 12.5-15.6%). Putting into consideration the number of crashes, Omaheke had the highest injury rate per 100 crashes while Khomas had the highest death rate per 100 crashes. Appendix 5.16 presents these findings for the regional distribution of injuries, deaths and the corresponding injury and death rates putting into consideration the number of crashes.

Figures 5.7 and 5.8 show the regional levels of motorisation and regional population proportions. Putting into consideration the number of registered vehicles in each region, Ohangwena had the highest rates of crashes and deaths per 1,000 registered vehicles, whilst Oshikoto had the highest corresponding rates of injuries. Meanwhile, considering the population, Khomas had the highest rate of crashes/ $10^5$  population. Erongo and Otjozondjupa had the highest injury rate and deaths rates/ $10^5$  population, respectively. Figures 5.9 and 5.10 illustrates these findings.





**Figure 5.10: Regional rates of crashes, injuries and deaths, per 100,000 population, 2012-2014**



### Regional distribution of injuries and deaths across road user groups

For all road user groups, the highest number of injuries were reported in Khomas except for cyclists, of whom the largest number were injured in Erongo. Appendix 5.17 illustrates these results. More pedestrians and cyclists were killed in Khomas than any other region. More drivers, motorcyclists and passengers were killed in Otjozondjupa. Appendix 5.18 presents these results. Because of lack of data on the total road-user numbers of cyclists, motorcyclists, passengers, pedestrians in each region over that specific period, it was not possible to present any analytical comparative regional rates of injuries and deaths by road user group.

## 5.7 DISTRIBUTION OF CASUALTIES BY ROAD USER TYPE

The road user group was indicated for 88% of all those involved in crashes (including those uninjured) (n=29,405). For motorcyclists, data was only reported for 2014 and they were 0.4% (0.3-0.6) of those involved in crashes for that specific year. Appendix 5.19 shows the absolute numbers and corresponding proportions. Passengers made up most of those involved in crashes who were injured or killed.

Meanwhile Appendix 5.20 shows amongst each road group, the casualty status following the road crash. Looking at specific vulnerability within road user groups, higher proportions of pedestrians and cyclists were injured or killed when they were involved in crashes. As the table shows, only 2.7% (2.2-3.3%) of pedestrians were uninjured following a crash compared with 58.7% (57.8-59.6%) of drivers.



## 5.8 DISTRIBUTION OF CASUALTIES BY GENDER

The gender of those involved in crashes was recorded for 95.4% of survivors (n= 31,564). Of these, 70.4% (69.8-70.9%) were male (n=22,215) and 29.6% (29.1-30.2%) were female (n=9,349). Proportionally more males were injured and killed and males had higher injury and deaths rates/10<sup>5</sup> population. Appendix 5.21 shows the gender distribution of casualties including the non-injured and the corresponding rates of injury and death. Of those crash survivors with gender classification, the road user group was recorded for 91.9% (n=28 636). Men comprised the majority of all road users and the majority of injuries and fatalities across all road user groups. Appendix 5:22 shows the gender of different road user groups involved in crashes and the corresponding proportions including injuries and fatalities.

Unfortunately, no data was collected on the gender of specific road users in Namibia generally over this period, which would have allowed for further analysis. Therefore analysis was done using the total number of specific road users of each gender who had been involved in crashes to calculate injury and death/crash rates. These results are presented in Appendix 5:23.

## 5.9 DISTRIBUTION OF CASUALTIES BY AGE

Age statistics were missing for only four percent of survivors who sustained fatal injuries (n=77) and for only 15% of those who were injured (n=2,913). Over the 3 year period, 31% (30.7-31.8%) of all those involved in reported crashes were aged from 18 to 29. This same age group was also worst affected in terms of injuries 34% (32.9-34.3%) and deaths 28% (26.5-30.5%).

However, considering the population of each age group, the 30 to 39 age group had the highest injury rate/ $10^5$  population whilst the 80 and above age group had the highest death rate/ $10^5$  population. Appendix 5.24 presents these findings including the injury and death/crash rate for each age group.

## 5.10 INJURIES AND HOSPITALISATION

### Types and severity of injuries

9,541 people are reported to have been hospitalised following injury from 2012-2014. Of these, only 37% (n=3,506) had the injury severity classified (as slight, moderate, or severe). The majority of those injuries were classified as moderate (60%, 58.6-61.8%). Appendix 5.25 presents these findings including the absolute numbers and the proportions.

Only 38% (n=3,587) had the injury category reported. However instead of being classified by the body site affected - for example; upper limb - the injuries were classified by the medical speciality such as neurosurgery and orthopedic. The majority of injuries (55%, 52.8-56.1%) were indicated as having been orthopaedic. Of these, the majority were moderate injuries. Appendix 5.26 presents the findings across all classifications.

21% (n=2,900) of injuries had been classified for both severity and type of injuries. Appendix 5.27 shows the distribution of the types of injuries by injury severity.

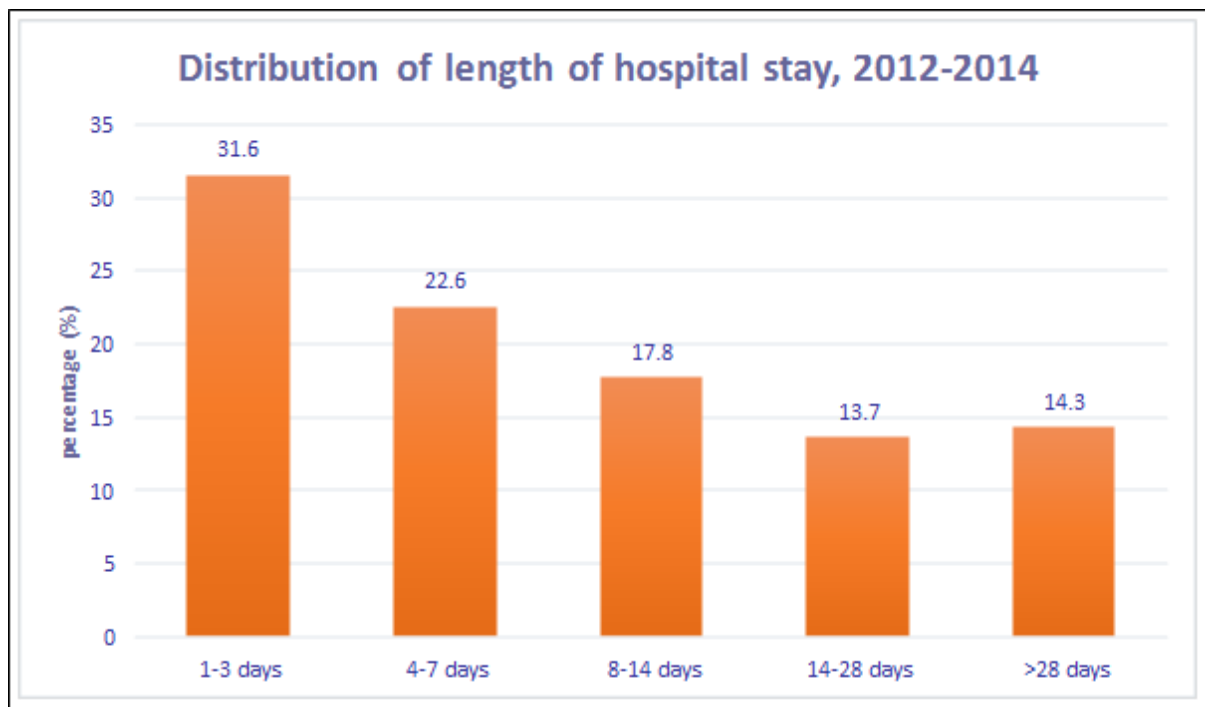
## Hospitalisation

Over 2012 to 2014, an average of 48% of the injured were hospitalised. In 2012 only 11% of the injured (n=714) were hospitalised. In the following years, comparatively more injured people were reported to have been hospitalised. This was 63% (n= 4,134) in 2013, and 67% (n=4,693) in 2014. Using the chi-square test statistic goodness of fit test showed statistical significance for the change in hospitalisation over the years: ( $\chi^2$  (2) = 2913.4, p = 0.05).

## Length of stay in hospital

Of the 2,210 injured people whose length of stay in hospital was recorded over the period 2012-4, the modal length of stay was three days or less. The median length of stay in hospital was three days. Figure 5.11 presents the overall findings.

Figure 5.11: Length of stay in hospital in Namibia due to road injuries, 2012-2014



#### 5.11 RESULTS FROM BIVARIATE AND MULTIVARIATE LOGISTIC REGRESSION ANALYSIS

Both bivariate and multivariate analyses conducted showed that the road user group had the greatest influence on the risk of being injured and killed, whilst the day of the week had the least influence. Being a motorcyclist was associated with the greatest risk of being injured and killed in the reported crashes. These results are presented in Appendix 5.28.

Considering factors associated with dying from an injury among those admitted to hospital, the method of transportation to hospital had the greatest influence on the risk of dying whilst the day of the week had the least influence. Specifically, being transported by the

police was associated with greatest risk of dying. These results are presented in Appendix 5.29.

Appendix 5.30 shows the results of multinomial regression analysis on the risk of being injured and killed by crash type. In order to maintain consistency, I have presented the results for the different crash types in the same order as Appendix 5.6.

Chain collisions were chosen as the reference group because they showed the lowest risk of injury. Compared with other crash types, hit and run crashes were associated with greatest risk of injury and death.

## **5.12 CONCLUSION**

This chapter has presented data analysed on RTIs in Namibia over the period 2012-2014. The findings of this analysis show that the rates of injury and death have risen within this short space of time which is concerning. In addition to calculation of these national rates, this analysis has also looked at rates by age group, gender, road user groups, and region, which previous reports on RTIs in Namibia have not done as they have only looked at absolute numbers in terms of vulnerability amongst different groups. As such, this analysis brings new insights about vulnerability as I included the numbers of people of the specific demographic grouping in order to calculate rates. For example, when looking at the numbers of people injured and killed, elderly people show the lowest absolute numbers. However, when considering the total population of that age group, they show the highest

rates. Furthermore, unlike other studies on RTIs in Namibia, I have conducted bivariate and multivariate regression analysis and identified the groups with the greatest risks of being injured and killed. This adds to the knowledge on RTIs in Namibia and as will be discussed in subsequent chapters is new information which can be of use to policymakers.

The next section presents the qualitative data from the interviews done with people who have been injured in RTIs and the healthcare workers involved in their care and disability advocates.

## **6.0 QUALITATIVE ANALYSIS FROM INTERVIEWS WITH INJURED SURVIVORS AND HCWS**

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### **6.1 INTRODUCTION**

To remind the reader, a description of the support systems in place for road injury survivors in Namibia was presented in Section 1.7. These are the MVAf and the disability grant. The MVAf is a fuel funded levy that was set up by the Namibian government in 1991 to compensate road injury survivors. Anyone injured in a crash regardless of fault can apply to the Fund and receive various benefits pending approval. The disability grant is a social benefit awarded by the Namibian government. Anyone can apply for the benefit but this is only issued following a health assessment by government medical officers and a decision to support the individual's claim by the officer.

I carried out interviews with injured road injury survivors and HCWs in order to ascertain the long-term impacts of road injuries in Namibia as well as the availability of rehabilitation and counselling services following the injury. In this chapter I discuss these findings.

### **6.2 DEMOGRAPHIC DETAILS**

Interviews were carried out with 14 road injury survivors and 20 HCWs. In terms of the gender and age characteristics of the injury survivors, 57.1% (n=8), were male, with 42.9% (n=6) being female, 78.6% were aged below 40, with the average age of 34.6 years. In terms of the HCWs, 55.0% (n=11), were male, and 45% (n=9) were female. They had an average of



9.6 years work experience. Tables 6.1 and 6.2 below describe the demographic details of the participants.

**Table 6.1: Demographic details of injured survivors**

Participant	Age	Gender	Injury sustained	Time since injury (years)	Highest level of education	Pre-injury employment status	Post-injury employment status	Region
L1	28	Female	T12 fracture-paraplegia	7	Bachelor of Education degree	Student: 1st year at university	Employed: rehabilitation coach	Khomas
L2	27	Male	T9 fracture-paraplegia	3	Grade 9	Employed: electrician	Unemployed	Kunene
L3	33	Female	T5/6 injury-paraplegia	13	Grade 10	Unemployed	Unemployed	Erongo
L4	29	Male	C4/5 injury-quadruplegia	5	Grade 12	Volunteer	Unemployed	Erongo
L5	32	Female	T12 fracture-paraplegia	10	BSc Honours degree	Student: high school	Employed: teacher	Kavango
L6	46	Male	Right shoulder fracture/dislocation, right scapular fracture	5	Grade 12	Employed: fishing industry	Unemployed	Oshana
L7	37	Male	Metatarsal fracture, rib fractures, right leg soft tissue injury	3	Grade 12	Employed: military	Employed: military	Otjozondjupa
L8	27	Female	soft tissue injury both legs, abdominal injury	3	Grade 10	Student: engineering course	Unemployed	Khomas
L9	27	Male	C5/6 injury-quadruplegia	2	Diploma in mechanics	Employed: mechanic	Employed: administration	Erongo
L10	50	Male	upper and lower limb fractures	2	Grade 10	Employed: delivery driver	Employed: delivery driver	Khomas
L11	39	Male	C6 fracture-quadruplegia	2	Grade 12 and military qualification	Employed: navy	Employed: navy	Khomas

L12	31	Female	T4/5 injury-paraplegia	3	Bachelor of Accounting and Finance degree	Employed: financier	Employed: financier	Khomas
L13	49	Male	Skull fracture, blindness, lower limb fracture	20	Diploma in Business Management	Employed: civil servant	Employed: NGO officer	Erongo
L14	29	Female	T1/2 injury-paraplegia	8	Grade 12	Employed: canteen supervisor	Employed: administration	Karas

**Table 6.2: Demographic details of HCWs and advocates**

Participant	Age	Gender	Occupation	Highest level of qualification	Years of work experience	Years with institution	Institution type	Region
P1	33	Male	Human Rights and Disability officer	Bachelor of Arts degree	7	7	Charity/NGO	Khomas
P2	32	Male	Basic grade Occupational Therapist	BSc Honours Degree	7	4	Government	Khomas
P3	29	Female	Senior grade Occupational Therapist	BSc Honours Degree	6	6	Government	Erongo
P4	35	Female	Chief Physiotherapist	BSc Honours Degree	11	6	Government	Khomas
P5	25	Female	Senior grade Occupational Therapist	BSc Honours Degree	3	3	Government	Khomas
P6	33	Female	Senior grade Occupational Therapist	BSc Honours Degree, Postgraduate Diploma	10	2	Government	Oshana
P7	34	Male	Senior grade Physiotherapist	BSc Honours Degree	10	6	Government	Otjozondjupa
P8	40	Male	Senior Orthotist/Prosthetist	BSc Honours Degree	12	12	Government	Khomas
P9	36	Female	Senior Registered Orthopaedic nurse	Diploma	11	10	Private	Khomas
P10	36	Male	Chief Physiotherapist	Master's in Public Health degree	13	8	Government	Khomas
P11	31	Male	Basic grade Physiotherapist	BSc Honours Degree	7	1	Government	Caprivi
P12	29	Female	Basic grade Occupational Therapist	BSc Honours Degree	6	2	Government	Khomas
P13	36	Male	Chief Orthotist/Prosthetist	MSc Degree in Biomedical Engineering	15	15	Government	Khomas
P14	33	Female	Medical Officer-Spinal Unit	Medical degree	4	4	Government	Khomas

P15	38	Female	Senior Social worker	BSc Honours Degree	4	4	Government	Khomas
P16	37	Male	Community rehabilitation specialist and Lecturer	Master's in Public Health degree	13	1	Private	Otjovondju pa
P17	38	Female	Practice owner-Occupational therapist	Master's in Business Management Degree	14	2	Private	Khomas
P18	36	Male	Rehabilitation quality specialist at MVAF	Master's in Public Health degree	13	3	Private	Khomas
P19	36	Male	Chief Regional Occupational Therapist	Master's in Public Health degree	13	10	Government	Omaheke
P20	36	Male	Practice owner-Occupational therapist	Master's in Public Health degree	13	1	Private	Oshana

### 6.3 THEMES FROM INTERVIEWS

The following tables show the themes to come out from the interviews with injury survivors and HCWs which will be discussed in detail in the following sections. There were some themes that were the same for injury survivors and HCWs. The themes will however be discussed in separate sections for injury survivors and HCWs. I will first begin by presenting the themes from the injury survivors. Figure 6.1 is a thematic map showing the themes are related.

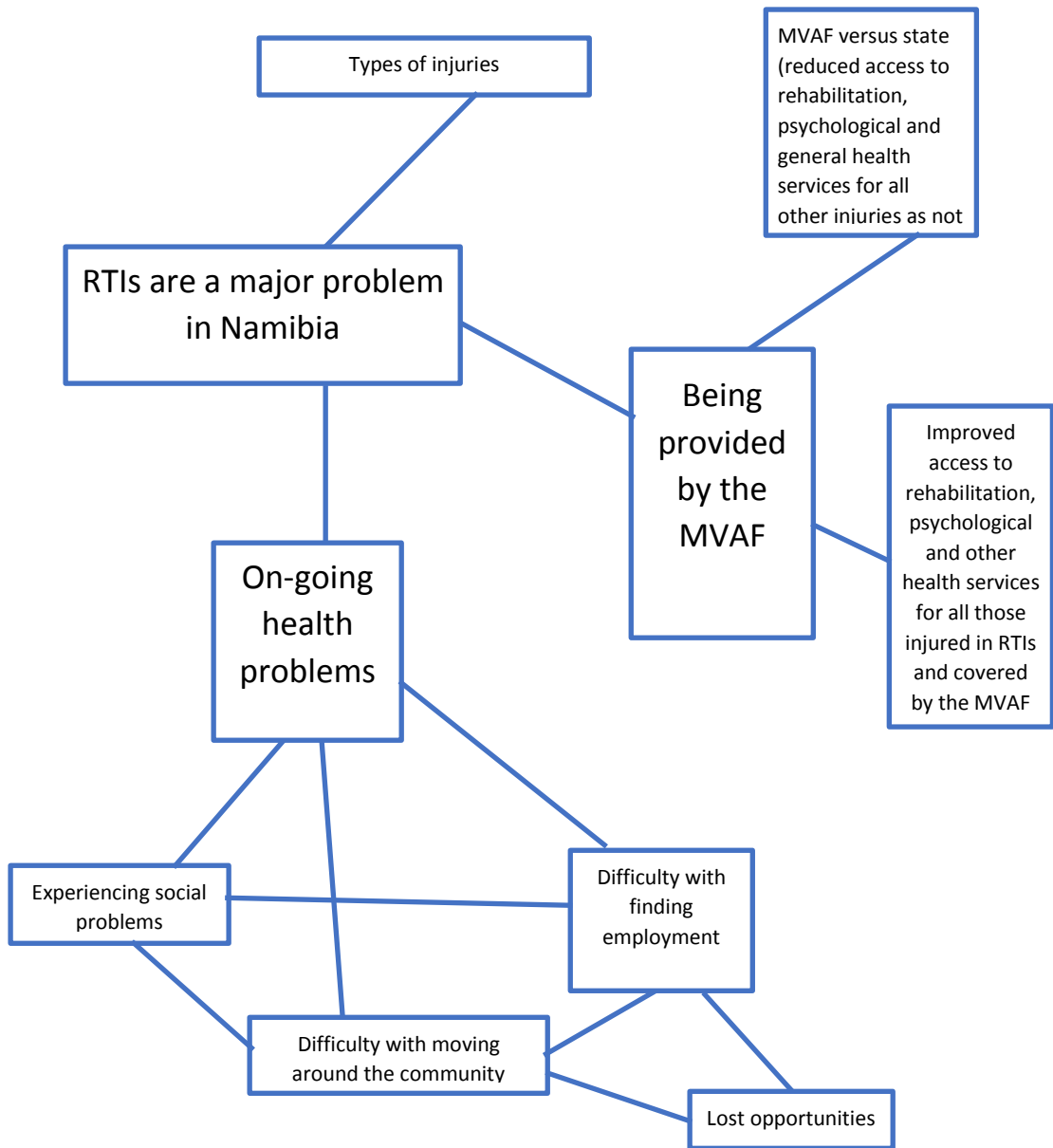
**Table 6.3: Themes resulting from interviews with injury survivors**

Main theme	Sub-theme(s)
Being provided for by the MVAIF	
On-going health problems	
Access to physical rehabilitation following road injury	
Financial Implications of RTIs	
Difficulty with finding employment	Lost opportunities
Experiencing social problems	
Difficulty with moving around the community	

**Table 6.4: Themes resulting from interviews with HCWs and advocates**

Main theme	Sub-theme(s)
Road traffic injuries are a major problem in Namibia	Types of injuries
Being provided for by the MVAFA	MVAFA versus State
On-going health problems	Psychological support for road injury survivors
Access to physical rehabilitation following road injury	
Financial Implications of RTIs	
Difficulty with finding employment	Lost opportunities
Experiencing social problems	
Difficulty with moving around the community	

Figure 6.1: Thematic map for interviews done with road injury survivors and HCWs



### **6.3.1 Being provided for by the MVA**

To remind the reader, the MVA is a statutory body in Namibia which is funded by a fuel levy and in terms of The MVA Fund Act 10, 2007, is designed to provide assistance and benefits to all individuals injured in road crashes.

A major theme to come out from interviews both with RTI survivors was that the MVA was doing a lot to provide for the care of them. The majority, but not all of participants interviewed were injured after the MVA Act had come in place, in 2007. They all reported comfort in the fact that they had not needed to worry about paying for any of the hospital costs and follow-on medical care after sustaining the injury. The MVA had paid for all these costs.

Funding for individuals injured before 2007 is not available, the fund is not retroactive – and the difference in what is available to those injured before and after the legislation is striking. Highlighting the importance of the MVA for road injury survivors in Namibia, two of the injury survivors who had been injured before the Fund was set up described hardships they had encountered following injury in terms of hospital and health costs. L13 he had been involved in the road injury as a passenger in a government car, travelling for an official visit. For this reason the government had only settled all the immediate medical bills, with no further funding for ongoing medical and personal expenses. He had sustained a skull fracture affecting a part of the brain associated with vision, and had been left blind, as well as with lower limb fractures. L13 reported having on-going health problems, and when questioned about how these costs were being met revealed that he was paying for these



costs himself as a workman's compensation he had received to settle any injury related expenditures was fixed and now had run out:

**Interviewer: How are these current medical costs funded?**

**L13: I'm paying for that myself.**

**Interviewer: So the MVAf is not involved at all?**

**L13: The MVAf was not in existence at that stage. It was the workman's compensation whereby they were just fixing a certain amount that had to cater to your medical needs and once that was exhausted, you had to source additional funds independently.**

**Interviewer: So regardless of someone having a permanent injury or not, they were only allocating a specific amount?**

**L13: Yeah, yeah, a specific amount and a specific time frame.**

The second participant (L3) explained her medical treatment had been in a private hospital in Windhoek and this had been followed by six weeks of rehabilitation in a residential unit in Cape Town, South Africa. All this treatment and rehabilitation had needed to be paid through her boyfriend's medical insurance as she herself had no medical insurance and her family did not have the resources to pay for the treatment.

#### Provision of aids, caregiver allowance and home modifications

All the injury survivors interviewed needing mobility aids such as wheelchairs and crutches following the injury reported they had not had any difficulty in acquiring these. Again, the MVAf was reported as having sourced and paid for all the necessary mobility aids. For

example, L10 noted that after injury he needed crutches and these were supplied through the MVAf at no cost to himself.

The Fund was also paying for the maintenance of the aids, specifically wheelchairs and replacing these when necessary. At the time of the interview, one of the participants reported that his wheelchair had problems with the brakes and the MVAf was funding for a new one from Sweden. It was later revealed by HCWs that most aids were sourced from either Sweden or South Africa as Namibia did not have a local manufacturing plant for wheelchairs and some orthotic devices and had reciprocal agreements with the two countries for the supply of these.

In addition to settlement of the medical and rehabilitation bills, many of the injury survivors were keen to point out other ways in which the MVAf had benefitted them following the injury. Almost half of those interviewed indicated that the MVAf had been involved in arranging for health related follow-ups. Several of the participants mentioned the MVAf case managers as points of contact when they needed any assistance related to their medical care. Meanwhile, some participants reported that the MVAf was paying the transport costs if they needed to travel for follow-up medical visits which had been arranged or set up by the Fund.

Several of the participants also mentioned that the MVAf was providing them with a caregiver's allowance that could be used to pay for someone to help with activities of daily living. This could be either a family member or a non-family member. All of the participants who reported receiving a caregiver allowance had severe injuries, having complete spinal

cord injuries and were wheelchair users. A few of those interviewed also mentioned having received lump sum "one-off" payments from the MVAf in addition to the caregiver's allowances. Again, all the participants who reported receiving these payments had severe injuries and were wheelchair users. L1 had used this money to buy a car whilst L4 had used it to build a shack to live in on his aunt's land.

A few of the participants also reported the MVAf had done home modifications to improve accessibility following injury. For example an excerpt of the interview with L12 below highlights the extent of the changes done to her home.

**Interviewer: Where any adaptations made to your home?**

**L12: Yeah, we got the ramps, and then they made the shower accessible, as well as the counters, like the kitchen counters, and the ramp.**

**Interviewer: Who paid for those modifications?**

**L12: The MVAf did that from the fund they allocate for patients after the accident.**

### Access to the system

None of the participants reported having had any difficulties being registered with the MVAf system after the road injury, nor with getting the medical coverage they needed. Several of those interviewed described the process as having been relatively easy and straight forward. For example, two participants pointed out:

***It was good, up to now I don't have a problem***

***It's not a long thing, they already start paying for your hospital bills whilst you're in the hospital.***

### Financial cap

In table 1.1, I illustrated the range of MVAf benefits including the Medical Benefit which is up to a maximum of N\$1,500,000 for each individual injured in a road crash in Namibia.

None of the RTI survivors who were registered with the MVAf reported a depletion of their funds. However, some of them who had access to individual or family-related medical insurance plans mentioned that they routinely used these to cover some of their health related costs including general appointments to avoid the depletion. The following two excerpts are examples:

**L12: Yeah, I go for regular check-ups to the GP, and then once a year I need to see the urologist. But otherwise, I do get regular medical treatment.**

**Interviewer: Is the MVAf paying for that or a medical insurance?**

**L12: Both, I just use whichever one I feel like. If I don't want to use my MVAf then I will use my medical insurance. Then certain procedures, I would use my MVAf. So I just mix and match, to not use up the MVAf allocation.**

***It's not a continuous thing, because it comes from your benefits anyway...it exhausts your benefits...So when I used to go for the bio-kinetics, I used to use my mum's medical insurance, because I didn't want to exhaust my benefits.***

**L1**

### Problems with the system

There are also problems and concerns with the Fund. Not all the participants reported they had found the MVAf entirely helpful; a few of the interviewees highlighted the fact that they felt that although they had found the MVAf very helpful, a flaw within the system was that they focused mostly on the medical aspect of road injury survivors' lives but not on personal aspects of their lives such as housing. In the words of one of these participants:

***Being a quadriplegic is a life changing injury. Namibia is a country that is not so good at reintegrating people that have serious injuries in the community and at workplaces. The MVAf policy of only focusing on the medical side has left big holes in our lives because they only helping with medical issues. They don't help you with other personal things.***

**L4**

Several of the participants also reported having to wait long periods for spare parts for wheelchairs and other orthotic devices as another problematic issue with regards to the

MVAF. As illustrated in the following conversation, L9 had been waiting for 5 months for his wheel chair brakes to be replaced.

**Interviewer: And maintaining the wheelchair?**

**L9: Currently, no repairs have been done on it. There are some brakes that were broken and I'm still waiting for the spare but they are taking long to bring them.**

**Interviewer: Do you know why it's taking so long?**

**L9: It's due to where the MVAF are ordering the parts... it's overseas. The process is too slow and there are delays.**

**Interviewer: How long have you been waiting now?**

**L9: 5 months.**

Meanwhile, several of the wheelchairs users reported the devices that had been allocated to them were not appropriate for the specific environment in which they lived. For example, in the conversation below L2 highlights that he lives in a rocky area which has worn out the wheels of the chair.

**Interviewer: What about where you live, getting around in the wheelchair, how is that for you in terms of the environment?**

**L2: It's hard my friend, it's hard. There are stones, rocks, and rivers around the place where I'm staying and it's challenging.**

**Interviewer: Doesn't that affect the wheelchair itself?**

**L2: As you can see, the wheelchair is now finished.**

### **6.3.2 On-going health problems**

#### Physical

All of the road injury survivors interviewed reported experiencing ongoing physical health problems. As was expected, those with more severe injuries, specifically complete spinal cord injuries, with lower limb paralysis, and upper and lower limb paralysis (wheelchair users) reported the most health complications. Some of the complications they mentioned include: pressure sores, blood clots, chest infections, kidney stones, contractures, dizziness, urinary tract infections, low-blood sugar, bladder infections, contractures, pain, non-healing injuries, dropped feet, blackouts, and fatigue. Several of them also reported recent hospital admissions which were related to having developed complications. For example, several months before the interview L14 had been hospitalised for a month.

Despite having been injured in crashes at least 2 years before the interviews all the non-wheelchair users, including those who had sustained soft tissue injuries and fractures reported experiencing on-going chronic pain. Some of them mentioned the need to medicate with painkillers. Some of the non-wheelchair users also highlighted chronic swelling associated with the injuries they had sustained as a problem which restricted them from normal life. For example in the excerpts below, L6 and L8 highlight the physical problems they were facing:

***After the injury, my health has changed because I can't do any difficult jobs even though I was working a difficult job at the mine. Sometimes there is a lot of pain at the shoulder. I get pain and I also have pain in the back.***

**L6**

***The leg is still giving me problems, and also the hand. Sometimes I cannot do things like washing or carrying heavy stuff. I can only carry light stuff. If I do heavy things, it's giving me problems.***

**L8**

One of the participants, L13, had been involved in a road crash 20 years before. He alluded to the fact that despite having sustained the injury many years ago, the pain he experienced was ongoing:

***Yes there is constant pain from when the accident occurred until now. When I'm travelling, I'm constantly in pain and have to be careful of certain movements. I have to walk in certain, limited directions and movements.***

**L13**

Another of the participants, L10, had sustained upper limb fractures in a road crash 2 years before. At the time of interview he reported that he was waiting for further surgery to his shoulder and felt very anxious about this as it was affecting his ability to use his arm. Of note, some of the participants revealed they felt susceptible to developing other injuries and health complications because of the existing injuries they had sustained from the road



crash. For example L1 reported someone was trying to help her navigate a step to get indoors but they let go of the wheelchair by accident and she fell backwards. Some of the participants also highlighted they felt the need to be more cautious about their health to prevent any health complications for example, by adopting a healthier diet. Meanwhile, one of the participants described feeling anxious about getting older and worrying the chronic pain he experienced would worsen.

***The pain is a problem. Once I become older, the pain will also increase because the body defence and immune system will be getting weaker.***

**L13**

Related to the injuries, all the participants reported being unable to do various activities of daily living that they previously had no problems with. As to be expected, those with more serious injuries reported greater limitations. Some of the activities mentioned included needing to be bathed, dressed, and fed.

Other participants talked about limitations in activities related to lifestyle. These included being unable to play football, inability to train and exercise, and difficulty with athletic running. One of the younger participants reported that due to chronic swelling of the legs, she was restricted in what she could wear and could not wear any tight clothing such as jeans - which were fashionable amongst people of her age group.

However several participants highlighted that they had been mostly restricted in the first few months following the injury but due to their rehabilitation, and improvements over

time, they had learnt to become more independent. For example, L1 noted she was now independent with activities such as cooking and driving.

***In the beginning yes, but now I have learnt a lot of things. I cook, I drive, I clean, I wash, I go to town by myself. I do everything basically that I did before besides maybe reaching things from high surfaces.***

**L1**

### Mental health

Most of the participants reported on-going mental health problems. Depression, stress, anger, anxiety were key words mentioned frequently. Only one of the participants noted having experienced suicidal thoughts when asked questions related to mental well-being. He revealed that faith in God had helped to overcome the thoughts.

A few of the participants reported having what could be likened to post-traumatic symptoms related to the road crash:

***You know what; these emotions are disturbing to my mind. The car that I was involved in the crash in was for work. That car is still at work and when I look at it, it gives me bad memories. It's like I'm not normal and most things just make me panic.***

**L7**

Another participant (L13) became visually impaired after the crash 20 years prior to the interview but reported that whenever travelling past the specific area where the accident occurred he started to feel more anxious. In his own words:

***Currently I'm visually impaired and I cannot see. However, once I'm travelling past that specific place where the accident occurred, I'm getting feelings of fear in my mind. In my body, I would say I'm sort of getting cold shivers and pimples when I'm passing that place.***

**L13**

As reported earlier, some of the participants reported feeling anxious about their on-going physical health problems related to the injuries. L10 was due to have surgery for his shoulder and highlighted the concern and anxiety he felt. L9 reported feeling anxious when travelling, and the fear of being involved in another road crash and his vulnerability due to paralysis of the lower limbs.

***Now if you think about it, if there's something happening like an accident, you need to get out. When paralysed you can't get out and you are trapped inside, but people who have legs will run away.***

**L9**

Almost half of the participants had not received any psychological support or counselling following the road injury. Half of them felt they would have benefit from this. As one participant reported:

***Yeah, that's what I've been saying that I needed, because these things, they are still running too much in my mind. I need some counselling.***

**L7**

Contrary to this L14 had received psychological support but felt it had not been helpful. She felt the psychologists could not understand her situation and had found it better to talk to people who had also been injured in a road crash and sustained serious injuries and this had helped her to cope with the new situation. In her own words:

***The psychologists would come to me and I would just say; just go because you don't understand. You keep telling me that you understand. So, as soon as I started this group whereby us in wheelchairs, ladies in wheelchairs. We talk and you know, it's kind of a relief because you talk to people who are all in the same situation. So when that person says I understand, then you know that person understands. It's the same with AA groups or whatsoever groups. When you talk to people facing the same situation, it's much more of a relief. It's much more that you can relate to that person, and through that, you can even counsel yourself because you can open up and speak more about it and realise you're not the only person in the situation. So, it helped a lot to talk about it.***

**L14**

Similarly L1 had not received any psychological support but felt psychological support had not been necessary for her. She found the support from her family helped her greatly in

coping with the injury. She also felt that the injury was part of God's plan and that everything happens for a reason.

Contrary to the general trend, one of the wheelchair users (L3) reported she felt well and the injury had no longstanding impacts on her mental health. She cited her family as having been very supportive. During her interview she reported she lived with her parents and her siblings were also involved in her life, with her brother driving her to most places and all employed family members giving her money on a regular basis.

Notably, the participants who described having the poorest mental health (L2 and L4) also reported having been abandoned by their families and not receiving any support from them. L4 reported receiving psychological and psychiatric care which helped initially once in hospital, but once he was back home, the cycle of depression would manifest again due to poor family support.

The support of family friends was cited the most by the participants as having helped them to cope with the injury. The second most common coping method mentioned was belief in God and going to church. As mentioned earlier in this section, one of the suicidal injury survivors had reported that his faith in God had helped to prevent him from committing suicide:

***Without the Bible, I would have been dead already. I wanted to commit suicide, maybe like four or five times. You know, it's not easy, everybody looks past you. It's quite a heavy process.***

**L2**

Other ways of coping that were mentioned by participants included a wheelchair basketball team, a ladies support group, WhatsApp group, and motivational speaking. Interestingly one of the participants (L11) highlighted one of the rehabilitation coaches employed by the MVAFA as a source of inspiration and comfort. The rehabilitation coaches were individuals employed by the Fund to help the newly injured wheelchair users with spinal injuries to adjust to their new situation. They had been injured in crashes themselves and were also wheelchair users.

***She is my hero in that sense. Because when I was in hospital, she gave us a testimony about how she got injured. She got injured at a young age but she kept on until she became independent. Yeah, she had a lot of challenges but she overcame them. When you look at a young lady like that doing things like that, why not me? Yeah, she has empowered me more about the fact that I cannot give up. I must try my best to also become independent one day.***

**L11**

None of the participants reported any problems with drink and alcohol following the road injury. This is however a sensitive area to broach and it is possible participants may not have felt comfortable to share any details.

### **6.3.3 Access to physical rehabilitation**

Although the current system for RTI support provides medical care at the time of injury, rehabilitation is also crucial to restore those with injuries to their best functional levels and there is provision in the MVAf to provide such care. However, informants reported the system does not function as smoothly as the medical care in the immediate aftermath of the injury. For example, a few of those interviewed indicated they had not received any rehabilitation following the road injury despite the need for this. For example, one of the participants reported she had sustained a lower limb fracture and had been given crutches but had not seen a physiotherapist to teach her on how to use them and as a result had used them incorrectly for a few weeks which had complicated her injury as she was putting excessive weight on the fractured limb. A few other participants reported they felt the rehabilitation they had received was not sufficient and had not been comprehensive. One participant (L4), who had a complete (cervical) spinal cord injury and was paralysed in all four limbs, had been an in-patient in a spinal rehabilitation unit. He expressed dissatisfaction because he had not been taught about bowel evacuation and reported he had to figure this on his own once discharged from the unit.

Services seem to be available to most in Windhoek but limited elsewhere. This was noted by several of the injury survivors who highlighted a difference between access to rehabilitation in Windhoek compared to the rest of the country, especially the rural areas. One participant reported that after treatment and rehabilitation in the capital Windhoek and being discharged to his home town in the region where he was to have follow-up treatment with an occupational therapist (OT), the regional OT did not know how to assist him and carry

out further management. He had needed to contact the MVAF in order to be sent back to see the OT in Windhoek. Similarly another participant stated that he felt the regional physiotherapy services he received once discharged from hospital had not been as adequate as the service he received when admitted in Windhoek and consequently he had developed complications (contractures) due to inadequate treatment. Some of the participants moved to Windhoek from their homes in the rural areas after the injury specifically in order to access better healthcare services and because of the unavailability of rehabilitation services in their home areas. For example, L14 highlighted this when she said:

***I was staying in Rosh Pinah, it's a small town in the south of Namibia. There is only one hospital. The treatment wasn't up standards as to Windhoek's. So, that's why I had to move to Windhoek.***

**L14**

Another participant however had actually moved from Windhoek to the rural area where her mother lived in order to have family support, thus having to decide between better rehabilitation services or family support. She highlighted that following the move she was unable to have any follow-up rehabilitation treatment.

**Interviewer: Following your discharge, did you receive any follow-up treatment?**

**L5: No, I did not get any rehabilitation or anything because I had to move from Windhoek to the rural areas.**

**My mother was in the rural areas and there, there are no rehabilitation facilities.**



#### **6.3.4 Financial Implications of RTIs**

Despite the support of the MVAf, the majority of road injury survivors interviewed indicated they were experiencing ongoing financial hardship as a result of their injury. A leading concern was that the injury had affected their income. Many of the injured had been breadwinners and reported being unable to provide for their family at the time of interview. For example, on being asked whether the injury had affected his family L6 made this response:

***Yeah, they are affected because if I'm a breadwinner, I'm the one providing. But now, I'm still unemployed; so it also affects my family.***

**L6**

Most of the participants explained they were in receipt of the disability grant, a monthly social grant of Namibian \$ 1,100 from the Namibian government (which I described in section 1.7). However the overwhelming consensus from those in receipt of the grant was that it was too low and not enough to meet their needs as some of them were not in work and had no other sources of financial support.

***No, I don't think it's enough because, you find that there are people that were working as police officers or as bricklayers. Now imagine this guy now lost his job and doesn't have a salary and is now in a wheelchair. When you're in a wheelchair you really need to take care of yourself, like in terms of transport. You don't have a car and would require taxi fare, and you now also have to pay for***

***your wheelchair because it's taking up someone's space. And you also have to buy your food. And let's say you're the breadwinner, the people at home are now looking at you. What now, in such cases?***

**L1**

The participants also explained that the disability grant takes a long time to be approved. This had deterred one of them from applying for the grant. She had to be convinced by friends that the money would be helpful before she had made an application. Another of the participants (L4) also explained that measures had been put in place by the government to minimise fraudulent applications for the grant and now there was a policy that that each person had to re-register for the grant annually. I could not find any specific details related to re-registration on the government website but as I noted in section 1.7, one of the regulations for the grant is that once it has been approved, an individual is still required to visit the pension office at least once a year for verification. L4 had not seen the paperwork detailing the new changes and consequently had not applied to re-register. This had resulted in L4 having been taken off the grant. At the time of the interview L4 revealed he had been told by a representative of the Ministry of Labour that he would need to re-register and could only start to receive the grant later in the year (several months later) and that the amount would not be backdated to cover for the months when he had not been receiving the grant. He highlighted this had considerably affected his finances.

***That has also put a big hole in the already struggling financial problems that I have.***

**L4**

Another interviewee (L6) reported that his grant had been limited to a period of two years and had since expired. He explained that he had gone to the official offices to renew the grant and had been sent for another assessment and despite having on-going functional problems, had been told that his impairment was not severe enough to meet the criteria for eligibility. L6 explained that before the injury he had been the main bread winner for the family but since the injury, five years earlier, had lost his job and had not been able to find another job due to on-going shoulder problems and his family were all now dependent on his wife's income and were struggling financially. Another interviewee (L9), a mother of one, reported that her application for the disability grant had been rejected despite the fact that she had ongoing problems with her leg. L9 was unable to get a job and she and her child were both solely dependent on her mother for financial support as she was not receiving any financial support from the government or any other sources.

As explained previously, the majority of those interviewed had been the family breadwinners and they stated they were still financial responsible for immediate family members and in a few cases, extended family members, through the caregiver allowance received from the MVAf and the disability grants they received from the government. For example, one individual who had the most severe injuries of all those interviewed - a complete cervical injury with paralysis in all four limbs - explained that he was receiving the monthly caregiver's allowance from the MVAf. This money was meant to pay for someone to look after him. However due to financial hardships, he was using this money to look after himself and his partner and child. Also due to the financial difficulties faced by his family, his girlfriend, who was his only carer needed to go to work all day and he was left alone at

home. Throughout the day, there would be no one to feed him, change his nappies, and change his position, thus leaving him at risk of developing pressure sores and malnourishment. In his own words:

***The MVAF have allocated something that they call the caregiver allowance. In my case, I spend most of the time in bed, cannot change myself, and I cannot do anything for myself. The caregiver allowance is N(\$) 3,000 a month. However, instead of hiring a caregiver to care for me, I use the caregiver allowance to pay for my child's school fees, to pay for my rent where I'm living, and with the little that is left, I'll buy food and so on. Due to the financial difficulties, my girlfriend (who is my sole caregiver) had to start working. That work pays her N(\$) 1,500, and is not enough to maintain us. But I have to make that sacrifice. So when my girlfriend goes to work, I lie alone, from 7 am till 5pm when she comes back. That's just a personal sacrifice that I have to make because if I hire somebody that has to care for me, I have to pay that person 1,500 or 1,000. However, I wouldn't be able to pay rent and I wouldn't be able to buy food. So that's also a very big constant challenge that I am facing currently.***

**L4**

As the following exchange illustrates, L4 was well aware of the risks to his health but felt there were no other alternatives.

**Interviewer: You mentioned your girlfriend being away from 7 to 5 and being unattended. Does that not leave you at risk of developing pressure sores and other complications?**

**L4: Yeah. That's also the biggest fear that I have but luckily I have not developed bed sores. However, a complication I get is constant bladder infections because as a quadriplegic, you need to drink a lot of fluids to minimise the risk of contracting bladder infections, but nobody gives me water. Sometimes I have low blood sugar levels because at the time my girlfriend is going to work, I'm sleeping. So, in the morning, I'm not even eating. The only time I eat is once a day, when she comes from work, because usually there is no one who can come in and fix me a meal when she is not there. I have big problems with the bladder infections, and not having adequate food to eat because of no one being there to prepare meals and I always faint and have low blood sugar.**

Meanwhile another participant, also with a severe injury, reported that he was using the disability grant to pay for school fees and to look after family members.

**Interviewer: Are you receiving any financial support?**

**L9: Yeah, yes.**

**Interviewer: Could you tell me more about this.**

**L9: I get it from the government....but it's not that sufficient to support the family.**

**Interviewer: Are you talking about the disability grant?**

**L9: Yes....**

**Interviewer: So you are saying it's not enough to support your family?**

**L9: Yes, especially when one is renting. Yes.**

**Interviewer: Do you support any family members?**

**L9: Yes.**

**Interviewer: Is it your children?**

**JJ: Yes, and my brother, sister, and my mother.**

Other participants highlighted that they were now dependent on family members for financial support. None of the participants reported they had needed to sell any family property or take any loans in order to support themselves.

Many of the participants also reported living with the injury was associated with extra costs. For one of the participants, the costs were associated with having to pay for on-going medical care. As previously mentioned on page 5, L13 had been injured before the MVAF was set up and was now self-funding for his on-going medical costs.

A further series of expenses were found in transportation costs. Those participants who were wheelchair users, reported that public transport was inaccessible and they needed to pay a private taxi driver in order to ferry them from place to place. A few of the wheelchair users were in employment and some of them had set-up a monthly payment scheme with a specific taxi driver to take them to work and back on daily basis and they were paying for this out-of-pocket.

**L14: I only come by private transport. He brings me every day to work and I pay him monthly.**

**Interviewer: And how do you pay for this?**

**L14: From my own pocket.**

L13, who as explained earlier developed visual impairment following the road injury, also reported that he had needed to pay for someone to accompany him when he travelled to guide him especially when travelling to unfamiliar areas.

The extra costs highlighted were however not just limited to travel expenses but also functional activities. For example, one participant explained that since burning himself whilst trying to cook, he was now paying for someone to cook meals for him and his children on a daily basis.

***I buy food and put it at one lady's house so that she can cook for me and send a plate for me and the kids. The one time that I tried to cook, I burnt my legs and I was in treatment for 6 months.***

**L2**

### **6.3.5 Difficulty with finding employment**

The majority of road injury survivors reported having had difficulties with securing employment or continuing with their studies as a direct result of the injury. 21.4% had lost their jobs due to the injury and remained unemployed, 14.2% were on extended sick leave, and 7.1% were still employed but on modified duties. All those who were unemployed reported they had been actively looking for work but felt disadvantaged because of their injuries. All those who were able to get back into the same job or find alternative work had at Grade 12 education or above while 60% of those unable to find work had only managed to reach Grade 10 or 9. The following excerpt from the interview with L2 highlights this issue.

***It's like 50% of the people that I talk to in my WhatsApp group. Our complaints are housing and jobs. Even just a job in an office, like an operator. Just to pick up the phone and cover the front desk. Just that kind of job, we'll manage it.***

**L2**

The road injury survivors interviewed felt that discrimination by employers was a major hurdle for people living with disabilities in Namibia. L4 recounted an encounter with potential employers who had showed ignorance towards his condition:

***So when I went for the interview, honestly, even the people that were interviewing me didn't know fully what quadriplegia is. Then, questions arose such as; but all your 4 limbs are disabled, how do you want to work? But who will empty your catheter?***

**L4**

Some of the participants mentioned that one of the reasons why it was so difficult for people living with disabilities to find jobs was that employers did not want to hire extra people to aid them. Some also reported that employers did not want the burden of making buildings accessible and toilets disabled friendly, as these would be extra costs, and they would rather hire non-disabled people. A participant who was in employment reported that most employers felt people living with disabilities were not able to do work properly due to their injuries or impairments. She also explained that another reason for the discrimination by employers was that they felt that people living with disabilities would be sick all the time and miss work often.



***No, it's very difficult. It's also one of the challenges we face. You know, people judge you! They basically think because someone is in a wheelchair that they can't do anything. They think that this person will be sick the whole day or every day. So, they just ignore the fact that you're looking for a job because you are in a wheelchair.***

**L14**

Most of those who were employed also reported finding work had been a difficulty journey. They had faced hardships in getting employment and this had taken a long time. The majority of participants felt that getting employment for people with injuries and people living with disabilities in Namibia was generally very difficult. One participant (L9) who had been able to go back to his job on modified duties noted that he felt lucky:

**L9: No actually, I just came back to the same job to the same company that I was working for. It was the lucky part of it.**

**Interviewer: Why do you say it was lucky?**

**L9: I can say it was the lucky part because it just made it easy for me to come back to work. I otherwise wouldn't have a job. There would be difficulty with getting a job, especially if you can no longer do what you studied for.**

One of the participants felt the government needed to do more to enhance the employment prospects of people living with disabilities and reported that though there was an employment law in place, to protect the rights of people living with disabilities, this was not really helping to improve the situation. He felt that even if complying with the law,

employers would rather hire people with minor disabilities just to tick boxes and not fairly consider those with more severe injuries such as wheelchair users as they would be seen as a burden. Similarly, L13 felt that there should be emphasis on people living with disabilities being employed in all sectors to improve visibility. Although in employment himself at the time of interview, L13 reported he had struggled to find a new job after being found medically unfit to carry on in his previous government job following the road injury. Interestingly, a few of the participants reported that medical facilities were more inclusive of employing people living with disabilities. The reason given for this was that these types of employers would have a greater understanding of impairment and disability.

Most of the participants who were in employment also highlighted the negative bias of co-workers and having to prove oneself to them. For example L13 explained how he had settled into his job:

***It's only that I have proven myself. I have proven myself that I can do A-B-C-D, whereas the able bodied people could not. That's what brought me on board.***

**L13**

Another participant had started a new job and her co-workers and managers had not known she was a wheelchair user. When she went to work the first day, she reported they were shocked to see her and felt they doubted her competence because of the disability. She reported she had needed to assert herself in order to earn the respect of her co-workers.

***I got there and the school wasn't wheelchair friendly, but it didn't shake me. I introduced myself, and they asked me all sorts of questions: will you manage? Do you need someone to sit in with you? Let's put you close to the principal's office because maybe the kids won't behave. I just took it up as a challenge and said; listen, don't treat me as a special case. Put me in the normal class where I'm supposed to be sitting in. Give me a class, just like an ordinary teacher, don't cut my class.***

### **L1**

A few of the participants however also highlighted some positive experiences in the workplace. L12 had been able to go back to her job after the injury and her employers had made all the necessary changes to her work area to make it accessible. They had renovated the toilet and made it wheelchair accessible in addition to installing a ramp at the entrance.

L1 had also experienced some positive changes in the attitudes of her co-workers in the school she had worked. Her fellow teachers had informed her that they felt inspired by her attitude and teaching skills. Since she had left the school, she had been informed by the principal that they had made the classrooms accessible in case a new student or a teacher was a wheelchair user. This was in response to how she used to ask how one of the students would access the classrooms if they were injured in a road crash and needed to use a wheelchair.

### ***Lost opportunities***

Some of the injured survivors reported feeling that they had been robbed of opportunities in employment and education due to the road injury. L4 had been injured aged 24 and reported feeling robbed of opportunities of finding good employment.

***My potential years, my youthful years, have been robbed by the accident.***

***L4***

Meanwhile L13 reported that he felt cheated by the injury because colleagues of similar age at his former work place, with whom he had been at the same employment grade, were now earning much more than him and held more senior positions. After the injury he had failed work fitness tests for that specific role and been medically retired.

For L8, the injury had prevented her from continuing with her course in engineering as she was unable to sit for long periods in class.

**Interviewer: So you were studying before the accident?**

**L8: Yes, but I did not finish.**

**Interviewer: Could I ask why you were unable to finish your studies?**

**L8: Because I was having problems with my left leg and I could not sit for a long time. It was swollen for almost 9 months, so I could not sit for long. Even up to now, it's still giving me problems; I cannot travel for long distances.**

Similarly, L14 had received a scholarship to study in another country but due to ongoing health problems had needed to come back to Namibia where she was guaranteed free healthcare under the MVAf.

### **6.3.6 *Experiencing social problems***

A greater proportion of the injured survivors interviewed reported that their social life had declined following the road injury. In general, wheelchair users reported the most problems related with social decline compared to non-wheelchair users. Almost all the wheelchair users reported declines in social life. In comparison, only one of the non-wheelchair users (L13) reported a decline in social life. L13 as previously noted, had a visual impairment following the injury. Therefore, generally, those with more severe injuries reported declines in social life.

Most of the participants cited losing friends as factors that led to this decline. Participants explained that following the injury, friends who had been in their lives had stopped coming to see them and were no longer in contact. A few reported that initially, following the injury, friends had been supportive and come to visit them. However these visits had started to wane until there was little or no contact. For example, L11 reported that he felt forgotten by his friends and they were not acting as they were before the injury, with only a few coming to visit him. This was echoed by L14 who recounted how popular she was pre-injury:

***I was someone that had a lot of friends and was popular. And then at the end of the day, I only had one or two friends and I was like; why, am I not good enough?***

**L14**

Another common reason given for the decline in social life was that it was now more difficult to plan and arrange meetings with friends due to the injury. For example L2 highlighted that planning to meet her friends took a lot of energy and time:

***There is definitely a change. For instance, you don't see people as frequently as you did so you kind of feel distanced from them, like everyday friends who you used to call up and have dinner with. Now I don't, because everything involves a lot of planning and I really don't have the energy to do all that.***

**L12**

Yet another reason given for the decline in social life was that it was more difficult to get out. Several of the participants explained that they had more difficulty going to the places they usually socialised with friends and family and they would now just spend at home watching TV. They explained that before the injury, they could just impulsively get into a car or public transport and go to the homes of friends or to public social places. However after the injury they were more restricted in terms of going out generally and also the places they could go, which meant they could not see friends and family often, leading to alienation, with friends and family becoming more distanced.

Almost all the wheelchair users also highlighted the lack of accessible public transport and wheelchair friendly buildings as an important reason for the decline in social life. They highlighted these factors as hindrances in going out and socialising in specific places. Most of them cited malls, shopping centers, and entertainment places as not being wheelchair accessible. For example, L12 wanted to go to a specific cinema but was unsure if it was wheelchair accessible. She reported that she frequently did not go to places where she had been supposed to socialise with friends because of the hustle of having to phone in advance to find out if the place was accessible.

Another participant highlighted the lack of social places for wheelchair users in Namibia.

***Due to the fact the country doesn't have those things in place; places where people in wheelchairs can socialise and so on, I'm left indoors 365 days in a year. I'm just stuck in my room, watching TV. So, the way my life has been effected, you know I cannot find appropriate words to sum up what I'm going through or how it has changed.***

**L4**

Other social issues highlighted included poor support from family members. Some of the participants reported they had been abandoned and neglected by family members. They reported that relatives' attitudes towards them, post-injury, had changed negatively and they felt the relatives avoided them and viewed them as potential burdens. One of the participants revealed that he had been receiving psychiatric input and psychological support for depression. However, once back home, the general lack of support and neglect from

family had made the depressive feelings worse again. Only one participant reported having had social problems related to a partner/spouse. L4 reported that due to the injury, his relationship with girlfriend had changed and he had needed to receive counselling.

Contrary to the general consensus, one of the wheelchair users (L13) reported her social life as being normal and unaffected by the injury. She mentioned having a good family support as the reason for this. As the following excerpt shows she reported feeling glad for having supportive family and friends.

**Interviewer: Has the injury had any effect on how you relate with family members and friends?**

**L3: No, no, it didn't affect that. I'm glad people love me.**

Of note, L3 had been involved in the road injury much longer before the other wheelchair users (13 years versus average of 5 years for the rest of wheelchair users) and the longer time period may have resulted in her being better adapted to the injury than the other participants. A few of the other wheelchair users also indicated that their social lives and mental well-being had improved with time. For example, L14 highlighted the changes which had occurred over the years:

***I'm now 8 years in a wheelchair. In the last three years, it has much improved but for the previous five years before, I struggled with friends and you know, even the public. But, you know, you learn. It's a learning progress and you have to understand that it's also new for them, and I've grown so much. I'm at peace now and I understand now.***



In addition to these reports, almost all the road injury survivors who were wheelchair users reported feeling stigmatised. Contrary to this, none of the other participants with long-term RTI related injuries who were non-wheelchair users reported feeling stigmatised. The wheelchair users cited a lack of awareness generally in Namibia. One participant, who compared the general attitude of Namibians to that of his friends from a neighbouring country noted:

**Interviewer: What do you mean by everybody looks past you?**

**L2: Everybody is just like; he is now in a wheelchair, what do we care?**

**Interviewer: Which people do you refer to when you say everybody?**

**L2: Family, friends.....ah....how can I say....The guys who really check me, are the guys from Zambia... yeah those guys, they motivate me.**

**Interviewer: Are they your friends?**

**L2: Yeah, they are my friends. You know, the people of Namibia, they don't really take seriously people in wheelchairs. But foreigners, they know. They know also the situation and they give me a lot of advice. Those guys also come and visit me every day.**

Another participant echoed this sentiment, reporting that Namibia was not good at integrating people with serious injuries. The participants also reported feeling pitied, overlooked, and being stared at by people as some of the issues that left them feeling stigmatised. Another participant revealed having been subjected to gossip from her local community:

***Then, they'd go to their houses and sit under the trees and just talk about my situation. And then when I started going back to school, when I started improving, they started saying things like; I never thought she would, I never thought!***

**L1**

A few of the participants also talked about having been abused by members of the public. One participant recalled her experience where she had been pulled out of her wheelchair by someone who thought she was pretending to be disabled. She explained that following the assault she was helped back into her wheelchair by other members of the public and the assailant had merely walked off without apologising nor being apprehended.

***They call me names and that I'm pretending to be in a wheelchair. This other man in Checkers (shopping store) just came in and said; you can't be using this thing as a joke, it's not a plaything! And I'm like; what? He pulled me and I landed on my knees and I looked at him. It's someone who doesn't know anything. It's the way people are. They just feel when a person is in a wheelchair, when a person is disabled, they expect the person to look dirty, they expect this person to be wearing pyjamas, and they expect this person to be wearing nappies. So, once they see you are independent, it's new to them, so they feel you either pretending or they'll be asking questions like; what's a beautiful girl like you doing in a wheelchair?***

**L1**

L1 worked as a rehabilitation coach and as part of her responsibilities would go to the hospital spinal unit daily. She reported that even when in the hospital, some people doubted that she was a genuine wheelchair user and confronted her about why she was taking the patients' wheelchairs and running around in them.

As a result of the abuse and stigma they had experienced, a few of the injury survivors reported feeling vulnerable and unsafe. All of them had severe injuries (wheelchair users and visually impaired). One participant described a situation in which she had been robbed. She had parked her car to do some shopping at a local supermarket. As she was about to get the wheelchair out of her car, someone had approached her and grabbed her handbag. She reported that even though she screamed loudly and the place was packed with people, no one came to her assistance. When asked why this was, she reported that she felt it was because people felt she may have been pretending to use a wheelchair. She noted that she no longer felt safe being alone in public places and would only go to those places she knew to have security cameras. She also reported that she was no longer using a sticker, which wheelchair drivers could put on their cars to enable disabled parking, because she felt this left her identifiable to hijackers and vulnerable to potential attacks. Meanwhile, another participant reported she was always accompanied when in public because she felt unsafe alone. She also felt that the general public would not be helpful:

***That's the thing; you never can be alone because it's quite a risk. Everywhere is unsafe these days, so for you to take a taxi to town, it's very unsafe because you can't run, but they can. You're sitting, so they can just grab your things and run. There is no safety, and being in this position that we are in, it's much more difficult.***

***Not having control of your legs whereby you can run or can call someone, but that person won't be able to hear you. So, you should always be with someone. Yeah, it's very unsafe, and people are unwilling to help.***

**L14**

Another participant highlighted the worry of being abducted. Although he had never been kidnapped, he had heard of instances of this happening to vulnerable individuals and was concerned about travelling alone for this reason.

### **6.3.7 Difficulty with moving around the community**

The majority of those interviewed reported having difficulty with moving around the community. 64.3% of those interviewed were wheelchair users and the rest did not use any gait aids. Wheelchair users reported the greatest limitation and this mostly affected those that lived outside Windhoek, with the terrain being described as the greatest problem, with the wheelchairs used not being deemed inappropriate for the specific terrain where participants lived. One of the reasons L14 had moved from her home area to Windhoek was the area was not wheelchair friendly. Similarly L5 lived in an area with a sandy terrain:

***It was very difficult, especially when I went to the Kavango region because there is thick sand. It's a struggle to move out of the house if I want to go somewhere for fresh air or just to go with my sisters somewhere. Moving around was really a struggle.***

Other movement limitations reported included inability to walk fast and inability to run, due to pain. Most wheelchair users reported difficulty moving around the home and community in general due to steps and the need for help from family members to move around.

### Transport

In terms of transport, all the road injury survivors who were wheelchair users explained that there was a scarcity of wheelchair accessible buses, trains and taxis in Namibia and that transport was a major concern. For example, L14 highlighted it as one of her biggest concerns:

***We have this problem with transport, basically. This is the biggest problem and I have spoken to many other friends of mine that are also wheelchair users and they face the same problem.***

**L14**

Although buses and taxis were reported to be the most common methods of public transport in Namibia, most participants expressed great difficulty in using buses because mostly they were not accessible to wheelchairs and as such, reported the need to be helped or carried by other people in order to access buses. To further highlight how dire the situation was, one of the participants explained that in Windhoek, the city council had introduced a limited wheelchair accessible bus service. She however elaborated that it had

limited capacity, only travelling during peak hours, and on a specific route - meaning it was very difficult to access. When asked about whether the authorities were doing anything to rectify this situation, she reported there being no improvements:

***This problem has been there forever and it has been in the newspapers and people have complained but, up to now, nothing has happened. So, obviously there is nothing being done about this issue.***

**L14**

To add to this, some of the participants highlighted that even hospital buses were not accessible and one had to be carried inside these buses by other passengers or hospital staff. This is illustrated in the following conversation with one of the participants:

**Interviewer: When you have to come to the hospital, you mentioned you use the free hospital transport. How do you get the point of collection?**

**L2: There is one cousin of mine that has a car. He is taking me to the hospital and they put me on the bus.**

**Interviewer: How is it to access the bus and to come to Windhoek?**

**L2: It's hard! It's stairs, you know, it's stairs. One guy must catch your upper body and the other one at the legs so that they can put you in the chair.**

**Interviewer: And how long is the journey?**

**L2: The journey is like 6 hours.**

As such, all the wheelchair users interviewed reported being dependent on private taxis, which they paid for from their own pockets, and private cars. They reported using these

modes of transport to transport them to work, to visit family members and friends, and when attending health appointments not arranged for by the MVAf. When questioned further about whether the MVAf was helping in terms of transport, the participants explained that the MVAf only funded medical visits which they had arranged for. Participants reported that it was not always easy to get private lifts from relatives, friends and acquaintances as they would have their own personal commitments and as such taxis were the only reliable form of transport available for them and other wheelchair users. They however explained that they often found it difficult to access public taxis because taxi drivers ignored them when they hailed them from the street, as the drivers felt that lifting and fitting wheelchairs into the taxis delayed them from running their businesses. As L9 recounted:

***I'd say the public are not aware of our situation. There was a time I hailed one driver and he said people in wheelchairs waste their time. The taxi drivers leave you behind! And also, some of our wheelchairs are not friendly with taxis. What I mean is, sometimes it doesn't fit in a taxi. So, at the end of the day, you will be left behind.***

**L9**

Other participants noted that taxi drivers end up charging them extra fees because of the "delays" they complain about with regards to transporting wheelchair users.

Only one of the participants was driving independently at the time of interview. However she was doing so without a license. She explained that for a long period she had been trying

to get a license but had faced several obstacles, the most significant being that there was no clear protocol for how wheelchair users could obtain a license. She had already tried to attend a license test but had been turned away and told to go the Ministry of Works to get a letter for permission. She reported frustration with being told different ways of moving ahead by different people, with no one seeming to have a clear path forward. She highlighted the fact that she had been driving the previous six years and had explained to the traffic officials when stopped what she had been informed. She also reported that there were many other wheelchair users driving without licenses because of the lack of clear protocol.

### Buildings

In terms of access to buildings, all the wheelchair users reported that many buildings and facilities were not accessible in Namibia. Surprisingly, one participant pointed out that even one building in which disabled people needed to enter to apply for the disability grant was not accessible.

***You find buildings, like were we go for the disability grants they have steps. When you come in, there's a step. When you get to the door, there is another step! And the windows are so high. When the officer is sitting, all you see is this part (beckoning to top of head). So you can't even say hello, I'm here.***

**L1**



The wheelchair users also reported being limited in terms of the places they could go because of a lack of ramps, lifts and wheelchair accessible toilets in buildings and public spaces. One participant highlighted that she now felt anxious about going to new places because of the general lack of accessibility with buildings. Several of the wheelchair users also reported having to travel with someone in case they needed to be carried or helped over a step/steps as the public were generally not willing to help.

Most of the wheelchair users also reported having to phone in advance when going to unfamiliar places to ensure there were wheelchair friendly entrances and accessible toilets including in the most popular shopping areas. As an example, L12 expressed how she felt about the lack of ramps in stores/shopping areas:

***It is an important issue, around this country and everywhere else. It's just really frustrating. The other day I went to a furniture store and everything was upstairs and they didn't have a ramp or an elevator. And they just said there was nothing they could do. So, I think accessibility is really important, as much as the health of the patient.***

**L12**

Despite the general consensus of accessibility of buildings being inadequate, a few of the participants were keen to point out that situation was improving. They noted that newer buildings were increasingly considering accessibility for disabled people in terms of ramps, lifts and toilets.

However one of these participants went on to add that although changes were being made, the building industry was still making errors:

***But now, you see that people are making changes. However, they are not well educated yet when making the ramps because you find places with a ramp, but the ramp is too steep.***

**L1**

The next themes are those resulting from interviews with HCWs

#### **6.3.8 Road traffic injuries are a major problem in Namibia**

A main theme to come out from the interviews with HCWs was that RTIs are a major public health problem in Namibia. All the HCWs reported RTIs to be a major problem in Namibia. They viewed them as a public health concern associated with high rates of death and injury. Several of the participants believed that it was the high rate of injury and death which had made it necessary for the formation of the MVAf in Namibia to support injury survivors.

***It's such a big problem and I think that's part of the reason why in the last couple of years the country actually set up the MVAf, specifically to fund the rehabilitation of RTI survivors.***

**P10**

Some of the participants compared the rates of deaths and injuries in Namibia with other countries. They felt that Namibia had one of the highest rates of deaths and injuries regionally and globally. For example P14 reported that Namibia had the highest global death rates;

***It is a big problem, because now Namibia stands at number one in the world regarding fatalities due to road crashes. So, it's bad. Really, really bad.***

**P14**

Moreover, RTIs were identified by many of the HCW participants as being one of the greatest causes of the burden of injury in Namibia. For example P14 was a medical officer in the Spinalis Spinal Cord Injuries Unit at Windhoek Central Hospital and noted that the unit's statistics showed that about 85% of spinal injuries were due to RTIs. When asked about the proportions of disabled people due to RTIs none of the participants had any indication as to the specific proportions but the general consensus was that RTIs were a responsible for a high rate of the burden of disability in Namibia. Some of them suggested that these statistics may be available in the *Disability Report (NSA, 2016)*. However as noted in Section 1.10, the Disability Report does not have the statistics on the actual cause of disability.

Most of the participants were eager to point out some of the factors associated with the high rates of crashes, deaths and injuries. Drinking and driving, speeding and reckless driver behaviour were cited to be major factors by the majority of participants. Other participants also felt that young drivers tended to drive more recklessly on the roads. Several of the

participants also highlighted poor law enforcement to be a problem. The participants also noted the time periods associated with higher numbers of crashes. It was generally felt crashes were higher during month-ends, when people would have been paid, and at festive periods like Easter and public holidays when a lot of people would be travelling to visit family and friends in other cities/regions.

Most of the HCWs interviewed reported that some efforts were being made to tackle the problem of RTIs in Namibia through some few public safety campaigns. However, most of them felt these campaigns were not helping to curtail the problem as they were not consistent. For example P9 reported that the public safety campaigns were mostly isolated to the festive season. In addition, most HCWs noted that there was not enough investment in road safety, and a number were aware that rates of crashes, deaths, and injuries were actually worsening.

The participants also discussed the demographics of the problem and correctly reported that younger age groups and males, particularly those of working population were worst affected. It was felt that RTIs were counterproductive for the economic advancement of Namibia as they resulted in the loss of manpower and economic output. Notably, most of the participants reported that those from lower socio-economic backgrounds were most adversely affected by RTIs. For example as the following excerpt shows, P18 who was a Rehabilitation Quality Specialist at MVAf explained that blue collar workers such as security workers were at most risk due to the form of transportation they used.

**Interviewer: You mentioned that the majority of people involved in MVAs are blue collar workers like labourers?**

**P18: Yes. And the reason for that is mainly due to their mode of transport. It's security guards, it's construction workers, because sometimes they sit at the back of big bakkies (trucks). There are no seatbelts. If anything happens, all those guys will have serious injuries because they will just be falling out of the car.**

Some of the participants reported RTIs as worsening the cycle of poverty in Namibia. They viewed them as having social consequences with families being driven into poverty with the death of breadwinners and injury survivors losing their employment. Several of those interviewed also noted that injuries, even minor ones, affected individuals in the long-term, resulting in poorer overall quality of life.

***It's very life changing, especially for people who sustain serious injuries and require long-term care. But even for those who suffered not-so severe injuries. They are affected throughout the course of their lives because it interferes with their function.***

**P11**

Reasons given for this included the restriction in ability to do activities of daily living, loss of independence, and mobility problems. For example P5 explained that in rural areas, injury survivors using gait aids like wheelchairs and assistive devices often had difficulty with mobilising and moving around the community due to the sandy and rocky terrain which

made it difficult for them to propel their wheelchair leaving them dependent on other people.

### ***Types of injuries***

Most of the participants reported that that fractures of the lower and upper limbs and soft tissue injuries were the commonest injuries resulting from road crashes in Namibia. Other injuries that were identified to commonly result from RTIs included contusions, amputations, nerve injuries, head injuries and spinal injuries. P18, the MVAFA employee had knowledge of the data collated data on annual road injuries in 2016 and revealed that severe injuries such as spinal and head injuries had formed about 7-11% of total road injuries.

***In terms of injuries, I think they are getting to about 500 and something per month. So that's a big number. And you have other injuries that are very severe, like spinal cord injuries, traumatic brain injuries. Those are roughly around 7 to 11% of injuries, so you can just imagine the burden.***

***P18***

### **6.3.9 Being provided for by the MVA-FHCWs**

Similar to the views of the injury survivors, all the HCWs interviewed also reported that the MVA-F was doing an important job in supporting the survivors of road crashes. The existence of the Fund was cited as important because of the high rates of RTIs. Interestingly, one of the participants (P2) had previously worked in a neighbouring country which did not have a similar system to the Fund and highlighted the difficulty faced by road injury survivors in terms accessing healthcare following the injury as they would have to pay from their own pockets for the costs.

***I used to work in Zimbabwe and coming here to Namibia, the difference between the two countries is that in Namibia they have this Fund for people who are involved in road accidents in Namibia. It's due to that Fund that most patients access clinical services after the accident. I'd say, it's a positive or a plus for this country compared to Zimbabwe, where people fund from their pockets if they are involved in an accident.***

**P2**

HCWs pointed out ways in which the MVA-F was helping injured survivors. They all mentioned that the Fund was paying for the costs of healthcare following an injury. P10 even noted that if one needed a specific type of treatment which was not available locally the MVA-F would even pay for this to be done in other countries.

***In terms of the medical and surgical care somebody might need, the MVAFF pays.***

***Regardless of whether it's available locally in state facilities or it's available outside the country.***

**P10**

Provision of aids, caregiver allowance and home modifications

The reports given by survivors were in concordance with accounts given by HCWs who similarly highlighted gait aids that were being provided to those with road injuries by the Fund. Some HCWs also highlighted the caregiver allowance and one-off lump sum payments as having been provided by the MVAFF to those with severe injuries such as spinal injuries. Some of them also mentioned the MVAFF case managers as good contact points for health workers involved in the care of survivors and how they were involved in facilitating follow-up care. Meanwhile P5 praised the MVAFF for maintaining good records and establishing a good referral system. A few of the health professionals likened the MVAFF to an open medical insurance.

***Basically, I think it's a system that works. It's like a medical insurance. So if you get involved in a car accident you get treated for free.***

**P11**

Access to the system

Similar to the experiences of injury survivors, most of the HCWs interviewed felt the majority of road injury survivors were able to access the Fund. Additionally, a few of them



noted how - in order to improve the access of the Namibian population to the Fund, the MVAf which had previously only had offices in the capital, Windhoek - had now established more branches in other regional towns. According to the latest report on the MVAf website there are now seven regional offices in Windhoek, Keetmanshoop, Walvis Bay, Otjiwarongo, Rundu, Katima Mulilo and Ongwediva.

However contrary to the experiences reported by injury survivors who were all satisfied with the accessibility of the MVAf system, some HCWs noted that there were still road injury survivors who were failing to access the Fund. P3 explained that in her experience, most of these people had lived in rural areas and had been unaware of the existence of the MVAf.

**P3: Most people do know about it, but there are some people who do not. I have heard of a few that people that never claimed through the MVAf. And then now it's too late because it happened a few years ago.**

**Interviewer: What do you think could be behind this?**

**P3: I think it's because of general lack of knowledge. And it's also people that live outside the urban areas....in the rural areas. So maybe there is no access to that information.**

Several of the participants also noted that if a road crash was unreported, there would be no cover by the MVAf as a police report was required. The participants also explained that there was a set period of 30 days over which a claim could be made. Adding to this, P7 reported that crashes occurring on smaller roads especially in the rural areas were often more not reported in the way the MVAf would require, due to a lack of police in rural areas

compared to those occurring in urban areas and major roads which had heavier police presence. P7 explained that this would disadvantage the survivors injured in these crashes from accessing the MVAf and the associated benefits. Meanwhile, P10 noted that a lot of patients with minor injuries were not being captured in the MVAf system possibly owing to lack of knowledge, the process being too lengthy or by the time the claim had been processed, their injuries would have healed.

**P10: So, you have a lot of patients who suffer minor injuries and they are not captured by the MVAf system and end up getting, or accessing healthcare at state facilities without the aid of the MVAf.**

**Interviewer: Why is it that they don't report the accident?**

**P10: I think part of the problem is that people are not aware because quite often you have to advise these patients to get registered with the MVAf, or they feel their injuries are not severe enough, or the process of being captured onto that MVAf system is probably a bit longer than a patient might anticipate such that by the time they are eventually registered with the MVAf, they've recovered.**

Similar to this report by P10, P7 explained that some road injury survivors were discharged from hospital without having had any assistance from the MVAf due to registration process being lengthy. Meanwhile, P17, who ran a private occupational therapy practice reported that most professionals and those from higher socio-economic groups tended to use their medical insurances instead of the MVAf to fund their treatment and rehabilitation after road injury. She reported that they found the process of registering with the MVAf too lengthy and complicated.

Several of the participants also noted that there would be no cover from the MVAf for individuals found to be guilty in causing the accident or other offenses such as having been driving without a license. However P18, who as noted in the section above worked at the MVAf, was well versed with the policy countered this, informing the interviewer that the MVAf covered the immediate costs for all patients in the acute phase regardless of fault and that it would only be the continuing care which would not be covered for someone found to be guilty in the road crash. The information given by P18 tallied with the information on the MVAf website.

#### Financial cap

In table 1.1, I illustrated the range of MVAf benefits including the Medical Benefit which is up to a maximum of N\$1,500,000 for each individual injured in a road crash in Namibia. Many of the HCWs reported that the MVAf allocation for each individual was limited, at risk of being depleted, and once the allocation had run out, the person had to pay for their own medical treatment. This was viewed by the HCWs to be a negative aspect of the system, particularly with regards to people with serious road injuries whom they noted to likely have lifelong health complications and on-going health care needs and costs. Some participants revealed that this depletion led to some injury survivors not coming back to services such as rehabilitation because they could not afford to pay for these and consequently not reaching full functional potential and developing health complications because of inadequate care. For example, P11 highlighted the case of one his patients whose funds had depleted.

***I have a client of mine who had a head injury. After a period of getting the aid from the MVAf, they then said, no we have done enough. So, right now it's his parents***

***that are taking care of the bills. They are actually asking for donations. It is a really bad situation. The guy has been like that for a long time.***

***P11***

Adding to this, P10 reported that the situation whereby patients find their funds depleted is a stressful one for them as they have to worry about how to fund their health costs and can lead to a decline to their mental health.

## Problems with the system

These views tallied with HCWs interviewed. Although all the HCWs reported that the MVAF were providing all the mobility aids, they highlighted some negative aspects to the process. Most of them reported that wheelchairs and orthotic devices were being imported, with no manufacturing plant in Namibia. (As noted earlier in this section) It was reported that most importations were made in South Africa and Sweden as Namibia had reciprocal agreements for the supply of these devices with these countries. They noted this as a problem as there were often problems with maintenance and service of the devices and wheelchairs with local servicers not having great familiarity with the devices nor the required spare parts. Acquiring these spare parts was consequently reported to take long periods with users often restricted in terms of mobility whilst waiting for the parts to be delivered to Namibia.

This is similar to reports from interviews done with injury survivors, some of whom disclosed having to wait long periods for spare parts for wheelchairs. It was also reported by some of the HCWs that the aids were not suited for the local areas especially for those living in non-urban areas. The terrain in these areas was described by participants as being often very sandy or rocky such that propelling the wheelchairs very difficult. P16, a community rehabilitation specialist suggests Namibia having its own manufacturing plant would be advantageous as the products would be suited to the local context:

***Most of the wheelchairs are meant for pavements and are not meant for the terrain in Namibia. The terrain in Namibia is rocky, it's also sandy and most of the wheelchairs that are being distributed are not suitable for the sandy and rocky***

*areas. Unfortunately Namibia does not have a warehouse whereby they manufacture their own wheelchairs. Maybe if we would have this, we could be able to manufacture the right type of wheelchairs that can be used in these sandy and rocky areas.*

**P16**

P19 added to this, highlighting the lack of proper wheelchair assessment for not only the terrain but also body measurements leaving the wheelchair users vulnerable to developing spinal problems like scoliosis/kyphosis due to using the wrong chair. P19 however added that the situation was improving with the MVAf incorporating occupational therapists to be more involved in the procurement of aids and wheelchairs.

#### ***MVAf versus State***

Interestingly during the interviews, the majority of health professionals made a distinction between patients funded by the MVAf and those without MVAf cover, paying for their own care in public hospitals (state patients). 'State patients' are defined here as those with medical or rehabilitation needs based on an injury or illness that was not related to a motor vehicle accident and hence not covered by the MVAf. There were a number of striking differences in terms of access to services, aids and support for these two groups - even when they had identical injuries - that HCWs commented on. They noted that, regardless of severity of injury, those with injuries which did not result from RTIs, such as stabbings, falls and gunshot wounds were not covered by the MVAf. P10 noted that only a few people

(15%) in Namibia had access to medical insurance and that the majority of these would seek treatment in the private health system. He reported that the other 85% who did not have medical insurance were dependent on the public/national health system. This figure he gave actually matches with information that has been previously reported (de Beer, 2009; Gustaffson-Wright et al, 2011). Participants also highlighted that when the MVA cover depletes, the road injury victim becomes regarded as a state patient.

Being a state patient was viewed as a negative thing as this meant injury survivors were under government care and had to pay out of pocket for some of the services. Participants also highlighted that although access to the public health was subsidised, there were associated co-payments which were not always affordable meaning some people opted out of care. L11 explained how this could lead to individuals not reaching their full physical potential:

***Especially for those who are not funded by the MVA cover or whose funds are depleted. Rehab services are very expensive compared to the general income. That's why they can end up not reaching their full physical capability because of inability to fund rehab services fully due to lack of funds.***

**P11**

As such, it was felt state patients were hugely disadvantaged compared to road injury survivors who were funded by the MVA cover. They reported the latter group could be seen in private hospitals where facilities were more advanced, with more favourable staff-patient ratio. Participants also reported there was a lot of pressure on public health services with

long waiting lists for services such as rehabilitation and shortage of health staff in public institutions which intensified this pressure on public services such that continuation of care was more difficult. For example P4 explained the difficulty in following-up on state patients:

***For example, us physios, we don't even do any home visits. We are too short-staffed, we don't even follow-up on patients. So even if I tell somebody to come back and they don't come, unfortunately, I don't look for them.***

**P4**

In comparison to this, P18 highlighted that MVAF patients are assigned their own case managers who are responsible in ensuring follow-up:

***Home visits and follow-up are not to the extent that they should be and as a result, the majority will be left out. But for those who are eligible for benefits from the MVAF, they can actually get help because each person is assigned a case manager who actually monitors what's going on.***

**P18**

As such, most of the participants felt that MVAF patients were more likely to have better outcomes compared with state patients. It was also highlighted by several of the participants that state patients were more disadvantaged in terms of access to aids and assistive devices. For example L5 reflected on how this could affect the quality of life in terms of ability to move around:



***For the state patients we do not have the correct assistive devices. We have limited stock and we only have the basic assistive devices for them. And obviously assistive devices can make them more independent.***

**P5**

Similarly, P18 compared the availability of aids for state patients with MVAF patients, divulging that the MVAF patients were a fraction of those with injuries and that the rest are considerably disadvantaged in terms of access:

***The majority of the patients actually depend on the state services and you will find that for people that are in need of wheelchairs, there are huge waiting lists for those. The same applies for prosthetic and orthotic devices. In terms of injuries related to RTIs, because of the MVAF benefit, those patients are actually covered. Whatever assistive device they need, they actually get. Even if it's not available in Namibia, it can be imported.***

**P18**

Several of the participants also noted that home modifications were not available for state patients requiring them. Reflecting on this, P14, a medical officer in the spinal rehabilitation unit described a huge discrepancy between accesses to services in favour of MVAF patients compared with state patients.

***About home modifications, that is not there because the government doesn't have such a program. So, if a patient is not covered by the MVAF, let's say they are***

*paralysed through a stab wound or a fall, then they are not covered by the MVAFA, which means the home modification is not done. It depends how much money the family has as they have to do their own home modifications.*

**P14**

#### **6.3.10 On-going health problems-HCWs**

Similar to the reports of the injury survivors, all the HCWs reported that RTIs in Namibia were associated with a range of long term physical health problems with the need for on-going medical care and associated costs continuing for many years after the injury, based on their own observations. They reported that serious road injuries were the most debilitating compared with moderate and mild injuries because they were more likely to be associated with sequelae. They reported mild and moderate injuries to be less debilitating with more people able to go back to normal routines compared to those with severe injuries.

Participants cited complications of bed rest to be commonly associated with severe injuries such as spinal injuries. Complications mentioned included pressure sores, urinary tract infections (UTIs), renal failure, infections, contractures, breathing problems, continence problems. For these reasons some of the participants felt that people with serious injuries tended to be at greater risk of dying from complications of injury. For example P6 discussed the life expectancy of those who sustained spinal injuries.

***I'm still to see a paraplegic who is aged above 60. The only ones you see in wheelchairs above 60 will be the stroke patients. Your life span is shorter than the average person.***

**P6**

The participants also reported chronic pain to be a prominent aspect of injuries across the spectrum of severity. P4 reported that this could often be debilitating and affect the functional ability of the injured. A few participants also linked chronic pain following the road injury to increased chances of developing mental health problems. For example, P14 reported some patients under her care had started to misuse alcohol to control chronic pain. Meanwhile P12 was an OT involved in carrying out disability assessments and described seeing patients who had been injured many years before and still experiencing pain.

***We see a lot of patients being referred for disability assessments. They'd have been involved in an RTI in the 90s or early 2000s or even way back as 1980s, and those people have chronic pain, chronic back pain, and those kinds of problems.***

**P12**

Most of the participants also reported that even minor and moderate injuries had long-term impacts. For example P10 presented information based on his clinical experience as a physiotherapist:

***However small the injury might be, from very mild to very severe injuries, I think they usually have long-term impacts to peoples' lives. So, I would sum it up by***

***saying, whatever injury somebody might actually suffer, it usually changes or has a long-term impact on that particular individual.***

***P10***

Several of these noted that chronic pain was the prominent sequelae associated with these types of road injuries. It was also reported that since fractures were common injuries associated with road injuries, the injured individuals were more likely to develop joint osteoarthritis.

### Mental health

The reports given by injury survivors regarding mental health decline tallied with the reports given by HCWs. All the HCWs reported that mental health of injured survivors was affected. Similar to the physical health problems, there was a general consensus from participants that those with serious injuries had been more likely to be affected compared to those who sustained moderate and mild injuries. Perhaps not surprisingly, one of the participants (P6) reported that long stays in hospital associated with serious injuries could also be associated with depressive symptoms.

The participants noted that road injury survivors were generally prone to depression. For example, P5 reported road injuries to be a big challenge to deal with mentally because of the physical and socio-economic changes associated with them. Most of the participants also felt that road injuries were associated with increased patterns of alcohol misuse in Namibia. Alcohol was reported to be used to cope with the injury and to forget as well as to

help control chronic pain especially. Other mental health issues that were mentioned by the HCWs to be associated with RTIs included stress, anxiety, anger and difficulty with coping. P9 also reported that some of those with road injuries had disclosed needing to take sleeping tablets.

***From those who we have seen when they come back for operations, there will be patients that will say; I actually had to go on sleeping tablets, or I had to take excessive alcohol to forget the situation that I am in.***

**P9**

Several of the participants also highlighted that some of the injured also developed suicidal thoughts. P14 noted these could be triggered by the new situation or chronic pain. Similarly, P6 highlighted the case of one of her patients who had committed suicide following discharge from the hospital. She reported that the family had informed her of the death when she had made a follow-up call to check on how the patient was doing.

***I think it somehow contributed to his depression because when he got home, after 2 weeks or so from when he'd been discharged from here, he committed suicide.***

**P6**

A few of the participants suggested that males could be more affected due to the gender norms associated with the injury, such as loss of work and the role of breadwinner leading to loss of self-esteem and feeling like less a man.

***For the gentlemen, especially African males, they feel if they can't work, they are not really anything. And you can understand that. If they come from the north, they farm to provide for the family while the wife is at home with the kids.***

***P5***

Meanwhile a few other participants reported that the injuries could also be associated with poor body image which could worsen the feelings of depression in a vicious circle. When asked for elaboration the most common example given was of those having sustained traumatic amputation as a result of the RTI.

Interestingly, some of the participants explained that depressive symptoms could also affect the physical health. P14, P15 and P20 highlighted that some survivors had developed apathy and had self-neglected following the road injury. They noted that this has led to a lack of morale to actively participate in rehabilitation activities which had led to poorer long-term outcomes. Related to this, it was also reported by several participants that some survivors due to depressive symptoms had developed sustained low motivation to go back to work following the road injury.

### ***Psychological support for road injury survivors***

Most HCWs felt psychological support was generally lacking in Namibia for RTI survivors. For example P11 reported that they rarely referred for such services and that the referral system was inadequate in terms of this:

***I'd want to say we are lacking in that area because we rarely ever send people for that type support. I had a lady that lost her kids in a car accident. Not even once did I remember referring to a psychologist. So I think we are lacking in that area. There is a need for improvement.***

***P11***

Many participants highlighted that the major problem was a lack of psychologists and counsellors. P6 revealed that there were only two psychologists working in the public health services in the whole country while P17 and P5 indicated that even in the private sector the psychologists were only available in Windhoek and the coastal towns but not the rest of the country. The participants highlighted that due to the lack of psychologists, social workers were the ones mostly involved in the counselling of road survivors. For example P2 worked in the spinal rehabilitation unit and discussed the counselling services there:

***In our unit we do have a social worker who deals with such cases. Here in Namibia, the social worker plays the role of being the counsellor.***

***P2***

One of the participants had worked in several regional countries and expressed some surprise with the role of social workers as being counsellors to the road injury survivors. She however added that members of the whole team looking after the injured were also contributing in this.

*I don't know, it's only here that I found social workers being counsellors. The social workers are the ones who are chipping in as counsellors. But then, the whole multidisciplinary team also act as counsellors when you work with the patient.*

**P6**

Several other participants also reported that they were contributing to trying to counsel the injured because of the lack of psychologists. A few participants also explained that psychological support was not necessary for everyone sustaining road injuries and reported that it was only when someone had been identified to need this that they would be referred.

#### **6.3.11 Access to physical rehabilitation-HCWs**

Whilst HCWs gave varying general statistics, they all reported that a greater proportion of road injury survivors were able to access rehabilitation treatment due to the involvement of the MVAf. Specifically they pointed out that access to rehabilitation for road injury survivors had greatly improved from the previous years due to the introduction of the MVAf case



managers and the decentralisation of the organisation from the previous one office in Windhoek to the seven regional offices, including the Windhoek one which began in 2008. The participants felt this had made the MVAF more accessible to people in the rural and regional areas. Interestingly, several of the HCWs also noted that the majority of MVAF patients were receiving their rehabilitation in private practices because the quality of services was deemed to be better and because they could get seen more quickly than in public hospitals - which served a larger population base and had longer waiting lists.

Most of the HCWs however also reported that a considerable proportion of injury survivors, despite the involvement of the MVAF and the improvements noted, were not able to access rehabilitation services and treatment. Participants felt that a reason for this was that access to rehabilitation was generally a problem in Namibia due to lack of personnel. Several of them noted that rehabilitation services in both the private and public sectors were already overwhelmed because of low staffing levels and long waiting lists such that even if funds were available from the MVAF, road injury survivors would have to wait to be seen, thus compromising their recovery to best functional levels. One physiotherapist attributed this to the lack of training opportunities. He highlighted that at the time of interview there were no universities offering courses to train physiotherapists, occupational therapists, speech therapists, and orthotists/prosthetists, with all staff in this line of work having trained mostly in South Africa, other neighbouring countries or overseas. Most of the participants noted that the majority of rehabilitation professionals were employed in private practices based in Windhoek and other areas in the city centres but such services were deficient in peripheral areas. For example P9 discussed the geographic location of physiotherapy practices:

***You'd find that most of the physios prefer to have practices in town. So, as you go to the outskirts it's not as readily available as in towns.***

**P9**

Adding to this many of the participants went on to explain that most of the rehabilitation services, including those in the public system were concentrated mainly in urban areas, especially in Windhoek. For example, several of the participants highlighted that the only spinal rehabilitation unit in the country was in Windhoek and there were also no orthotic/prosthetic units outside Windhoek. An overwhelming consensus amongst the participants was that access to rehabilitation services and treatment was much poorer in rural areas compared to urban areas because most rehabilitation facilities and personnel were mainly located in urban areas. P18 reported on the distribution of rehabilitation personnel.

***Yeah, I think the biggest challenge is that rehabilitation services are concentrated in the urban areas. Not just the urban areas, but the main major urban areas.***

***That's where you find most of the physios, OTs. Speech therapists; I think there are only in the capital city, or maybe in the coast, one or two. So if a person is coming from a rural place, for them to access these services, they need to travel to those particular centres where they can get such services.***

**P18**

For this reason HCWs reported that even though road injury survivors were supported by the MVAf with costs of rehabilitation treatment, if they were living in rural areas they were

still at a marked disadvantage because most rural areas in Namibia had no rehabilitation services at all and the distances to travel to access services were too long. For example P11 remarked on the size of the country:

***Namibia is very big. There are still quite a lot of places where you don't have state rehab professionals or private rehab professionals. So maybe that's the other 20%, and maybe more, of RTI survivors who do not access rehabilitation.***

**P11**

Adding to this, P13 reported that the only other way those in non-urban areas could access rehabilitation services was through community outreach. However several of the HCWs criticised community outreach as having been generally irregular and erratic. Additionally, P13 reported that his team had established that some of the people needing to access their services who were located in remote areas had not been aware of the outreach programs and dates, whilst for others, travelling distances had been a barrier. The general consensus of participants was that road injury survivors living outside urban areas were more likely to have poorer outcomes compared to those living in cities, especially Windhoek, because of reduced access to rehabilitation treatment meaning they would not be able to reach their full potential. For example P17 reported that some of them would end up being transferred to Windhoek in the long-term after developing complications such as contractures.

**Interviewer: So you mean there are some MVAF patients who do not get rehabilitation treatment?**

**P17: Yeah, because not all the MVAF patients are coming here and there are some who are in regions which have no physio or OT. You can also see that others will come here later on when they have got complications. When they are sent home, they go and then they will fail to function.**

And then later on when they go to the MVA, the MVA will send them now here because the patient has contractures and is not functional. Or, if they go back to work, they are failing to do their duties. So they come here and then you ask them; did you have physio or OT? They will say; ah no, I just got to the hospital and after that I went back home. I don't have statistics, but you can actually see that's what's happening because sometimes you see the patients coming with contractures.

Meanwhile, several of the HCWs also highlighted that even when services were available in regional centres and rural areas, there was a lack of specialised rehabilitation staff in those areas compared to the urban areas. For example P5 worked in the Spinalis unit in Windhoek and reported that some of their road injury patients who had been discharged to the care of regional hospitals had developed potentially life threatening complications.

***What we see in the northern regions is that, obviously there is a physio and an OT, but they are not trained specifically with spinal cord injuries. So, the patients get secondary complications and can die from them.***

**P5**

These reports by HCWs are similar to the experiences described by some of the road injury survivors. For example, as mentioned earlier, L3 had reported that the rehabilitation that he received from the physiotherapist and occupational therapist once discharged from the hospital in Windhoek was not adequate in his home town as they did not know what to do with someone of his condition and he had to be transferred back to see the OT in Windhoek. A reason for this was given by one of the HCWs, P6, who noted that most of the staff who worked outside the main cities lacked clinical experience and had less

opportunities to pursue continuing professional development courses compared to those in Windhoek;

***Here, you've got a higher chance of being sent to courses for CPD activities. There is not much happening out there. It's just someone who graduated with the level of knowledge that they had, and what you graduate with is just like a base. You're still blank and you need to get experience. So the quality that you get at a regional hospital is different from the quality of service at a tertiary hospital.***

**P6**

HCWs explained that although there were national groups for physiotherapists and OTs such as the Namibian Society of Physiotherapy which organised continuing development courses, the majority of the courses were done in Windhoek because most practitioners were based there. They explained that these courses had to be paid for by the individual and the additional expenses of travel to Windhoek, and staying there, would be a deterrent for practitioners based outside the city. Adding to this, other HCWs reported that OTs and physiotherapists in the regional centres had less time to do any clinical work as they had a lot of administrative duties. They noted that as a result they were not as clinically exposed and could only offer patients, including road injury survivors, limited treatment sessions. P19 and P20 added that frustration at the short treatment times, added to the often long distances of travel to reach rehabilitation services, had resulted in some road injury survivors not coming back for follow-up treatment.

Meanwhile, P6 noted that due to the extensive administration done by the rehabilitation professionals in the districts and rural areas, auxiliary staff titled medical rehabilitation workers would often conduct the treatments of patients. P6 felt they were not adequately trained to manage the treatment sessions of the injured.

***We have got the medical rehab workers. I'm not sure about their level of training, how detailed it is when it comes to exactly what must be done for the patient. But from my experience, when I worked with them, their level of knowledge is really, not forthcoming. So if you are in that area, you have to come to Windhoek to access rehab services. I don't know, I think it's wrong to say proper, but I think that's what it is for me if you want to get something that's proper.***

**P6**

Also discussing the quality of rehabilitation services outside the major centres and in rural areas, several HCWs raised the point that due to the low staffing numbers of rehabilitation personnel and poor community rehabilitation services, family members were being trained to continue with the rehabilitation of road injury survivors following discharge from hospital to their home areas. They highlighted that because care givers were not suitably trained, road injury survivors generally had poorer outcomes and developed more complications in these areas compared to those in Windhoek and other major centres whose continuation of care was managed by professionals.

***So you'd find that those that live in their towns have better access to rehabilitation services compared to those that live in rural areas. So you end up, maybe, training***

*the caregivers to give the daily exercises. But obviously the quality differs and the caregivers follow the specific protocol that you'd have given them. But with the therapist, they are flexible in terms of, if they realise a specific modality is not working they can change it, unlike the caregivers. So in some ways, you'd feel patients in the rural areas are short changed.*

**P2**

Surprisingly, I actually came across a similar scenario to that being discussed by the participants. I had visited a healthcare centre called Paramount, in Windhoek, to speak to some of the staff and was introduced to the family of a road injury victim who had sustained traumatic brain injuries. The RTI victim was still unable to mobilise independently, needing to be propelled by family members in a wheelchair, unable to communicate verbally, and was still having speech therapy. Whilst it was not possible to interview the individual, his family reported that they lived in Oshakati, the second largest city in Namibia and capital of the Oshana region, about 800 miles away. They reported that all the medical and rehabilitation treatment was being paid by the MVAFF. However, the only times he could have speech therapy was when he was brought into Windhoek as there were no speech therapists in their city or anywhere closer. Prior to the recent visit to Windhoek, he had last had speech therapy over three months before. The speech therapist had given the family exercises to try to continue with the rehabilitation but they had not seen any improvements from when he had last been seen in person by the therapist.

For all these reasons mentioned above, HCWs felt that road injury survivors living outside Windhoek, especially in rural and district areas, were disadvantaged in terms of access to

rehabilitation services and treatment. They reported that in the long-term they had poorer outcomes as they were less likely to reach their full physical potential and more likely to have residual disabilities following rehabilitation. In fact, some of the HCWs interviewed noted that some road injury survivors who had relatives living in Windhoek had moved to there in order to access better rehabilitation services and to enhance their chances of reaching pre-injury physical potential. This also echoed the reports of some of the road injury survivors, mentioned above, who decided to move Windhoek because the services in their local areas were not as comprehensive such as L14.

Interestingly, when discussing the availability of rehabilitation services to road injury survivors in Namibia some of the HCWs started discussing about the levels of inequality in general society. They reported that people from higher socio-economic classes benefited from having access to private funds as well as medical aids and had options as to where they could seek treatment. For example P17 reported that professionals with medical insurance chose not to use the MVAf, while P6 and P14 reported that they generally saw MVAf patients from low socio-economic groups in the public institutions they worked and that high income injury survivors tended to go to private rehabilitation therapy services, while wealthy road injury survivors requiring in-patient rehabilitation went to Cape Town for this. Similarly, P4 reported that the road injury patients she had managed were mostly from poorer areas and wondered whether those from well-up areas received more from the MVAf or used private medical aid services.

***You find, someone who is seriously injured will be admitted here, let's say from Opuwo or Gobabis. The affluent people, if they have accidents, you will not find***



***them here. So I don't know whether the MVAf gives them more or they also use their medical aid. But you will not find them here.***

***P4***

The MVAf was also criticised for limiting the number of rehabilitation sessions available to those with injuries. As noted in the previous section, most of the participants highlighted that the specific fund allocated to injured individuals were limited and at risk of depleting. Which as noted by several of the participants was a problem with the system because the injuries often affected individuals over their lifetimes, especially the more serious ones, with the need of on-going rehabilitation and general treatment. Additionally P17 reported the referral of injured survivors by the MVAf to rehabilitation services had become more complex, requiring a doctor to prescribe these services and authorisation. P17 reported difficulties with this process because of a general lack of knowledge on rehabilitation services.

***Sometimes, the MVAf case managers will just say that there is no need for therapy even if the doctor wrote the referral letter. So actually, you find you go back to that issue that they don't know what OT is, what physio is and what exactly the patient can benefit from these professions. And sometimes they give you the authorisation and they say the patient can have five sessions. Then you think, for severe head injuries, you can't do five sessions and say that's it! Then you have to beg them again and say the patient needs more. So, sometimes it's irritating and if you are very busy, sometimes you don't continue to fight with them. So, in the end the***

*patient is the one who will suffer because the moment you leave them, they start to develop the contractures.*

**P17**

### **6.3.12 Financial Implications of RTIs-HCWs**

Similar to the reports by injury survivors, HCWs noted that most road injury survivors faced financial hardships. They linked this to the loss of employment and reported that most of the injured survivors were unable to get back to work. The financial hardships were also linked to the on-going costs related to the injury, for example P20 highlighted the need for to buy supplies such as nappies for those with spinal injuries. The general consensus of participants was that those with serious injuries were more likely to face financial hardships because they had fewer opportunities to find employment. A lot of the participants also reported that the medical costs of those injured in RTIs were more likely to be on-going and actually life-long such that there was a chance of their MVAF allocation depleting resulting in them needing to pay for their own medical care.

The majority of HCWs noted that the majority of survivors with serious injuries would end up being dependent on the disability grant a source of income. It was unanimously felt that the grant was too low and not enough to meet basic needs. Participants highlighted the high costs of living in Namibia, especially in Windhoek and reported this made it even more difficult for the injury survivors to live off the grant.

***Ah it's not enough! Especially in the urban areas like Windhoek. The cost of living is too high! So, that amount, if you are only receiving that and there is no other income, it is not going to be enough.***

***P13***

With regards to the disability grant, several of the HCWs also explained that it was not guaranteed to all those with road injuries. They explained there were eligibility criteria that needed to be met in terms of the severity of injury. P18 reported that each individual had to be assessed for it and not every injured person would end up receiving the disability grant. Adding to this P1 who was a disability advocate noted many people had been rejected for the grant despite having on-going health problems but had not re-applied due to a lack of knowledge even when their conditions worsened.

***Many people, if rejected once, might not go back even if they have on-going, worse, problems because some of them don't know the procedures.***

***P1***

Interestingly, one of the HCWs despite agreeing with the general consensus that the disability grant was too low, also praised the Namibian government for having this in place at all. He compared this with other countries in the region and highlighted that most of other countries did not have such a scheme in place:

***I should congratulate the government. Namibia is one of the only Southern African countries that is providing a disability grant as a social protection system, which is good.***

***P18***

### **6.3.13 Difficulty with finding employment-HCWs**

The reports of injured survivors matched with those of HCWs, with the interviewed HCWs reporting that once involved in a road injury many individuals had been unable to get back to their old jobs or to find alternative employment, ending up unemployed.

***Of course, it's like that. It happens a lot. Many, many people are not getting back into work. I know even of a lady, she is in a wheelchair. You are actually judged how you are. You come in a wheelchair, they believe you will not conduct duties well.***

***P1***

P2 drew upon statistics from the spinal unit where he was employed:

***From our own statistics, of the 40-50 patients that we saw last year, 20 were working before the injury and only two are back in work now.***

***P2***

Several of the participants revealed that although those with serious injuries were worst affected, even those with less severe injuries also encountered difficulties with getting back into work because of on-going health problems such as chronic pain.

***Once they have some sort of disability, employers are not willing to accommodate those survivors back to work, even if it's just a minor disability.***

***P7***

***Some of them describe having back pain which is too much and they just can't concentrate on anything. They will tell you; since I had this accident 10 years ago, the pain has been very debilitating.***

***P4***

The participants also linked the associated socio-economic consequences related to the loss of employment and revealed the loss of family breadwinners as a major problem because the working age group and young males were the group mainly involved by road injuries. Some of them also highlighted the consequences associated with this, citing financial hardships and worsening poverty as likely outcomes for the individuals and their families. For example P3 reported that some road injury survivors end up being dependent on the disability grants.

***They almost always end up not in work and receiving the disability grant and then obviously won't be getting enough money. Then it will be a new struggle in the new situation they are in.***

**P3**

Adding to this, P6 reported that most of the road injury survivors already had low household incomes and this would only worsen their situations:

***The household income is definitely affected. It's already low for most of our patients and this just makes it worse.***

**P6**

The main reason given by HCWs for the loss of employment was that after an injury someone might not be able to go back to the same type of work they were able to. Most of the participants highlighted that a large proportion of injury survivors were from poorer socio-economic backgrounds with low educational qualifications. Thus they were reported to tend to be employed in blue collar jobs which often involved manual labour meaning it would be not physically possible for them to go back to this type even for those with less serious injuries such as fractures. The highest level of high school education in Namibia is Grade 12 (matriculation) and participants noted that the majority of road injury survivors tended to only have gone up to grade 10 or achieved low educational levels. This was revealed to limit their employment opportunities as most office jobs or white collar jobs required a minimum of Grade 12. P3 discusses this below:

***A lot of our patients are manual workers and often work with their hands. They are builders, painters, plumbers. Most of the cases when they have a brain injury or***

***end up in a wheelchair, they don't have the mental capacity or cognitive capacity to perform those jobs or if they have difficulty with walking, they can't do physical work. Often, these people didn't go past Grade 8; the educational level is already low. It's difficult.***

**P3**

It was also highlighted that most people working in the blue collar jobs were contract workers with employers having no obligations to pay them sick pay or to hold their jobs for them. In contrast, participants reported that those with higher educational qualifications were more likely to be able to go back into their old jobs or find alternative employment. For example P2 highlighted that employments such as police, navy, and the civil service which normally required at least Grade 12 qualifications, were easier to go back into because of solid contracts in the public service with injured individuals having their jobs kept open for them and also continuing to receiving salaries during the period of convalescence. It was also reported such employers were more willing to find alternative duties for those unable to carry on doing the same duties. This mirrors some of the information given in the interviews with the injured participants.

Another problem highlighted by all the HCWs in terms of the retraining of the injured was the lack of vocational retraining centres (VCTs). The majority of participants reported that this did not exist at all in Namibia, while a few others reported the existence of a few operational VCTs. However they also reported that in order to be accepted onto any VCT, one needed to have attained at least a grade 12 and any lower qualifications were not

considered. They also reported that the VCTs were not specifically meant for people with impairments or disabilities but actually open to the general public.

***We only have mainstream vocational training centres that normally takes people that have reached grade 12. But if you have anything less, even Grade 10, you don't qualify. We don't have specifically for spinal cord injury or for disabled people specifically where we can send them to receive training.***

**P15**

P3 also reported that the VCT lacked adequate accessibility for wheelchair users.

***In fact, if I'm not mistaken, it is not very accessible for someone in a wheelchair. There is no vocational rehab training for people with disabilities that I can say is formal.***

**P3**

Due to the reported lack of VCTs, participants felt injured people no longer able to do the jobs they were doing pre-injury (including those with other injury types such as falls), were limited in terms of re-training options.

Another common reason given by HCPs for the difficulty in finding employment or returning to work of those with road injuries was discrimination by employers. Several participants



reported that employers were not willing to take back RTI survivors or hire those with in wheelchairs or using aids because they believe they may not be as productive:

***The problem is stigmatisation and discrimination because immediately, when they see that you are now using a wheelchair, they just start thinking like; how will this person be able to cope up with our work or whatsoever? There are only a few of them that have gone back to work.***

**P15**

It was also reported that employers were not willing to make adaptations which would be necessary for some employees such as disabled toilets. The responses given by the HCWs mirrored some of the responses of injured participants, as mentioned earlier, who reported having been discriminated against due to their disability. Several of the HCWs interviewed also noted that even though laws existed to protect the employment rights of injury survivors and people living with disabilities, they were not being adequately implemented. For example P12 revealed having referred some of her patients to the Ministry of Labour:

***Employers, I've realised, are very harsh. We've even tried to refer some of the patients to the Ministry of Labour for assistance but I don't really see much happening. So, the patients then just resort to applying for the disability grant.***

**P12**

It was also felt that jobs could be at risk due to lengthy hospitalisations related to the injury. For example P4 discussed the case of one of her patients who had a lengthy hospitalisation following a road injury:

***For example, I used to have a patient who spent too long in the hospital and they wanted to fire him because he had spent too long in the hospital although the job he was doing, he could still do it sitting in a wheelchair. But anyway, he fought it and they didn't fire him.***

**P4**

Interestingly P9 alluded that road injuries can also result in someone not being able to do the specific job they love which can have negative effects on their mental health. She reported on one of her patients who had worked for a car company as a mechanic but due to an injury was unable to do the job in spite of significant efforts by surgeons.

***I've got my own example of a young man who was working for a car company and fell off a motor cycle and injured, maybe it was the plexus or nerve system in the hand. He comes often to the hospital. They've tried to do everything for him. He was passionate about mechanics, he can't do that anymore. Now to shift someone who has their mind on their mechanics to do something else? I think he needs strong counselling.***

**P9**

A few other participants also reported that following road injury they had noted some of their patients to have poor motivation go back to work due to low mood.

### ***Lost opportunities***

In a similar vein to the injury survivors, the HCWs also highlighted that road injuries in Namibia were associated with limited opportunities in education. Several of them reported that the majority of children injured in RTIs were unable to go back to school following a road injury. For example part of P6's work involved rehabilitation of injured children and she reported on her own experiences;

**Interviewer: In your own opinion what proportion of kids are able to go back to school following a serious road injury?**

**P6: I would say, 3 in every 10 kids. I've got examples. There was one MVAF patient they sent to me for an assessment from Rundu. Before, she was staying in the town and was then sent to the village because now she needs someone to look after her permanently. She is just pushed and left in the shade the whole day and doesn't go to school.**

The participants also highlighted a lack of inclusive and also wheelchair accessible schools. They reported that most schools were not willing to take in children once they become disabled following RTIs as they had no lifts and disabled bathrooms. P5 worked in the spinal rehabilitation unit and highlighted this to be a major problem even in Windhoek.

***There are literally no wheelchair friendly schools in Windhoek. We have looked everywhere and the schools are not willing to change or to modify. That is a big,***

***big problem. Our children can't go back to school and most of our children end up leaving school. Also, there are no disabled bathrooms. There's stairs and no lifts. It's just not accessible. And it's not just for someone in a wheelchair, someone on crutches will also have difficulty with climbing stairs.***

**P5**

Meanwhile, P7 discussed the case of a young child who had started using a wheelchair following a road injury. He reported the case was headline news because it was something unusual for children using wheelchairs to be accepted into school.

***Right now, there was one case which has been in the media the last two/three weeks when the schools opened. It's one of the cases that was being talked about because before, there was no integration of school kids. If they are wheelchair bound, usually they won't be accommodated back after an injury. It shows that it was something which was not existing because if it was existing, they wouldn't talking that much of a child going back to school and making headlines because they are in a wheelchair.***

**P7**

Other participants also reported that road injuries resulted in children missing out on school for long periods after injury which resulted in them falling back and at times needing to repeat grades. They felt this could negatively affect their future potential. Others reported that it had also been difficult for some children to adjust following the injury and some had been afraid to go back to school due to issues related with body image and being

stigmatised. Interestingly, P9 who worked in a private hospital introduced another socio-economic dimension to the discussion, reporting that wealthier parents could afford to pay for private tutors to teach hospitalized children, which she had observed in the hospital she worked. She felt that poor children would be affected more in terms of missing class and tend to fall back more in their education thus worsening the potential cycle of poverty.

#### **6.3.14 Experiencing social problems-HCWs**

The accounts given by injury survivors in describing the social problems they encountered following the road injury matched with the accounts given by HCWs - with all of the HCWs reporting that road injury survivors developing permanent impairment and disability experienced a variety of social problems following their injuries. Several talked about societal stigma. For example, P1 and P6 reported about the injured people who had become disabled being moved away from the city to villages and being hidden away from society.

***Culture is a devastating thing that you can see in the country. Having a person with a disability around you, for some or many people is quite a taboo. So, some would want to hide or to keep that person in a place where they wouldn't be really visible to the whole of society. So they'd rather keep them in the village or rural areas where unfortunately they won't really have good access to health services.***

**P1**

P3 had previously worked in the spinal rehabilitation unit and recalled seeing injury survivors being ignored and pushed out of the way by public members on outings which

were meant to give them the confidence to go out independently. Adding to this, P8 reported that those with obvious injuries such as wheelchair users were more likely to face stigma than those with hidden injuries such as an amputee using a prosthetic leg which could be hidden under the clothes. Several of the participants also talked about some survivors being ill-treated and neglected by family members. For example P14 reported survivors improving when in hospital but starting to decline once back home because of neglect from family members and social isolation. They noted that they had experienced on numerous instances cases of injury survivors not wanting to be discharged from hospital or wanting to be admitted again because of the poor care and difficulties at home. For example P4 reported they could even come back having developed health complications because of the poor care at home:

***The home situation is not good and maybe there is no proper care. Most of the times they do come back with complications, even if when they left you would have given them a home program.***

***P4***

Adding to this, P8 reported that this could be every few months:

***You find that every two/three months the person comes back. Probably because the hospital takes good care of them; they are given food, bathing, they don't have to collect water on their own.***

***P8***

Meanwhile, P5 reported that some of the caregivers could abuse the caregiver allowance and lump sum allocated by the MVAFA and the disability grant given to the road injury victim:

***So, the caregivers only come forward so they can get those monies. The other thing we have seen is that they misuse this money; they drink, whilst the patient lies there in bed. No one is there to wash them, to dress them, and to put them in the wheelchair.***

**P5**

Several HCWs also highlighted that survivors could lose or become alienated from their spouses or partners due to the injury and resulting difficulties with sexuality such as loss of libido and chronic pain. Adding to this P6 reported that sexuality was however mostly ignored in both the public and health discourse as it was a culturally sensitive topic in Namibia:

***One area which I know which has got very little support is to do with sexual issues. I don't think it's well tackled. It's a very neglected and more or less untouched area. Everyone is not sure of what to do, so it's ignored. So, you've got professionals who'd rather not talk about it, they're not confident enough and don't know what to say. Then, you've got the patients on the other side not wanting to discuss it because they actually don't know how to ask you, they are shy. Culturally, here, we can't talk about those things. So, that already affects their marriages or their relationships.***

**P6**

### **6.3.15 Difficulty with moving around the community-HCWs**

#### Transport

Similar to the accounts of injury survivors, several of the HCWs interviewed also highlighted that access to public transport was a major problem for road injury survivors with mobility problems. In terms of transport, they noted that people needing to use wheelchairs following the injury were the worst affected. For example P6 and P16 highlighted the lack of accessible transport:

***Generally in Namibia we don't have wheelchair accessible public transport. It's something that we discussed. We did a workshop with people with disabilities two years ago and we were hoping to get the City of Windhoek and the Ministry on board, to try and get them to be more aware of the situation. We don't have such things. It's just the same type of buses so you have to make a plan.***

**P6**

***Public transport is not accessible for most people with disabilities. Most of the buses, if you're in a wheelchair, you can't get in. Even on crutches, you can get challenges. They are the normal mainstream buses and they can't cater to people with disabilities.***

**P16**

Similar to road injury survivors, they also reported that despite being the commonest form of public transport, taxi drivers were not willing to take people using mobility aids especially



wheelchairs because they believed they would delay them. Some of them similar to injury survivors also reported on how it was difficult for wheelchair users to use taxis because they were also not accessible.

Above I reported how some injured survivors explained that hospital transport was not accessible. A corresponding report was given by the HCWs working at the Spinalis (SCI) unit, who reported that even the hospital transport ferrying spinal injury patients using wheelchair users to the unit, from areas outside Windhoek for follow-ups, was not adapted. This following excerpt of the interview with P4 illustrates this:

**P4: Let's say I gave them an appointment to come back and they are from the regions. They go to the hospitals in their regions and are booked and transported from the hospital via the ministry's bus to here, and then they go back via the bus.**

**Interviewer: Is the bus designed to be accessible to disabled people?**

**P4: Not really, because it's the standard buses.**

**Interviewer: What about the wheelchairs users?**

**P4: Yeah, they come with the bus. It's only those who are very sick or who need oxygen, who come with the ambulance. But the majority, it's the bus.**

Other HCWs also reported the hospital bus drivers not wanting to take patients in wheelchairs.

***It's a big problem. They refuse to take the patients in the wheelchairs because they take extra space. It's always a fight with the people here. The buses aren't always full but they don't want to take the patients in wheelchairs. It's just terrible!***

**P5**

It was also reported that the hospital buses could leave wheelchairs if they saw them exhibiting some of the physical manifestations which are normal of spinal injuries such as spasms:

***The drivers, if they see someone with spasms, will not want to take that patient.***

***They will think the person is sick. But for our spinal cord patients, it's not like they are sick. So they will say; you need to come with an ambulance, you need a nurse with you. So they will leave them.***

**P6**

As result of both these reasons, participants reported that many wheelchair users had to wait long periods before being transported back to their home regions from the spinal unit.

## Buildings

Similar to the accounts of injury survivors, HCWs also noted a general lack of accessibility to buildings for those with mobility difficulties following road injury. Adding to this, P1 and P16 reported that Namibia was still mainly using the pre-independence standards of buildings.

***The thing with Namibia, we don't have building standards. The South African old standards that are outdated are still used. I personally feel that the municipality should pick up such measures to ensure that whatever houses are built in the towns or whatever buildings should be access friendly to people with disabilities.***

**P1**

***There are no accessibility standards passed in Namibia. The ones that they are using are for the South African bureau, the old regime standards for buildings. So you will find that even these people that you're talking about that are involved in road traffic accidents will have challenges in accessing some of the public buildings here in Namibia.***

**P16**

Also, as previously mentioned, some participants had noted that VCTs and schools were not accessible to wheelchair users whilst others had also highlighted that due to difficulty in accessing workplaces because of a lack of disabled accessible entrances, road injury

survivors with mobility problems were disadvantaged because employers were not willing to make adjustments to make their buildings accessible as they believed these to be costly.

#### **6.4 CONCLUSION**

In this chapter I have presented the results of from the qualitative analysis of the interviews done with injury survivors and HCWs in Namibia. In summary, it was reported that RTIs were a major problem and were one of the major causes of injury and death. The contribution of the MVAF towards the health care of those sustaining RTIs was mainly lauded by both the injured and HCWs, although they did highlight some problems with the system. HCWs also noted the major gap between those covered by the MVAF and those with similar medical or rehabilitation needs who are ineligible for coverage because they have become injured and disabled in non-RTI accidents.

Both injury survivors and HCWs reported that RTIs were associated with an array of ongoing health problems, financial difficulties, limitations in finding employment, social problems and difficulties in moving around the community. In the next chapter I will discuss the results from the quantitative and qualitative studies drawing upon literature findings from other studies and other countries.

## 7.0 DISCUSSION

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### 7.1 INTRODUCTION

RTIs are currently a leading cause of injury in most countries (Nhac-Vu et al, 2011). Unless protective measures are put in place, they are set to be the leading contributor to the global burden of disease by 2020 in LMICs (Zamani-Alavijeh et al, 2011). Despite this, there is a scarcity globally of accurate and reliable data on the long-term health consequences of road-injuries, especially long-term impairment and disability (Ameratunga et al, 2006; Sharma, 2008; WHO, 2015a). This seems to be a prominent problem at even higher structural levels as the World Health Organisation's *Global Status Report on Road Safety* lack data on injuries, with statistical rates being provided for only fatalities and none provided for injuries. The dearth of information on long-term consequences of road injuries is much worse in LMICs, which already have scarce research on RTIs (WHO, 2015a). Namibia is one such country. Despite having one of the highest fatality rates globally, there have been no published studies in the peer reviewed literature on national deaths and injuries, nor on long-term impairment and disability related to RTIs. The only statistical data available on RTIs in Namibia are from reports done by the National Road Safety Council (NRSC) and the Motor Vehicle Accident Fund (MVAf), the two agencies involved in road safety in the country.

Considering the scarcity of data on RTIs and their consequences, especially in SSA, the findings of this research from Namibia are informative, both in terms of the statistical findings on crashes, injuries and deaths, and the qualitative findings on long-term

consequences of injury. This research comprised two linked studies. The first, a quantitative analysis of national data on crashes, injuries, and deaths, over the years 2012-2014, was undertaken in order to determine the counts of crashes, injuries and deaths and associated rates of injury and death as well as to identify the most vulnerable road users and the worst affected regions. To my knowledge, this is the most comprehensive data set on RTIs in Namibia for that specific period because it was based on data from not only the police, but also data from calls made to the National Accident Call Centre, and data from claimants involved in RTIs. The results showed that rates of deaths, injuries and crashes had increased over the period of study. The analysis also identified the most vulnerable groups by gender, age, road user type, and established a regional mapping of injuries and deaths. In addition, I performed regression analysis to calculate the risk of injury and death based on different variables such as age, gender, and road user type. To my knowledge, this is the first study to do any such analysis in Namibia and comparable studies are rare from other LMICs. These findings will be discussed in greater detail below.

The second study was qualitative and involved semi-structured interviews with road injury survivors and key people involved in health and disability in Namibia in order to establish the long-term impacts of road-injuries and the accessibility of rehabilitation and psychology services to road injury survivors. The results showed that many Namibians who had sustained road injuries were impacted greatly by the injuries in the long-term. They experienced a range of health problems, physical and functional limitations, economic and socio-economic problems which negatively impacted on the quality of their lives and in most instances, their families.

To my knowledge, this is the first study of this kind to investigate the impact of RTIs in Namibia and one of the first studies on RTIs in Africa incorporating qualitative methods to capture the voices of those who have been affected by RTIs and the key professionals involved in their care. Ultimately, this research adds not only to the statistical knowledge of RTIs in Namibia and SSA, which is lacking, but also to the growing body of global knowledge on the long-term impacts of RTIs. Most of the research that has been done on the long-term impact of RTIs has been in HICs and these countries have different contexts to LMICs. This research therefore not only adds to the body knowledge on this, but it also brings in new information from a different geo-political and socio-economic setting to the previous research that has been conducted in HICs.

The findings of the quantitative and qualitative studies will be discussed in greater detail below. Where possible and relevant, the quantitative and qualitative results will be discussed together.

An additional component of this study was to review how the MVA system worked – where a fuel tax is used to fund medical and rehabilitative care for those injured in RTIs. By looking both at a policy and reviewing experiences of HCWs and individuals who are recipients of such funds, this study provides a better understanding of how such a health care intervention works in both policy and practice – and these findings will add to the Discussion section below.

## 7.2 RATES OF ROAD TRAFFIC CRASHES, INJURIES AND DEATHS

The main finding from the quantitative study, despite the short time frame covering the years of 2012 to 2014, was that RTIs had worsened over the period of study, as indicated by the increase in not only the absolute numbers of crashes, injuries, and deaths, but more notably, the increase in the rates of crashes, injuries, and deaths when taking into consideration the estimated total population, and the vehicle kilometres travelled (VKT). The death rate in 2014 of  $29.4/10^5$  population shown in my study ranks much higher than the 2014 world average of  $17.4/10^5$  population which was reported in *the Global status report of 2015* (WHO, 2015a). However it is also possible that the rise in numbers of crashes, injuries and deaths over the years 2012-2014 may be a result of better surveillance and reporting of RTIs.

As already highlighted in the literature review, Namibia is rated as having one of the best networks of roads in SSA and has set itself on the path of improving its road infrastructure even further for the purpose of further development with aims towards HIC status. According to Bachani et al (2012) and UNECA (2015), as countries in Africa develop further and road infrastructure improves, the number of vehicles and vehicles' speeds will most likely increase, resulting in increased rates of RTIs and fatalities. This is something not unique to African countries, as analysis of data from many countries across the world shows a direct relationship between increasing levels of motorization and increase in RTIs and fatalities (Sharma, 2008).



This certainly seems to be the case in Namibia: results showed that the increase in death and injury rates has been in line with increased motorisation levels, which are likely the result of increased economic growth and urbanisation. This study found a 13% increase in crashes from 2012 to 2014. Over the same period, the number of registered vehicles rose by 17% while the number of licensed drivers rose by nine percent. Meanwhile, the population rise was comparatively lower at 5%. This indicates that more people were driving than previously and there were many more cars on the road than before. Additionally, the crashes and deaths/10 million VKT rose respectively by 13% and 29%, which are concerning figures indicating that RTIs are increasing at levels disproportionate to the levels of travel and road usage.

The increase in motorisation was probably associated with the rapid development that occurred in the country; Namibia's Gross National Income (GNI) per capita almost tripled from US\$ 2,110 to 5,870 between the years 2000 and 2013 and Namibia was elevated from MIC to UMIC status (World Bank, 2015). Drawing comparisons with Botswana, a neighbouring country with a similar population and which had a similar economic and population growth over the same period, similarities can be noted. Wiebe et al (2016) investigated the effect of GDP on RTI deaths in Botswana and concluded that from 1960 to 2012, rapid economic development in Botswana over this time period was associated with a proportionate rise in road traffic fatalities.

Meanwhile, historical data from analysis done in HICs has shown that road mortality only starts to decrease once a development threshold measurable by GNI per capita of US\$ 8,600

has been achieved or the country's income is sufficient for it to be classified as high income (Kopits and Cropper, 2005; Legarde, 2007; Naci et al, 2009). Adding to this, the World Bank (2003) reports that the relationship between RTI death rate and rising per capita income is such that RTI death rate first increases, reaches a peak, and then declines. This is because at low income levels, the rate of increase in motor vehicles outpaces the decline in fatalities per motor vehicle, while at higher income levels the reverse occurs (World Bank, 2003).

Based on its current GDP, Namibia is far from reaching the development threshold mentioned above and based on this historical evidence, RTIs deaths will only worsen unless drastic measures are put in place. This theory is supported by the World Bank (2003) and Naci et al (2009), who state that if LMICs follow historic trends, it will take many years for them to achieve the declines in deaths rates that have been realised in HICs, because they will need many more years to reach the development threshold.

The results in my study, showing an increase in crash, injury, and death rates, are consistent with the latest WHO *Global Status Report of 2015*, which reported that Namibia was one of the 68 countries in which deaths had risen since 2010. The report used data from 2013 and the death rate for Namibia was estimated to be 23.9/10<sup>5</sup> population, with the SSA region estimate being 26.6 deaths/10<sup>5</sup> population. The WHO estimate given is lower than the one found in this study for the corresponding year (29.2/10<sup>5</sup> population). This difference can be explained by the fact that the WHO report used data from the NRSC, which was based solely on police reports and defined a road fatality as having died within 24 hours of a crash (n=308). In producing the report, WHO then applied an estimated correction for underreporting, generating an estimate of 551 deaths (95% CI 474–628). In comparison, as

already noted, the data used in my research was not only based on police reports, but also data from calls made to the national accident call centre, and data from claimants involved in RTIs.

The World Health Organisation and other global and national organisations use the data from the NRSC when presenting information on RTIs in Namibia because it is the official lead agency involved in road safety in Namibia. In order to enhance road safety worldwide, the WHO has advocated for a lead agency in each country which is meant to provide guidance and to shape road safety forward. The NRSC is the national agency involved in road safety and it also analysed crashes, injuries and deaths for the year 2012 and published a national report in 2016. In addition to the data being used by the NSRC being based solely on police reports, they have also highlighted that some of the data reports they have collected from the police for the analysis have been incomplete, lacking vital information such as age and gender, the number of passengers per vehicle, and severity of injuries sustained by pedestrians and passengers (NRSC, 2016b). They report that some of the police stations have also not been co-operative in terms of providing the reports at all, as well as unclear, which has resulted not only in delays in collating data, but also underreporting of crashes, injuries and deaths (NRSC, 2016b).

The WHO *Global Road Safety Status Report (2009)*, recommended that in order to have harmonization for surveillance purposes, the recommended definition of a road traffic death be “any person killed immediately or dying within 30 days as a result of a road traffic injury accident”. The choice of 30 days was based on research which showed that most

people who die due to a crash, succumb to the injuries within 30 days of sustaining them (WHO, 2009). However the data used by the NRSC in their analyses, collected from police, limits deaths to within 24 hours only. The NRSC acknowledge this and also report that there also has been a lack of consistent follow-up on people admitted to hospital with serious injuries, hence the number of fatalities and permanently injured have been underreported (NRSC, 2015a).

In the most recent reports of 2015 and 2016, the NRSC has applied a standardised 1.3 fatality adjustment factor to the number of deaths to try to adjust for the 24 hour limit. However, there is no clarification as to why this specific adjustment factor was used and how reliable it is. To put this into context, the 2016 report by the NRSC, which analysed data for the year 2012, presented a total of 3507 injuries and 382 deaths, with an injury rate of  $162.5/10^5$  population and death rate of  $17.7/10^5$  population (NRSC, 2016b). In comparison, in my study, which used much more comprehensive data (as already highlighted), for that same year, 6,444 injuries and 598 deaths were reported, with an injury rate of  $285.2/10^5$  population and a death rate of  $26.5/10^5$  population. Therefore, despite the 1.3 fatality adjustment there is still a marked difference for the absolute number of deaths and the death rates between the two data sets. The NRSC is yet to present any reports following the 2016 report and I am unable to make comparisons with data in my study for 2013 and 2014.

### **7.2.1 Underreporting of crashes, injuries and deaths**

Based on the fact that the data sets used in my study are much more comprehensive compared with the NRSC data sets, there is clear evidence that the number of crashes, deaths and injuries being reported by the NRSC are not reliable and are likely to be considerably underreported. As highlighted in the literature review, this is not a problem unique to Namibia and has been highlighted to be a common problem in LMICs which is worse in SSA (Legarde, 2007). This is because RTI injury and death numbers are derived from police and crime reports, with police also not being able to correctly categorise the severity of injury because of a lack of training (Legarde, 2007). The WHO adds that official government statistics often report less than one-fifth of RTI injuries and deaths in SSA (WHO, 2014a).

As the lead agency for road safety in Namibia, the NRSC is meant to shape the way forward in road safety. The underreporting of injuries and deaths in the NRSC reports is thus a major problem because the statistics they produce are the ones used by national and international bodies to present information on RTIs in Namibia and in formulating national budgets. It is also likely to be the information used by media sources in disseminating information on crashes. This leads to lack of recognition of the severity of the problem, which ultimately affects the amount of funding that is channelled towards road safety. According to Ghaffar et al (2004), the absence of reliable surveillance data and estimates on the levels of injuries and fatalities leads to underestimation of the severity of the problem and hampers road safety promotion efforts in LMICs.

Instead, reliable research proving the magnitude of the problem can awaken policy makers, governments, public health professionals, health care providers, civil society and populations (Ghaffar et al, 2004). A recent report indicates that this is the present scenario in Namibia. Funding for road safety has been reduced in Namibia, possibly because of underestimation of the severity of the problem. An interview conducted with the NRSC Executive Secretary revealed the NRSC's funding allocation had been severely affected by a government funding cut and for this reason, NSRC had to make arrangements with a bank in order to continue to function; the organisation was unable to run road safety campaigns throughout the year:

*ET: Yes, our budget has been badly affected. Our subsidy for 2015/16 was 100 percent cut, to the extent that we had to make private arrangements with the bank to keep our activities running.*

*WO: What are some of your challenges?*

*ET: Adequate funding is our main challenge, as we are unable to run campaigns throughout the year. The second constraint is the legal framework and structural set up.*

(Nhongo, 2016: p 1)

Adding to this, a more recent report shows that the funding for the Roads Authority, which is the organisation responsible for maintaining roads and highways in Namibia, was cut by 20% (Brandt, 2017).

The results from the quantitative analysis are in line with the views of healthcare workers interviewed. They were in direct contact with the survivors of road injuries and they showed uniformity in terms of their views on RTIs. They regarded RTIs to be a major public health problem responsible for high rates of injury and death. In fact, HCWs often reported Namibia as having one of the highest rates of deaths and injuries globally death and attributed the need of having the MVAFA to these high rates. HCWs also regarded RTIs as not only a public health problem but also as a socio-economic problem responsible for worsening the cycle of poverty and inequality in Namibia and counterproductive for the economic development of the country. They also attributed a reduction of individuals' quality of life and ongoing health and social problems to RTIs, including minor ones . This will be discussed in detail in the sections below.

### 7.3 TYPES OF CRASHES

It is important in road safety to study the types of road crashes because some crashes are more dangerous than others and are consequently associated with greater rates of more severe injury and deaths. Compared with other types of crashes, those involving a pedestrian typically result in more serious injuries and death (Kim et al, 2017). Consequently they are directly impacted on by the force from the vehicle. They also lack the speed and mobility of cyclists and other two-wheelers to escape a dangerous encounter with a vehicle (NRSC, 2012).

Roll-over crashes are the most dangerous type of crash for drivers and car occupants (Bidez et al 2007; Dobbertin et al, 2013; Freeman et al, 2012; Mandell et al, 2010). A roll-over crash is one in which a vehicle experiences at least two quarter turns which are equal to or greater than 180 degrees about its longitudinal axis (Dobbertin et al, 2013). According to Eger and Kiencke (2003), they are the one major type of crash which still remains without adequate occupant protection compared with other types of crashes. Even if car occupants are wearing seatbelts or are ejected from the vehicle during a roll-over crash, they are still at high risk in these crashes. First, the seat belted individual, as a result of loading to the head which in turn loads the neck, is at risk of sustaining fatal neck injuries (Grzebieta et al, 2009). Secondly, they are at higher risk of sustaining serious injuries to the thorax including lung contusions and fractured ribs than in other types of crashes (Bambach et al, 2013). As such, they are more likely to cause on the spot fatalities and more serious injuries such as



paralysis than any other type of crash such as head-on collisions, side and rear collisions (Dobbertin et al, 2013, Jehle et al, 2007; Freeman et al, 2012; Jehle et al, 2007).

In this study I found that pedestrian and roll-over crashes were the two most prominent reported crashes over the period 2012-2014 in Namibia contributing, respectively, 25% and 24% to all reported crashes. In the next sections I will discuss these findings - paying attention to comparable study findings and the current road safety practices in Namibia - beginning with pedestrian crashes, and then moving onto roll-over crashes.

### **7.3.1 Pedestrian crashes**

The findings in this study showing a relatively high proportion of pedestrian crashes are similar to studies which have been conducted and reported in the following years in Namibia, with MVAf (2015) reporting 22%, and MVAf (2016) reporting 23%, of crashes as having involved pedestrians. The findings are also similar to other studies done in SSA in showing high levels of pedestrian crashes. In a review of RTIs in Africa, Chen (2010) established that pedestrian crashes accounted for more than 40% of crashes in African countries. In fact, the high number of pedestrian crashes is one of the reasons given for why SSA has the highest rates of global deaths as compared with other regions which have greater levels of motorization but a much lower proportion of pedestrian crashes (Hassen et al, 2011, Onywera and Blanchard, 2013).

The results, however, differ considerably from the findings of NRSC (2016b), which were based on crashes which occurred in 2012 in Namibia. NRSC (2016b) reported only 4% pedestrian crashes. Similarly, NRSC (2016a), NRSC (2015a), and NRSC (2013) reported 4.5%, 5%, and 4.4%, of crashes as having involved pedestrians. This is in stark difference to the findings of my study and the trend reported by Chen (2010). It has already been highlighted that the reports compiled by the NRSC are based on police data. Based on this premise, there is little doubt that pedestrian crashes are significantly underestimated in the official reports they have produced.

According to the WHO (2013c), in many countries, crashes involving pedestrians are poorly reported in official road traffic injury statistics. Considering that the NRSC are the official, main body involved in road safety in Namibia, such low estimates of pedestrian crashes have considerable consequences. Budgets of policymakers are often based on results emanating from such reports and such low estimates of pedestrian crashes will undoubtedly have negative impacts on the prioritization of pedestrians in road safety policy changes and implementation of measures to improve safety for pedestrians, such as road crossings and walking pathways. According to Sharma (2008), the absence of reliable surveillance data and estimates on the current levels of RTIs limit road safety promotion efforts.

The high proportion of pedestrian crashes in this study is alarming because as explained above, these types of crashes are more likely to result in serious injury and death.

Pedestrians are the most vulnerable road users in Namibia as they are not as protected as drivers and passengers are, and they lack the speed and mobility of cyclists and other two-

wheelers to escape a dangerous encounter with a vehicle (NRSC, 2012). In addition, when exposed to high speed impact, pedestrians among all road users face the highest risk of death or severe injury (NRSC, 2012). Further to this, those least likely to drive or be a passengers are the elderly people and the poor – who probably have less physiological reserve and suffer greater consequences from any given crash than a fit young adult. In this study, although pedestrians represented 12% of those involved in reported crashes, they accounted for 31% of all deaths. The high proportion of pedestrian injuries and deaths are, however, not surprising. Literature findings show that similar to other SSA countries, Namibia has poor separation of pedestrians and cyclists with motor vehicles (Heidersbach and Strompen, 2013). Having previously lived for 2 years in Namibia and having visited several times in recent years since then, I can also draw on my personal experience and confirm there is a dire shortage of pedestrian and cycling pathways and poor separation of pedestrians from traffic on roads.

According to the WHO, *“The survival of unprotected users depends upon ensuring either that they are separated from the high speeds of motor vehicles or – in the more common situation of shared use of the road – that the vehicle speed at the point of collision is low enough to prevent serious injury on impact with crash-protective safer car fronts”* (WHO, 2004: p 79). Pedestrians have a 90% chance of surviving crashes at 30 km/h or below but at speed of 45 km/h and above, this is reduced to less than 50% chance of surviving the impact (WHO, 2004). The probability of a pedestrian being killed rises by a factor of eight as the impact speed of the car increases from 30 km/h to 50 km/h (WHO, 2004). When pedestrians are involved in crashes, because they are not protected from impact of the vehicle, they are

more likely to die or sustain serious injury. Based on extensive research done in HICs, such as Grundy et al (2009), who found that 20 mph traffic zones introduced in London, United Kingdom were associated with an approximate 40% reduction in casualties and collisions, the WHO (2015a) advocated for every country to adopt national speed limits of 30 km/h in urban areas, where pedestrian crashes are most likely to occur. However in Namibia, this has not been adopted and the national speed limit for urban roads is set at 60 km/h, a figure which is double the recommended limit. Thus, when hit at such high speeds, the risk of death and serious injury of pedestrians is exceedingly high in Namibia. Based on the high proportion of pedestrian crashes found in this study, and the evidence in existence showing the impact of 30 km/hr urban speed limits, there is an urgent need for Namibia to adopt and implement the recommendation that has been made by the WHO.

The NRSC is aware of the recommendation made by the WHO (2015a). However there are structural problems that exist which prevent them from being able to implement any changes. Although it receives national funding, the NRSC does not have any legal or regulatory powers to enforce traffic laws (WHO, 2015a). This is a common scenario in SSA. According to Chen (2010) and Odero (2004), although many countries in Africa have heeded the call by WHO to establish road safety agencies in the form of National Road Safety Councils since the early 1980s, most of them do not have legal or regulatory powers nor the necessary resources to develop and enforce traffic laws. According to an NRSC executive, Namibia's road safety approach is currently under-resourced as well as poorly co-ordinated due to the lack of regulatory power (Informante, 2014). According to Amend (2006) in many countries in SSA the lead agencies for road safety are weak also because responsibility for

road safety is divided between numerous government bodies and often the communication between these different ministries, departments and agencies is poor. A similar situation to this exists in Namibia and according to the chief executive of the NRSC, road safety work in Namibia is highly fragmented, to the extent that it falls within the operational sphere of more than seven various ministries and state institutions (Nhongo, 2016). These reports signify that in order for road safety to improve, the NRSC must be given regulatory powers and needs additional support from the government.

### **7.3.2 *Roll-over crashes***

In terms of roll-over crashes, the findings of this study are similar to those of MVAF (2015) and MVAF (2016), who found these to be 29% of reported crashes. On the other hand, the reports by NRSC had no category for roll-over crashes, and they were probably included in the “other” category. I could not find any studies which have looked at the incidence of roll-over crashes in SSA. In terms of LMICs, I found one study in India which reported that they constituted 1% of crashes reported in this study (Mohan et al, 2009), which is considerably lower than the reported crashes in my study. Several studies have been done in HICs. Similar to the study in India, and contrary to Namibia where roll-over crashes have been shown to be prominent, the studies done in HICs have shown a low incidence of roll-over crashes. However, these same studies have also revealed that despite being less frequent, they caused a disproportionate number of fatalities. For example, in the USA in 2000, despite being only 3% of crashes, they killed 31% of occupants of passenger cars and light trucks (Jehle et al, 2007). In 2005, despite only 3% of crashes being roll-overs, they resulted

in 21% of fatal crashes, and 30% of all occupant fatalities (Mandell et al, 2010). Similarly, in another study in 2005, they contributed only four percent of crashes but accounted for 34% of all car occupant deaths (Bidez et al, 2007). Another study in the USA found that the risk of death to children in roll-over crashes was 80% more than in crashes which did not involve roll-over. Similar findings are noted in other HICs such as Japan, Germany, Sweden, and Australia (Bambach et al, 2013; Eger and Kiencke, 2003; Ferguson, 2007; Freeman et al, 2012).

Given all of the above, there is a need to understand why roll-over crashes are so prevalent in Namibia (23.8%) and whether this is may be a common feature in other countries in SSA or is unique to Namibia. Given that, although they are small proportions of reported crashes in HICs but still are responsible for a large proportion of fatalities and serious injuries in these countries, it is reasonable to assume that if the numbers of roll-over crashes were reduced in Namibia, there could be a significant reduction in serious injuries and deaths.

According to Bambach et al (2013), Jehle et al (2007) and Rivara et al (2003), the risk of roll-over depends on the specific type of vehicle involved in the crash. The crashes are most commonly associated with Sports Utility Vehicles (SUVs) (Jehle et al, 2007; Rivara et al, 2003) and pick-up trucks (Ferguson, 2007). This is because these types of vehicles have a relatively higher centre of gravity, which is actually worsened by the addition of vehicle occupants (Jehle et al, 2007). This explanation is supported by analysis of data from the USA, which showed the estimated risk of roll-over depended on the type of vehicle, with picks-ups and SUVs at high risk (Ferguson, 2007). To add to this, Bambach et al (2013) found

that occupants of SUVs and pickups were 3.4 times more likely to receive serious thoracic injury than car occupants.

Given these findings, one possibility for the high proportion of roll-over crashes in Namibia is related to the wide use of pick-up trucks on the roads. Although I could not find any specific statistics on their specific numbers and VKT, pick-ups are one the most popular types of cars in Namibia, and generally in the southern countries in SSA such as South Africa (Howlett et al, 2014). This could explain why at 34%, they were the second largest category of type of vehicles involved in all crashes over the study period, and they also contributed the largest proportion (42.5%) of people involved in total crashes.

There is a compounding factor in Namibia which may account for the significantly increased death rate related to roll-over crashes through the country. This is the common practice in Namibia for pick-ups, also known as bakkies in Namibia and South Africa (Howlett et al, 2014), to carry passengers in the back/cargo area without any seatbelts or restraints (Figures 7.1 - 7.4). This method of passenger transportation is the most unsafe in Namibia, with the case scenario being that the vehicle overturns with many passengers sitting at the back (NRSC, 2013). The NRSC reports that this practice is a persistent challenge in Namibia resulting in a high number of injuries and deaths from crashes (NRSC, 2011). According to Viano et al (2007) and Howlett et al (2014), in the event of such a crash the unstrained individuals are likely to be ejected from the vehicle and have a much higher likelihood of sustaining serious injuries including head and cervical injuries or being killed. In neighbouring South Africa, Howlett et al (2014) also found significant risks related to this.

Their study found that travelling in the cargo area of a pick-up was associated with a high rate of ejection of passengers from the vehicle in the event of a crash, significantly higher than would be expected in crashes involving closed sedan-type vehicles (Howlett et al, 2014). They established that the practice was associated with a higher mean injury severity score and an increased need for intensive care admission compared with non-ejection (Howlett et al, 2014). They also found that passengers involved in crashes while travelling in the back of a pick-up have a significant chance of sustaining a devastating neurological injury and permanent disability, including quadriplegia and paraplegia (Howlett et al, 2014). This may explain why in my study the largest proportion - representing 41% of people - were killed in crashes involving pick-ups.

According to Howlett et al (2014) the danger of the practice has been recognised in HICs, and it is prohibited in Europe and Australasia. However, in Namibia there is no regulation at all on this (NRSC, 2013) despite the NRSC having acknowledged how much of a problem this is, as noted above and may likely be because the NRSC have no regulative powers. Howlett et al (2014) report that similarly in South Africa, while there are laws against having unrestrained passengers in the back of a pick up, these are unclear and poorly enforced. It is likely that in most countries in SSA this practice is unregulated and there are no clear laws against the practice despite how dangerous it is in the event of a crash. This may be a major reason for the higher burden of RTIs in SSA, considering pick-ups are one of the most popular types of cars. This is a potential area for further study.



According to Kiek et al (2016), public transport in villages in Namibia is based mainly on the use of pick-ups. This limits the availability of safe transportation options for people in many parts of the country. Thus one important way of implementing road danger reduction as well as increasing accessibility to public transportation for people with disabilities in Namibia would be to enhance safer public transport options, both in urban and rural areas.

**Figure 7.1: Workers standing at back of pick-up/bakkie**



**Figure 7.2: Young men standing at back of pick-up/bakkie**



**Figure 7.3: Passengers standing at back of pick-up/bakkie in rainy conditions**



Because of the high morbidity and mortality of roll-over crashes, evidence-based efforts have been made to try and reduce these (WHO, 2015a). These efforts have led to the introduction of a technology called electronic stability control (ESC) (Ferguson, 2007). ESC is a vehicle stabilisation system that acts to prevent rollover by slowing down the leading wheel and prevent skidding and loss of control in cases of oversteering or understeering (WHO, 2015a). ESC has been shown to be effective even for vehicles at highest risk of rollover such as SUVs and pick-ups (Jehle et al, 2007). In a review of the effectiveness of ESC in reducing rollovers, Ferguson (2007) found the effects of ESC to be mostly positive; vehicles with ESC had a third fewer crashes than cars without this technology and SUVs had 56-67% fewer roll-over crashes. In fact, ESC was also found to not only help reduce rollover crashes but also more diverse crash types, with 31-54% reduction in crashes for cars with ESC (Ferguson, 2007). As such, the WHO has advocated for this to be mandatory for all cars. ESC is the most important United Nations regulation for crash avoidance: it is effective at preventing rollover crashes and its success has led to it rapidly becoming mandatory in many HICs (WHO, 2015a). Although ESC is also effective in commercial vehicles such as trucks, coaches and mini-buses and presents enormous life-saving potential across the world's entire vehicle fleet, it has yet to be utilised in many countries (WHO, 2015a). Only 46 countries globally adhere to the UN regulation (WHO, 2015a). Namibia is one of the countries which does not adhere to this regulation and has no vehicle standards for ESC. This may be another reason to explain the high proportions of roll-over crashes in Namibia. Given the high numbers of pick-ups involved in crashes, introducing and implementing regulations for ESC may have large benefits in terms of reducing severe injuries and deaths.

## **7.4 SEVERITY AND PATTERNS OF ROAD TRAFFIC INJURIES**

Determining the severity and pattern of road injuries is an important way of highlighting the magnitude of the problem to policymakers. For example, if there is evidence to show that more people are sustaining severe life changing injuries such as paralysis due to RTIs, policymakers are more likely to take note of the problem and to implement measures to try to reduce them. However if there is no evidence to show the impact of RTIs, lack of awareness of the problem will continue. Thus as part of my analysis I conducted analyses to establish the severity and patterns of injuries. I discuss the results in the sections below.

### **7.4.1 *Severity of injuries and disability***

According to Batailler et al (2014), Fort et al (2011), Kellezi et al (2017), Kendrick et al (2013) and Palmera-Suarez et al (2016), severe injuries are more associated with subsequent serious impairment, lower work capacity, increased need for aids, greater functional dependence, the need to move home and need for family support. They are also more likely to be associated with a higher burden of disabilities (Palmera-Suarez et al, 2016). Results from this study show that over the period of 2012-14, 21% of all injuries were severe, with 60% moderate and 19% minor. Based on the evidence given above, these statistics indicate that over a fifth of those who were injured in Namibia over 2012-2014 were at risk of developing long-term morbidity. These results indicate that RTIs during that period were a major source of potential disability, which correlates with the findings from interviews with HCWs, who reported RTIs to be one of the greatest causes of disability in Namibia. Notably, one of the HCWs interviewed worked for an organisation which had collated data on annual

road injuries in 2016 and revealed that severe injuries such as spinal and head injuries were about seven to 11% of total road injuries. The interviews with the injured also highlighted that those who had sustained severe injuries such as spinal injuries reported permanent disability such as paralysis and the need for permanent use of mobility aids.

The interviews that I conducted with those who had sustained minor and moderate injuries also showed that they all experienced ongoing chronic pain, with HCWs interviewed, reporting that minor injuries are also associated with ongoing complications. Comparable findings are reported in HICs by Batailler et al (2014) and Gopinath et al (2014), who reported that although minor and moderate road injuries are less likely to be associated with long-term disability than severe injuries are, they can also have long-term impacts including chronic pain.

Although there has been scarce research on disability related to RTIs in SSA (WHO, 2015a), these results are similar to the few studies done which have shown that RTIs, including minor and moderate ones, are associated with a high burden of injury and disability (Ayana et al, 2012; Kohler et al, 2017, Juillard et al, 2010, Mock et al, 2003; Ogendi and Ayisi, 2011, Zimmermann et al, 2012). For example, in Nigeria, Juillard et al (2010) found that almost a third of those who had been injured in a road traffic crash reported that the injury had resulted in a disability. Adding to this, the interviews in that study had been done within a year of injury and it is possible that had follow-up been conducted in the years following the injury, more would have reported disability.

When asked about the total levels of disability related to RTIs, none of the HCWs were aware of any statistics. This is not surprising because these actually do not seem to exist. As noted in Section 1.10, Namibia produced a *Disability Report*, in 2016, based on data from the National census of 2011. According to this report there were 98,413 people living with disabilities in Namibia, with the majority (18%) having impairment of the lower limbs and 10% with impairment of the upper limbs (NSA, 2016). This report collects a wide range of data related to people living with disabilities, including a number of demographic details as well as household and social characteristics, but it does not contain any information about the cause of disability. For example, there is no information in the report that identifies if a person is unable to use his or her lower limbs because of a fall or an RTI.

According to the WHO (2014a), information related to a cause of disability is important and should be collated because it allows policy makers and key government departments to make proper comparisons between road traffic crashes and other causes of injury and disability, and is essential for raising awareness of the seriousness of road crashes as a social problem. This need to collect data on the cause of disability is also necessary as RTIs can result in various kinds of disabilities, from those affecting extremities to cognitive, visual and mental ones (Stocchetti and Zanier, 2016). Additionally, quantifying the estimate of the burden of disability due to different causes can help with allocation of resources for prevention strategies (WHO, 2011b). In Namibia and other LMICs, showing figures of disability resulting from RTIs could be used to persuade policymakers of the need to strengthen efforts to reduce RTIs.

#### **7.4.2 Classification of injuries**

In terms of types of injuries, analysis from the quantitative data sets showed that the majority of injuries were classified as orthopaedic. This is consistent with reports provided by HCWs, who reported that the commonest injuries were upper and lower limb fractures. This is generally similar to research involving RTIs in other countries in SSA, which has shown that injuries to the lower and upper limbs are the commonest injuries in crashes (El-Tayeb et al, 2015; Ipingbemi, 2008; McGreevy et al, 2015; Zimmermann, 2012). According to El-Tayeb et al (2015), this is a common feature of research conducted on road injuries in LMICs. However it must also be noted that the data on injuries did not include any of those that died so it is possible that other injuries such as major abdominal trauma or head injury, might have been more common but those experiencing these types of trauma were more likely to die before making it into the data collection system.

To make more in-depth analysis, it would have been better if the data had classified injuries by specific body site instead of the blanket term 'orthopaedic'. Additionally, in terms of neurological injuries, there is no clarification as to whether these people had spinal or head injuries. Such information would be useful to make better analyses to classify specific injury severity, as well as to inform policymakers on the consequences of road injuries and the needs of survivors.

## 7.5 EMERGENCY CARE SYSTEMS

In the section 3.4.2 of the literature review I highlighted a lack of emergency care (EMC) services and personnel in Namibia. In my study, almost a quarter of those injured in crashes were transported to hospital by either the police or private vehicles with the rest transported by private and state ambulance, which seems to be consistent with the literature findings. However whilst it is of concern that so many people were transported by police or private vehicles, it must also be noted that over that period, 19% of people in the reported crashes sustained minor injuries. Therefore it may be possible that there would not have been any need for some of them to be transported to hospital by ambulance such as in this case of those with soft tissue injuries like whiplash.

Unfortunately, the data did not allow for analysis to be conducted on whether some of those transported to hospital by police or private vehicles had serious injuries. However, information provided by the WHO (2013a), which used data from 2009, reported that only about 50-74% of those seriously injured in road crashes were transported to medical services by ambulance in Namibia. This is of particular concern because, according to Jafarpour and Rahimi-Movaghar (2014), when being moved and transported by people with no adequate training, road injury survivors are at risk of further injury and death. Evidence shows that appropriate first aid and transfer of those with RTI injuries can save lives, and reduce complications and the risk of permanent disability (Ghaffar et al, 2004).



Additionally, the multivariate regression analysis that I performed showed that those transported by police and private vehicles were at significantly higher risk of dying. In fact, the relative risk ratio for having been transported by police was much higher than for any other factors that were considered. There are several reasons why this may be. One possibility is that the individuals may have sustained further complications to their injuries due to incorrect lifting procedures when being moved from the crash sites in police/private vehicles. They may have also possibly been not given appropriate first aid to try and stabilise their injuries, for example minimisation of blood loss, because the police/private drivers lacked training in this. Another possibility is that those who were transported by police were in remote areas lacking any EMC services. Thus due to longer travel distances, they would be more likely to receive treatment late and could be prone to developing more complications before reaching the hospital. Another possibility is that police may have been first at the scene of crashes and in cases where the injuries seemed severe, they may not have waited for EMC services as it was a matter of urgency to transport the injured to the hospital. It may also be that a combination of these factors are at play.

I found one other study in SSA which has looked at the method of transportation of those injured in crashes (Osoro et al, 2011). This study, done in Kenya, found that 89% of those injured in RTIs were transported by private vehicles or taxis to hospital, with only three percent of the injured transported by ambulance services (Osoro et al, 2011). The figure of 89% is considerably higher than in my study, however the Kenyan study was based in one district and was done over a limited period of time so the findings may not have been representative of the rest of Kenya. However, in general it has been reported that EMC is

lacking in SSA, which is an additional factor which contributes to why there are much higher rates of death and disability when compared with other world regions when crashes occur (Moroz and Browner, 2014; WHO 2013a). These findings from my study highlight the importance of EMC and the need for enhancing services across the country.

Another way to try to improve post-crash care for RTIs in Namibia would be for all police officers to have basic life support training (first aid). This would be most likely to be most useful in the remote areas where EMC services are not readily available. According to Taibo et al (2016), considering the financial and resource constraints in LMICs, simple but systematic pre-hospital training programmes have been implemented in rural villages in LMICs to stabilize patients injured in road crashes. Most pre-hospital deaths are the result of airway compromise, respiratory failure or uncontrolled haemorrhage; all three of these conditions can be addressed using basic first aid measures (Taibo et al, 2016).

## **7.6 ROAD USER TYPES**

In section 7.3 I discussed the types of crashes. In this section I discuss the specific road users involved in these crashes. It is important to study the road users involved in crashes because this shows the vulnerability of different road users, which is information that can be used by policy makers to improve road safety. Additionally, in different parts of the world the most vulnerable road users differ and there is a need to understand vulnerability at a local level.

The results of this study show that passengers (44%) and pedestrians (31%) formed the biggest proportion of fatalities, with passengers (59%) showing the biggest proportion of injuries. Looking at the specific road users involved in crashes, only three percent of motorcyclists, three percent of pedestrians, five percent of cyclists, and 18% of passengers were uninjured in reported crashes, compared with 59% of drivers, which is a considerable difference. These results are similar to the findings shown by NRSC (2015a, 2016a, 2016b), which showed that higher proportions of passengers and pedestrians involved in crashes reported to the police in Namibia were injured and killed compared with drivers.

Further to the limited analysis done by NRSC, which showed only the proportions of injured and killed road users, I also calculated the rates of injury and death based on the number of people involved in reported crashes and also conducted regression analysis on the risk of being injured and killed, by road user group. Pedestrians, motorcyclists, cyclists and passengers each had much higher rates of injury and death than car drivers. The results of multivariate regression analysis shows that motorcyclists had the highest risk of death and injury. Although lower than for motorcyclists, the risk of death and injury for pedestrians, cyclists, and passengers were all significantly much higher than that of motorists. All of these results undoubtedly confirm the vulnerability of these road user groups compared with motorists and are in line with statistics published by the WHO (2015a), who indicated that in LMICs these groups have much greater vulnerability than car drivers. My results are also in line with findings from other countries in Africa (Chen 2010, AfDB, 2013).

The higher risk of death and injury for motorcyclists is likely to be due partly to the lack of wearing helmets. According to the WHO (2015a), despite having this national law on helmets for motorcyclists, Namibia has poor enforcement of helmet wearing, thus compliance rates are also very low at 12%. Similarly in Ghana, Kudebong et al (2011) found low helmet compliance rates of 29% in their study.

The reason why enforcement has been poor is probably because there is such a low complement of traffic officers (NRSC, 2015b; Winnet, 2009). Consequently this increases the likelihood of motorcyclists being less concerned about wearing helmets (Miyanicwe, 2013; Winnet, 2009). It also possible that officers and traffic authorities may not be as concerned with regulation of motorcycles compared with cars. For example, Kudebong et al (2011) found that 71% of motorcycle riders were not licensed and 69% were uninsured in Ghana. Additionally, this may be indicative of a “motoring culture” in which motorcycle drivers are not aware of the importance of wearing helmets or do not place a high value on their usage nor do public awareness campaigns exist that would encourage family and friends to encourage riders to use such helmets. Another possibility may be that helmets are expensive and motorcyclists are unable to afford these. The reasons behind the low compliance of helmet wearing could be an area for future study in Namibia.

Another reason to explain the higher risk of death and injury for motorcyclists is the relative lack of protection compared with car occupants. Although pedestrians and cyclists are also greatly vulnerable due to the lack of protection, many more motorcyclists are likely to use wide roads and can travel on highways in Namibia such that they are far more exposed to

fast moving traffic. Another reason could also be motorcycles are more likely to be driven by more risk-taking people, especially young males. In the study in Ghana, Kudebong et al (2011) found that this was the case, and more young adults, particularly males, were involved in motorcycle crashes.

I have already discussed the vulnerability of pedestrians in section 7.3.1 and discussed how they are prone to more serious injury and death when involved in crashes because their bodies are directly impacted on when a crash occurs. Cyclists are at similar risk when involved in crashes because they lack the protective barrier which car occupants have (WHO, 2009). A lack of cycling lanes on roads in Namibia means that cyclists are not separated from fast moving traffic and are at high risk of serious injury and death when involved in crashes (Heidersbach and Strompen, 2013; Tendekule, 2013).

The increased risk of injury and death of passengers is likely because they have very poor seatbelt wearing rates. Although Namibia has a national law on rear seat belts wearing, this is very poorly enforced (WHO, 2015a) and very low compliance rates have been reported, ranging from one percent (WHO, 2015a) to 17% (NRSC, 2016b). In the event of a crash, these passengers are at much higher of serious injury and death than are those that are belted. The poor enforcement of seatbelt laws is likely due to very low numbers of traffic officers, which I have already discussed as a cause for poor compliance with traffic laws in Namibia. The poor compliance with seatbelt laws is also likely due to lack of awareness and could be related to socio-economic status, with more affluent people having greater levels of awareness. As I reported in the literature review, seatbelt use is much lower in the rural

population compared with urban, with compliance rates of 56% (urban females) versus 29% (rural females) and 76% (urban males) versus 43% (rural males) (NDS, 2013). Similarly, Van Hoving et al (2013) found lower compliance rates in residents of lower socio-economic areas in South Africa.

Additionally, taxis and minibuses are the commonest forms of public transport, carrying scores of passengers at a time (Madejski et al, 2014) and as reported by NRSC (2016b), most of these vehicles are lacking seat belts and consequently show even lower seatbelt wearing compliance rates. According to the NRSC (2016b), it appears that proposed safety regulations regarding mandatory seatbelts for passengers in buses have not yet been promulgated and data on seatbelt compliance has been poorly completed on the crash forms by police officers. To date, there are no official campaigns to improve compliance rates in buses and taxis. And as I highlighted in section 7.3.2, a common practice in Namibia is to carry “passengers” in the back of pick-ups. In the event of even minor crashes, these “passengers” are at extreme risk of injury and death as they are completely unrestrained and have a strong likelihood of being ejected from the car. To quote one of the HCWs interviewed:

*“They sit at the back of big bakkies. There are no seatbelts. If anything happens, all those guys will have serious injuries because they will just be falling out of the car.”*

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To date, there has not been any official recognition of the significant risks of injury and death which are associated with this practice. In both cities and rural areas in Namibia it is also common to see school children and the elderly sitting or standing at the back of pick-ups. In section 1.7, I discussed how there is a severe shortage of public transport in Namibia, with the most reliable form of transport for those without cars being private taxis, whose costs are unaffordable for the majority of the population. It is likely that people are aware of the dangers associated with sitting or standing at the back of pick-ups but due a lack alternatives for transport, especially in rural areas, they have no alternative. This is confirmed by Kiek et al (2016) who reported that due to the scarcity of public transport in rural areas, public transport is mainly based on the use of pick-ups for those who cannot afford cars. This is an example of how socio-economic factors play a role in RTIs in Namibia and those from poorer backgrounds are put in vulnerable situations because they have limited options for travel and is a potential for future research.

The lack of official recognition of this problem and the lack of official campaigns to improve seatbelt compliance rates in buses and taxis also reflect a problem with current policy and enforcement of these laws. There needs to be an official commitment to improve public transport such that people are not forced to rely on dangerous methods of travel and there is a need for stricter enforcement and campaigns to improve compliance of seat belt wearing, as well as stricter measures in place such as fines and license penalties for private cars and taxis/minibuses to ensure that all cars have functioning seat belts for not only the driver, but for each passenger.

According to Nantulya and Reich (2003), a way to ensure that policies on road safety effectively protect vulnerable groups is to involve those groups in designing measures to reduce their risks and to increase public accountability for road safety agencies in implementing protective policies. Yet this is not happening in Namibia. Policy has mostly overlooked the vulnerability of pedestrians, cyclists, and passengers and has focused mainly on road drivers: there are no groups that advocate on behalf of pedestrians, cyclists and passengers (Madejski et al, 2014). Other evidence illustrating how vulnerable road users have been overlooked by policy in Namibia is shown by the fact that unlike the recommendations made by the WHO to promote vulnerable road users, Namibia has no policies to promote walking or cycling; no policies to separate road users and protect vulnerable road users; no policies to encourage investment in public transport; and no legislation in place to promote safer cars (WHO, 2015a).

The lack of advocacy on behalf of the vulnerable road users is also reflected in the fact that, as I reported in section 1.14, only two percent of the 2012 national road repair and maintenance budget was spent on enhancing non-motorised services such as creating pedestrian crossings and cycle lanes (Heidersbach and Strompen, 2013). Despite evidence from NRSC (2015a) showing that most pedestrians get hit when trying to cross roads at undesignated locations in urban areas, there has not been any solid action taken towards improving this situation: urban areas almost entirely lack pavements, zebra crossings, and traffic lights due to the neglect of pedestrian facilities (Heidersbach and Strompen, 2013; Riehle, 2016). This illustrates an urgent need for authorities to invest in pedestrian facilities such as zebra crossings. According to Amend (2016), this is a common feature in SSA: in any



African city, the neglect of pedestrians is clear in the absence of footpaths and safe crossings; the poor management or maintenance of those footpaths that do exist; the lack of street lighting; and the lack of speed control. These reasons can explain why the SSA has the highest proportion of pedestrian-related deaths in the world (Amend, 2016).

Another factor that indicates the lack of prioritisation of vulnerable road users in Namibia is the fact that the Namibian government has not made efforts to reduce speeding in urban areas, despite being a signatory to the UN Decade of Safety. A 30 km/h speed limit, instead of the current 60 km/h, and enforcement of these speeds is a simple measure that is likely to produce positive results immediately as, even if struck at such speeds, vulnerable road users will have less likelihood of being killed or sustaining serious injury. Other simple measures that can reduce speeds in urban areas include introducing speed humps, which have been highlighted by Simasiku (2017) to be lacking in Namibia. If more people felt safe enough to be walking and cycling this will also be of benefit to public health because this will help to reduce the incidence of and mortality from NCDs such as obesity and diabetes, which have become a problem in the country (MoHSS, 2015).

## **7.7 GENDER**

Globally, males are disproportionately affected in terms of RTI deaths and injuries (Loncak et al, 2007; Rhodes and Pivik, 2011; WHO, 2015a). For example, according to the European Traffic Safety Council (2011), males represent 49% of the EU population but 76% of road deaths. The findings of my study are in line with these findings: more males were shown to

have been involved in crashes (70%), injured (64%), and killed (73%). Males also had considerably higher injury and deaths rates per 10<sup>5</sup> population compared with females. These findings also match the results of studies done in Namibia by NRSC (2013; 2015a; 2016a), and in SSA, other LMICs and HICs (WHO, 2015a).

Various researchers have reported on why males are worse affected by RTIs. Rhodes and Pivik (2011) and Smart et al (2004) attribute this greater level of collision-proneness to greater risk-taking behaviour amongst men, such as higher driving speeds and less regard for traffic laws. Similarly, a European commissioned study reported male drivers to be more prone to risky driving behaviour than female drivers, with UK Home Office statistics in 2002 showing that 88% of all recorded driving offences and 83% of speeding offences had been committed by men (ETSC, 2011). In a study investigating drink-driving and RTIs, Allianz (2014) found across every continent, a greater proportion of male than female road crash survivors were attributed to alcohol. In Namibia itself, Pashona and Pazvakavambwa (2014) found that males were responsible for 95% of traffic violations. The greater risk-taking behaviour is not only limited to male drivers: in their study, Holland and Hill (2007) found that female pedestrians were less likely to cross the road in risky situations than male pedestrians. Mohammadi (2011) also reported that females were less likely to be involved in risky driving behaviour and found that in Iran they were more likely to wear seatbelts, and less likely to use mobile phones while driving than males. It has also been reported that even in old age, females were more likely to adopt safer strategies regarding road safety. Bernhoft and Carstensen (2008) reported in their study that many more older female drivers had given up their licenses than older males drivers.

Aside from greater risk-taking behaviour, there are other factors which explain why males are worse affected by RTIs. Welsh and Lernard (2001) reported that females make fewer and shorter trips as a car driver compared with their male counterparts and have less exposure to risk. I could not find any gendered statistics on car drivers, driving license owners, and other road users in Namibia but it is acknowledged that there are considerably more male drivers than females (NRSC, 2016b), which is in line with the less exposure to risk from driving reported by Welsh and Lernard (2001). It is also possible in Namibia that in addition to the shorter/fewer trips, women are less likely to afford a car and in those families where there is only one car, they may also be denied equal access and may be disproportionately at home compared to males.

When considering the number of people involved in crashes within each gender grouping, the rates of injury and death narrowed down considerably and in fact, females showed higher injury rates compared with males. Regression analysis (bivariate analysis) also showed that females had a significantly higher risk of being injured and killed than males (Table 5.32). The increased risk of injury and death to females shown in the bivariate analysis could be linked to a variety of reasons. In Namibia they are possibly more likely than males to be vulnerable road users. I could not find any official statistics on the gender distribution of road users in Namibia however, as I reported above, there are considerably more male drivers than female ones. Additionally while I found that 89% of drivers involved in crashes were male, this narrowed down considerably to 59% for passengers and 65% for pedestrians, which is suggestive that there were more female passengers and pedestrians than drivers. Adding to this, NRSC (2013; 2015a; 2016b) also showed similar patterns in female road users involved in crashes.

Although these findings showing higher risk of injury and death for females are somewhat surprising considering that more males are killed, they actually are consistent with some other research on this topic. I could not find any research on risk based on gender differences in Namibia and SSA, but there are study results from HICs. For example, in a reported commissioned by the US National Highway Traffic Safety Administration, Kahane (2013) reported that the fatality risk related to females is on average  $17.0 \pm 1.5$  % higher compared to males of the same age. This increased risk of injury and death for females is likely related to intrinsic human anatomy and physiology (Kahane, 2013). For example, compared to elderly men, elderly women often have decreased bone mineral density and increased bone porosity and therefore a greater fracture risk (Jingwen et al, 2012). Additionally, due to generally smaller stature compared with males, females generally have lower injury tolerance (Jingwen et al, 2012). Adding to this, McFadden (1998) intimated that a female driver's increased vulnerability to injury is due to a closer proximity to the steering wheel, itself a function of driver height, which is generally lower for females than males. In a study concerning foot and ankle injury, Crandall (1996) showed that the risk of injury decreases with driver height and is greater for females than for men.

The increased risk of injury and death for females is also likely related to vehicle design and technology (Kahane, 2013). *"The current design process for vehicle safety systems relies heavily on crash tests to ensure design crashworthiness and occupant protection. Crash tests generally require the use of one or more crash dummies, known as anthropometric test devices. The injury measurements from the dummy, such as the head injury criteria, chest deflection, and femur force, are compared with the injury thresholds developed based on*

*human cadaver tests to assess injury risk*” (Jingwen et al, 2012: p 296). However most of the procedures used by car manufacturers to develop vehicle safety features use male-sized crash test dummies (Eikeseth and Lillealtern, 2012; Jingwen et al, 2012). Analysis done by different researchers has linked the greater risk of injury of death and females to this. Welsh and Lernard (2001) and (Eikeseth and Lillealtern, 2012) found that females are more vulnerable to injury, particularly neck strain and whiplash injuries because car seats are not designed to suit their physical size. Meanwhile, Jingwen et al (2012) reported that field data analyses showed that the effectiveness of vehicle airbag deployment on injuries is reduced for smaller vehicle occupants than mid-sized men.

Offering an alternative explanation for the increased risk of injury and death for females compared with males, analysis by Thomas (1999) identified that the mass of a car is a key factor that determines injury outcome and reported that because women tend to drive smaller and lighter cars than men, they are at greater risk of injury and death.

In terms of when other factors were taken into account, in the multivariate analysis, only the risk of injury remained higher for females and there was no significant difference in risk of death by gender (Table 5.32). It showed that when all factors were taken into account, the road user grouping had the greatest influence on the risk of having died or not, with motorcyclist and cyclists having the greatest risk compared with any other factors including having been a pedestrian or a passenger. Of those involved in crashes, females composed only four percent of cyclists and 13% of motorcyclists. The considerably smaller numbers of

female cyclists and motorcyclists is likely to have been correlated to the reduced the risk of death of females that was identified in the multivariate analysis.

## **7.8 AGE**

In an evidence-based study of population health, it is important to understand how a health problem affects specific age groups in order to establish the age groups at greatest vulnerability. Previous research in Namibia by NRSC (2015a) and NRSC (2016b) has presented information on the total distribution of road injuries and deaths amongst specific age groups. However in this study, in addition to presenting data on the total numbers of people by age involved in crashes, injured and killed, I also calculated the age-specific rates, taking into considering the population of that age group in Namibia. I also preformed regression analysis to identify the age groups at greatest risk of injury and death after adjusting for other key factors. This information thus not only provides new insight into RTIs in Namibia but this approach is also important, particularly for readers from HICs, because the age distribution of the Namibian population is very different from that in HICs so comparisons of numbers by age group can be misleading. The results are discussed in the next sections.

### ***7.8.1 Distribution of people involved, injured and killed in crashes by age***

In terms of absolute numbers of people involved in crashes, injured and killed, my results show that the 18-39 age groups made up the highest percentages: 60% of those involved in crashes, 60% of those injured, and 53% of those killed in RTIs. These results are also similar

to the findings of NRSC (2015a) and (2016b). These findings are also in line with other findings from SSA and globally: it is well established that young adults in the 18-39 age groups have the highest counts of injuries and deaths across the world in relation to RTIs (WHO, 2015a). The reason why young adults in Namibia are affected in greater numbers is probably similar to the reasons found in the global patterns, in that they have are much more mobile than other age groups and have greater risk exposure, and also have greater risk-taking behaviour (WHO, 2004). To support this premise, Pashona and Pazvakavambwa (2014) found that young drivers in this age group in Namibia were responsible for about 60% of traffic violations including risky driving behaviour such as failing to wear a seat belt (58%) and speeding (55%).

The interviews with HCWs also revealed a general sentiment that young road users tended to be more reckless on the roads. In addition there are some other factors likely to be associated with why more of them are involved in crashes. They are likely to be less experienced and to drive older and cheaper cars than older drivers. They are also more likely to work late or longer hours and thus can be exposed to external factors such as fatigue and poor driving conditions such as poor lighting. They are also more likely to experiment with alcohol and drugs than older drivers. The increased risk-taking by younger people is not limited to car drivers and research has also shown that younger pedestrians and cyclists also tend to take more risks than older ones (Bernhoft and Carstensen, 2008). Bernhoft and Carstensen (2008) add that the reason that the older road users more often act safely is the need to be safe, the lack of trust in their own abilities, and respect for the law.

These results confirm that RTIs have socio-economic consequence in Namibia in the loss of so many in this age range, who, according to NSA (2015), are the most productive age groups and results in reduced national economic output as well as loss of breadwinners. This is likely to worsen the cycle of poverty and increase inequality in the country. Because of these are large total numbers in comparison with other age groups, the working age group have been the focus of most reports to do with RTIs in Namibia, when age demographics have been discussed (NRSC 2013, 2015a).

### **7.8.2 Rates and risk of injury and death by age group**

In this study, my regression analysis showed that children (0-17) had the greatest risk of injury. Children probably have great risk in Namibia when crossing roads. In 2013, the NRSC reported high casualties of children as pedestrians in Namibia (NRSC, 2013a). Similarly, Fontaine and Gourlet (1997) and Amend (2016) reported that children were the most vulnerable to pedestrian crashes among different age groups. There are several reasons why this maybe likely.

They may be confused when crossing roads and may panic and run into oncoming traffic. In urban areas such as the high density suburb of Katutura, Windhoek, where busy roads are situated parallel to houses, they may be playing ball games near the road. Young children are not aware of the dangers of running in the road for example, to pick up a ball. Small children are also less visible than adults to drivers and have slower reaction times, which can put them at greater risk. Considering how rapidly Namibia is become urbanised, one



way of addressing this would be involving public health in road design such that considerations of such scenarios as children playing on the road in neighbourhoods are made when new roads are constructed. The addition of pedestrian crossings near schools and playgrounds staffed by crossing supervisors, could also be an effective way of reducing crashes involving children.

According to the WHO (2014), RTIs are not a major cause of death for the elderly. However, relative to their proportion in the overall population, older people are often overrepresented in traffic fatalities, especially as vulnerable road users (WHO, 2014). This matches with my findings in this study: although they formed the least numbers involved in crashes, injured and killed, the 80+ age group had the highest age-specific mortality rate per  $10^5$  population. Regression (bivariate) analysis also showed that the 80+ age group had the greatest risk of dying compared to all other age groups. The 80+ age group were also at much higher risk of dying once likelihood of having been killed, given transfer to hospital. The results, showing increased death risk in this age group, are also in line with other studies. For example, Feleke et al (2018) found that fatality rates by both distance and time in 2007-12 in England for cycling and walking were lower for younger age groups but the rates increased exponentially with age, especially in the upper age bands (70+). Similarly, Rolison et al (2012) in Great Britain found an increased fatality rate in older drivers and pedestrians in 1989-2009. In their analysis, Yee et al (2006) concluded that motor vehicle collisions involving elderly people have become an important problem that requires further investigation.

There are several factors why older people may have a higher risk of dying. According to Kahane (2013) as people become older, their fragility increases and they are more susceptible to injury when exposed to similar physical insults. Yee et al (2006) found that RTIs in the elderly resulted in a hospital mortality rate double that of younger patients, with a significantly higher rate of chest injuries. On a population basis, overall road traffic fatality rates for the elderly were almost double that of the younger group (Yee et al, 2006).

According to the WHO (2014a), the reason older road users, pedestrians in particular, are associated with a very high rate of road injury and death is mainly due to their increased physical frailty (WHO, 2004). Due to this frailty, they are more likely to die given the same injury such that the fatality risk for car occupants increases by three percent, for each year they age, from about 21 years of age (Kahane, 2013). Older people are also more likely to have other illnesses (co-morbidities). Co-morbidity increases the severity of the sequelae of a given event, except for the most severe injuries (Camilloni et al, 2008). For example, an older person with a heart condition is more likely to have a poorer outcome after sustaining the same type of road injury than a younger person with no other health problems.

Meanwhile, Fontaine and Gourlet (1997) reported that the elderly are greatly vulnerable to pedestrian crashes. Possible reasons for this is that they have slower reaction times due to age-related slowing and age-related reduced sensory awareness of their surroundings including visual and hearing impairments, which would make them less aware of surrounding traffic or less able to react in time to a perceived threat. This may explain why O'Neill (2016) reported that countries that introduce screening of older drivers have higher pedestrian fatalities among older people. As drivers, age-related functional limitations,

including deteriorating vision, hearing, and cognition could result in reduced control, reduced awareness of other vehicles, slower reaction times and increased risk of involvement in a collision (MacLeod et al, 2014). In addition, degenerative joint related problems, which are common in older people, are likely to result in slower reaction times.

Although these physical-related risks are likely to be global, there are other contextual risks faced by older people in Namibia and other LMICs that are likely to be different to those they face in HICs. For example, in HICs there are accessible public transport services. Meanwhile, these are not sufficiently available for older people in Namibia and other LMIC settings and they are more likely to depend on more vulnerable forms of road transport including walking, which means they are particularly more vulnerable than other road user groups. I could not find any research on this; it is an area for potential research in Namibia and other LMICs as there is a need to understand the specific risks that older people face in Namibia and other LMICs.

## 7.9 FREQUENCY OF CRASHES, INJURIES AND DEATHS BY DAY AND MONTH

The highest percentages of crashes (19%), injuries (19%) and deaths (21%) occurred on Saturdays. These results are similar to the findings of MVA (2015a; 2016b), who reported respectively 21% to have occurred on Saturdays. However in other countries there have been different findings. In South Africa, National Injury Mortality Surveillance System (2004) data showed that most of the transport related deaths occurred on Saturday (21%) followed by Sunday (17%). In Nepal, Jha and Agrawal (2004) reported the highest numbers of vehicular accidents were observed on Sundays and lowest on Mondays. Meanwhile in India, Kumar et al (2008) found no significant difference in incidence of vehicular collisions on weekends and weekdays.

The regression analysis that I conducted showed a significantly higher risk of dying on Saturday or Sunday than any other days, after adjustment for other relevant factors, with no significant findings by day for risk of injury. It is possible to speculate about why there is a significantly higher risk of dying at the weekend compared with any other day. I have discussed in the literature review about the high levels of alcohol drinking in Namibia. According to Lau-Barraco et al (2016), a burgeoning literature supports that drinking varies on weekdays as compared with weekends. Lower rates of alcohol use occur during the week but become elevated during the end of the week, reaching a peak on Saturdays (Lau-Barraco et al, 2016). Thus it is likely that the higher risk of death associated with Saturdays and Sundays may be associated with increased alcohol consumption. Another reason to explain the higher risk of dying at the weekend is that people are more likely to leave their

daily routines and travel farther or go to places they are less likely to be familiar, with such as new restaurants or visiting family or friends at a distance.

The highest proportions of crashes (nine percent), injuries (11%) and deaths (10%) occurred in December. Similar findings were produced by MVA (2016), who reported the highest percentages (10%) of crashes to have also occurred in December. According to MVA (2016), this variation is likely to be because December has the festive holidays, which are associated with higher volumes of road travel between cities and regions. This may explain why road safety interventions are more prominent during the festive season and other holiday periods in Namibia, as reported by lipinge and Owusu-Afriyie (2014) and some of the HCWs interviewed.

Looking at the numbers of injuries and deaths compared with the number of crashes each month, the highest injury and deaths rates were in December and January, respectively. There were, however, small differences in the rates of injury and death for the different months, with rates of injury varying from 150-183 per 100 crashes (annual average of 168), and death rates varying from 12.4 to 17.7 per 100 crashes (annual average of 16.2). Based on my findings, road safety campaigns should not be isolated to the festive/holiday periods but should be done throughout the year. These were also the conclusions of lipinge and Owusu-Afriyie (2014), who reported that students interviewed in Namibia felt that it was a mistake that road safety campaigns were focused on festive seasons and school holidays, and that instead they should be done throughout the year.

## **7.10 REGIONS**

It was necessary to conduct analysis on crashes, injuries and deaths by region in order to identify the worst affected regions, which is information that would be useful for policymakers. As part of my analysis I therefore identified the regional distribution of crashes, injuries and deaths and the rates of crashes, injuries and deaths when taking into consideration the regional populations and car usage. In addition to this, I also conducted regression analysis on the risk of being injured and killed by region. This information provides new insight into RTIs in Namibia as the NRSC and MVA are not currently doing such analysis in their reports. I first discuss the regional distribution of crashes, injuries and deaths before moving onto the rates and risk of injury and death.

### ***7.10.1 Distribution of crashes, injuries and deaths by region***

From 2012 to 2014, the highest numbers of crashes were recorded in Khomas region. Similarly, most road users across all road groups were involved in crashes that occurred in Khomas. These results are not surprising as it is the region with the highest population and density. It also contains the capital Windhoek, and is the most urbanised. These results are similar to those shown by MVA (2015, 2016) and NRSC (2014, 2015a and 2016b). The least crashes and fewest people involved in crashes were in Caprivi region. These results are also similar to the findings of MVA (2015, 2016). These results can be explained by the fact that Caprivi had the lowest levels of motor usage and ownership (motorisation) and one of the lowest population densities.

Most injuries occurred in Khomas, however most deaths occurred in Otjozondjupa. Similar findings have been reported by MVA (2016). The high deaths in Otjozondjupa may be because of the major roadway – the B1. This is a long stretch of road crossing the region and connecting Windhoek to the northern region of the country. According to Newera (2015) and Namibian Economist (2016), the road is a notorious crash hotspot contributing to many crashes, injuries and deaths in Namibia. The reason why there may be so many crashes on this road is possibly drivers become fatigued whilst driving on the lengthy stretch. They may also be driving particularly fast, so the likelihood of a crash is increased and the consequences of any crash are far worse.

When looking at RTIs in relation to the number of cars in each province, Khomas had the lowest rates of both death and injury. Similarly, both bivariate and multivariate regression analysis showed having been involved in a crash in Khomas to result in the lowest risk of injury and death compared with other regions. However, being involved in a crash in the Kavango region was associated with the highest risk of injury and death. In section 7.5, I discussed the importance of EMC and how being transported to hospital by police and private vehicles was associated with the highest risk of being killed for injured people. One major contributing factor to the high risk of death is that Kavango is one of the poorest and most remote regions in Namibia, with many people in the interior of the region living far from health services (Thiem and Jones, 2013). Thus, due to the long distances and longer times to reach hospital services, those injured in RTIs are likely at greater risk of dying. Based on their research in a rural part of South Africa, Vanderschuren and McKune (2015) concluded that EMC is overlooked in many regions, and can play a major role in rural areas

in SSA as morbidity and mortality are likely to be worse if care is not instituted within the first hour of the road injury occurring.

Kavango had one of the highest proportions (44%) of injured people being transported to the hospital by police and private drivers whilst Khomas had the lowest (six and a half percent). I could not find any specific literature related to the regional levels of EMC, however it is likely Kavango region has lower coverage of EMC services because of how remote it is and because of its financial standing compared with other regions as demonstrated in Sections 5.5 and 5.6. It has also been reported that there is an acute shortage throughout Namibia of ambulances to safely transport the injured (Sankwasa, 2012), with services being concentrated in most urban regions such as Khomas (Guarigupta et al, 2012). Thus, it is likely that more people are involved in RTIs in Kavango in locations where there are no EMC facilities close to them; and they are at higher risk of dying from the injuries compared with the people in Khomas, who are more likely to receive input from EMC services. To add to this, my analysis also showed the other regions (apart from Kavango) in which the highest proportions of injured people were transported to hospital by police and private vehicles – Caprivi (58%), Ohangwena (63%), Omusati (65%) and Kunene (40%) - showed significantly higher risk of dying than those in which more injured people had been transported to hospital by ambulance services such as Erongo, where a much lower proportion (nine percent) had been transported by police and private vehicles. These discrepancies in the risk of death between the different regions highlight the importance of EMC and the need for these services to widely distributed and accessible in Namibia, especially considering how dispersed its population is.



## 7.11 THE IMPORTANCE OF THE MVAF

Following a road injury, many people in LMICs are faced with hardships with regards how they will pay for the costs of treatment and rehabilitation (Perez-Nunez et al, 2012). A major finding in this study was that the MVAF is doing tremendous work in meeting these costs. Both injured survivors and HCWs interviewed in the qualitative study praised the MVAF for the work it was doing in looking after the health-related needs of injury survivors. The MVAF was reported to have paid for all the costs of medical care and rehabilitation, including in private facilities, as well as providing for all the aids and maintenance, and importing the aids from overseas if they were not available locally. The MVAF case managers were also following up on, and arranging for the continuity of care of, injury survivors. Those with serious injuries, including spinal injuries and traumatic brain injuries, had also received a lump sum payment and a monthly caregiver allowance.

Although some concerns were raised about exhausting their allocation from the Fund, the injured all reported taking comfort in the fact that they had not needed to worry about paying for hospital costs and follow-on medical care, aids, and rehabilitation as the MVAF had paid for all these costs. None of the injured reported any out-of-pocket expenditures or having needed to resort to catastrophic measures such as borrowing money or selling furniture. This is of particular importance because evidence shows that those who sustain non-intentional injuries such as RTIs have the need for greater health service use than the general population and in some cases this can continue for many years (Cameron et al, 2006). Thus, in line with the “safe systems approach” adapted in the Global Plan for the Decade of Action for Road Safety, the WHO has actually recommended for governments to

encourage the establishment of appropriate road user insurance schemes to finance rehabilitation services for RTI survivors.

I could not find any literature related to how effective the other fuel levy funded schemes in SSA are in enhancing access to services however I mentioned the TAC scheme which operates in Victoria, Australia in Section 1.1. Gabbe et al (2014) reported that TAC was viewed favourably with many road injury survivors reporting their treatment costs were being covered by TAC, and minimal out of pocket payments which matches with the findings from my study about how this type of system enhanced access to services following road injury. Another important advantage with regards to the MVAf is the use of rehabilitation case managers whose activities were reported positively by both HCWs and injury survivors. Similar to MVAf, TAC was viewed positively by road injury survivors because of a single point of contact with TAC called early support coordinators (whose activities are similar to MVAf case managers) (Braaf et al, 2019; Gabbe et, 2014). In a study of needs of injury survivors following discharge from hospital, Christie et al (2017) reported that problems with care-coordination and follow-up could be improved by the use of case managers to improve care pathways. Additionally a case manager dedicated to supporting injury survivors could reduce the complexity of health system for the injured survivors by mitigating health literacy barriers to improve understandings about hospital and rehabilitation care and facilitate communication between health professionals, acting as a single point of contact, providing consistent and up to date information, and coordinating service provision (Braaf et al, 2018). Care coordination by case managers can also promote timely access and engagement with appropriate services based on individual needs,

improve quality of care and the flow of information between service providers, as well as enable cost savings (Braaf et al, 2019). Additionally case managers could promote independency, and autonomy for those with severe injuries (Braaf et al, 2019). Instead, Braaf et al (2019) found that when no key person coordinated care, people with severe RTIs and their families reported restricted options for service access, follow-up, quality and collaboration. *“In the absence of an accountable key coordinator, long-term planning, information sharing, and the alignment of needs with resources, did not consistently transpire”* (Braaf et al, 2019; p 579). Given the long-term nature of RTI recovery more effective care coordination can reduce individual, family and societal burden and enhance optimal care and recovery outcomes. Follow-up by case managers in the long-term can also optimise care by early identification of people not coping, initiating timely support and assessments and liaising with service providers, the injury survivor and their family (Braaf et al, 2019). As carers of people with severe RTIs are also at risk of mental health issues for many years after injury, effective care coordination is not just important for the injured but also for preventing extra stress on family care givers (Braaf et al, 2019).

As mentioned above, the MVAFF system has been reported by both HCWs and injury survivors as effective in enhancing access to health services for road injury survivors. In terms of similar studies conducted in SSA and other LMICs without a specific fuel-related insurance scheme like the MVAFF, contrasting findings have been reported. In Sudan, Tayeb et al (2015) found economic consequences and coping strategies such as borrowing money and selling belongings to consistently affect households from lower socio-economic strata following road injuries of family members. Similarly, in Nigeria, Juillard et al (2010) reported

that the injured had to pay for their own care; RTIs caused frequent and repeated visits to both formal and informal healthcare providers; and the choice of providers was partly determined by costs. In this Nigerian study, the mean direct cost of treatment was US\$ 25 per person, which at that time was a major burden on household expenditures (Juillard et al, 2010). Another Nigerian study showed that on average, each road crash victim had stayed in hospital for 25 days and spent about US\$ 444 (Ipingbemi 2008). Additionally, among those not utilizing modern health facilities, one of the major reasons for not doing so (for 24% of people) were the costs of modern treatment. According to Perez-Nunez et al (2012), in their Mexican study, the high financial costs associated with RTIs are felt immediately when the costs of medical care have to be met, especially for low income families. In this study, many low-income families were found to be concerned immediately after the crash because they did not have money available to cover the medical expenses and were forced in the days following the crash to ask for financial assistance from the extended family and social networks.

These results shows that costs associated with road injuries can be hindrances in seeking care and lead to people being unable to access or to limit treatment or to seek cheaper alternative traditional care or home care, despite their need and desire for established modern care. They are therefore also unlikely to have expensive examinations such as X-rays and MRI scans to identify specific injuries such as fractures or internal bleeding. As a result, these people receive inadequate care and risk further, potentially avoidable complications, permanent disability, and even death. It is also unlikely that they will go on

to have rehabilitation, to reduce the likelihood of permanent disability, if they were unable to or cannot access the first line of care following the RTI.

For example in Uganda, O'hara et al (2016) found that of all patients admitted for surgical treatment following injury, due to financial limitations, only 58% were able to have the recommended surgical treatment. Additionally, although patients having surgical treatment assumed more debt, this was found not only to be the right decision for their long-term health outcomes but also from a cost-benefit point of view, as surgical treatment was found to have a substantial, positive effect on earnings at 12-months post-injury (O'Hara et al, 2016). Similarly, in Malawi, Kohler et al (2017) reported that some of the injured patients with lower limb fractures were being managed with conservative means (non-surgical) because surgery was too expensive, however surgery helped people recover more fully and more quickly as they were able to ambulate much sooner and were pain free compared with those receiving conservative management. The inability to access healthcare following RTIs due to lack of health insurance has also been noted in the US, which is a country without a nationalized health system. Lao et al (2012) found that injured uninsured individuals were more likely to report not being fully recovered and to be no longer having treatment while individuals with insurance were more likely to visit a clinician. An uninsured person who experienced an unintentional injury had greater difficulty receiving recommended medical care and had a longer recovery time to full health (Lao et al, 2012).

From the information given by HCWs interviewed, those injured in road injuries in Namibia are in a unique position compared with those who are injured from other causes as they are

receiving support from the MVAf whilst the latter group are not. As reported above, through the MVAf, RTI injury survivors were entitled to have all their medical and rehabilitation needs met and paid for, with follow-up treatment being organised for them, and were also being provided with any mobility aids they required at no cost. For example, several of the injured reported in the interviews that they were being provided with caregiver allowances which they could use to pay for help to manage activities of daily living. In comparison, those injured from other causes such as stabbings or falls, whom HCWs referred to as “state patients”, were reported to be very disadvantaged and often had lack of access to quality aids, rehabilitation services and had poor continuity of care because of the existing problems with healthcare in Namibia. HCWs alluded to the fact that “state patients” were more likely to have poorer outcomes than the MVAf funded patients. This is confirmed by reports from VSO (2016), who indicated that access to rehabilitation services is still very low in Namibia due to a lack of rehabilitation staff within the Ministry of Health and Social Services (MOHSS), with only 26% of people needing rehabilitation being able to access this. This inequitable pattern has also been reported in Victoria, Australia, where the TAC system operates in terms of comparisons of those receiving compensation from the system and those not receiving it (Braaf et al, 2019).

VSO (2016) also reported that although 67% of people living with disabilities expressed a need for assistive devices, only 17% of them were able to access them. Similarly Lang (2008) reported a severe shortage of aids such that in 2004 approximately 85,000 people living with disabilities needing orthotic and prosthetic appliances did not have these (Lang, 2008). To try and improve the situation and improve service availability especially in the rural

areas, the Ministry of Health and Social Services restructured the management of its orthopaedic technical services with commitments to establish two mobile prosthetics and orthotics workshops and recruit and train more orthopaedic technicians and technologists in order to extend the geographical coverage of the service (Lang, 2008). However a more recent study by Pärämäkoski and Sirkka (2012) found that there were still ongoing problems with accessing assistive devices for people living with disabilities, due to lack of funding, high prices of the devices, and the slow delivery process. Pärämäkoski and Sirkka (2012) also highlighted the lack of maintenance of assistive devices as a problem encountered by people living with disabilities, which correlates with Lang (2008), who found that only one-third of all assistive devices were professionally maintained.

Additionally, considering that only 15% of the population have medical insurance, it is likely that a huge number of “state patients” have to fund for their own treatment. HCWs reported that the costs of paying for treatment can be a barrier to accessing care such that they end up not being to access services like rehabilitation, which are essential in regaining their full potential. A study to look at the “state patients” and their choice of treatment options following the injuries is likely to show similar findings to the studies in SSA which have shown that the injured individuals are limited in accessing front line health services due to costs and if they do, catastrophic expenditures are frequent. This remarkable difference between “MVAF patients” and “state patients” highlights how beneficial the MVAF has been.

Adding to this, one of the injured people interviewed had been injured before the set-up of the Fund and reported having needed to use her partner's medical insurance for her treatment and rehabilitation. This shows that before the Fund, people had to pay for their own care in Namibia. There are only four other countries in SSA who have such a Fund: these are Botswana, Lesotho, Swaziland, and South Africa. I could not find any specific literature as to which country was the first to adopt such a system.

In most of the countries in SSA, motor third-party liability (MTPL) insurance is used to pay for the healthcare costs of those injured in crashes, otherwise they have to pay for the costs themselves (World Bank, 2009). With MTPL, the injured survivors, including the driver, can claim compensation from the insurance company to settle for their treatment and personal expenditures related to the injury. In countries where MTPL has been used, various problems with the system have been highlighted. In Zimbabwe, Kawadza (2016) reported that most people were not aware of MTPL and did not make any claims following road crashes and thus were liable to pay out-of-pocket for their own medical and rehabilitation expenses. Similarly, research done in Uganda by Kitunzi et al (2016) found that eight out of 10 motorists in Kampala did not understand MTPL, with 95% having no knowledge of their rights as policy holders and 88% having no knowledge of their obligations when involved in an accident. Additionally, the majority of motorists involved in crashes were reported to not have made claims to their insurers for compensation (Kitunzi et al (2016). Another disadvantage of MTPL reported by Kawadza (2016) is in the case of hit and runs, the injured pedestrians do not have the details of the car driver nor any ability to make any claims



against them, and lack personal injury insurance, so they have to pay for the costs of treatment themselves (Kawadza, 2016).

Consequently it has been reported that MTPL has been failing to meet the financial costs of the medical care and rehabilitation of those injured in road crashes. Additionally, in Zambia, the Permanent Secretary in the Ministry of Transport, Works, Supply and Communication was quoted as saying that the current MTPL scheme did not effectively address the post-crash needs that arose from road accidents: most motorists saw it as a form of tax that they would try to avoid rather than a protection for their lives and thus were deliberately avoiding paying into the system (Lusaka Times, 2013). In Zimbabwe, it was similarly reported that motorists were reluctant to pay for MTPL as they saw it as a form of tax (Kawadza, 2016). According to a report by the World Bank (2009), this is a common trend in LMICs as it has only been introduced in in the early 2000s and it is still poorly understood. Motorists are inclined to view it as a form of tax that they are at liberty to evade, rather than as a protection against their personal liability, a concept that is not familiar to the general public (World Bank, 2009). As an illustration, Kawadza (2016) reported that 65% of vehicles in Zimbabwe did not have MTPL, such that if involved in accidents, injured people including passengers and pedestrians were unable to claim any compensation to pay for their health costs.

In comparison, in my study all the injured survivors and HCWs reported that accessing the Fund was not difficult. Based on these vast differences, the MVAf is a model that could be used in other countries in SSA and other LMICs as it is a system that has been shown to be

effective in terms of making treatment accessible for road injury survivors despite of financial status. Considering the difficulties likely to be faced by uninsured injured road survivors (who are likely to be the majority) in accessing MTPL and paying for their health costs in SSA and other LMICs without nationalised health care systems, the MVAf model may a great solution. Another advantage of this is that it not only pays for the health related costs but also funds a lump sum payment and monthly caregiver payments to those who sustain serious injuries such as spinal injuries, which MTPL is not covering.

#### **7.11.1 *Problems with the MVAf system***

To remind the reader, the MVAf was providing capped funds for individuals injured in road crashes in Namibia from which their medical care was being provided and in the case of those with severe injuries, funds were also being provided for care. Several of the injured survivors and HCWs, however, also highlighted what they considered to be negative aspects of the system. HCWs highlighted that the MVAf allocation for each individual was limited at N\$ 1,500,000 and at risk of being depleted. Once the allocation had run out, an individual had to pay for their own medical treatment. They viewed this negatively, and reported that there should not be any limits to the allocation. In order to preserve their MVAf allocations from being depleted, some injury survivors reported that they would routinely use their own resources, medical aids or family medical aids to cover some of the health-related expenses. Road injuries have long-term health impacts and in the case of severe injuries, are often associated with permanent disability and consequently, lifelong health complications and lifelong health care needs. Both my research and the literature in Namibia has shown younger age groups to be at higher risk of road injury. Thus this cap is unjustifiable, as the

costs of long-term health care are undoubtedly very high and there will be costs for many over a long lifespan. At the least, there may be a need to assess how much each specific individual is allocated and not just a fixed sum for every individual. In a recent court case, it has been ruled that the caps are unconstitutional (Menges, 2017), which may lead to a change of the current scenario and may result in the removal of caps. The MVA policy on these caps needs to be reconsidered as in many instances road injuries will affect people for life and as they age, they are likely to have more complex health needs.

Another issue of concern is the shortages of and poor access to mobility aids in Namibia. The importance of mobility aids and assistive devices cannot be understated. They greatly reduce the inequalities experienced by individuals living with impairments and with chronic conditions and functional decline by enabling them to be productive and participate in all areas of life including in education, the labour market and civic life (Tebbutt et al, 2016). They also reduce the need for formal health and support services, long-term care and the work of caregivers (WHO, 2016).

The shortage of wheelchairs is an excellent example of the problem of poor access to aids in Namibia. The WHO has published a guideline on the provision of manual wheelchairs in less-resourced settings such as Namibia. In addition to meeting the user's needs and environmental conditions by providing a proper fit and postural support and being safe and durable, the WHO also reports that a wheelchair should be deemed appropriate for an individual only when it is available in the country and can be maintained, with services sustained in the country at an affordable cost (WHO, 2008).

However, contrary to this, HCWs reported that when individuals in Namibia needed wheelchairs following road injury, the MVAf were importing these from South Africa and European countries. This made it difficult for the wheelchairs to be maintained and serviced, with the replacement of spare parts often taking long periods and wheelchairs not always being suitable for the environment of the injured individual. The WHO (2008) recommends governments support local manufacturers by making efforts to minimise the costs of testing for local manufacturers, and also by the use of local material in producing the wheelchairs, the long-term goal being a sustainable solution.

The Namibian government should be lobbied to start a local manufacturing workshop to produce low-cost wheelchairs and other aids. Not only will this be a good thing for those with road injuries, but also for those with other disabilities, who have been reported to have poor access to aids. This could also be an effective way of lowering the expenditures from the MVAf allocation such that this is preserved from being depleted, as the costs of wheelchairs and other aids are deducted from the individual allocation. This would also be a way of creating employment opportunities for local people.

The issues extend beyond medical aids – indeed, a focus on improved access and funding of medical equipment alone obscures other major barriers. An element of socio-economic imbalance was highlighted by both road traffic survivors and HCWs interviewed. The survivors who were struggling with finding suitable housing reported that the MVAf only focused on medical issues and was not willing to allow individuals to use their allocation to fund housing needs. Adding to this, both the injured and HCWs reported that home

modifications could only be done for those who owned a house or whose parents owned a house. Automatically, those from lower socio-economic groups were disadvantaged in this regard because they would be less likely to own property.

It is likely that the MVAF does not want the individual's allocated amount to be used for other social needs such as housing because it would be depleted, as they anticipate those disabled through RTIs will need these funds in the long-term for their health. However the living environment has a bearing on the status of individuals and poor living environments are associated with poorer health outcomes. There is need for consideration of individual cases in terms of funding for improved housing, especially for those with severe injuries.

#### **7.12 ON-GOING HEALTH PROBLEMS**

All the injury survivors interviewed revealed having on-going physical health problems related to their road injuries despite some of them having been injured many years before. Those who had sustained more severe injuries, specifically spinal injuries, reported more health problems, including for some of them the need for recent hospitalisation. However, even those who had sustained comparatively minor injuries also reported ongoing problems, with pain being a prominent sequela. These findings were consistent with the findings from interviews with HCWs, who reported that RTIs in Namibia, including minor ones, were associated with on-going physical health problems and long-term sequelae (with chronic pain reported as a major problem), with the need for long-term medical care.

These findings on long-term injury are consistent with research which has been done internationally. However to my knowledge, this is the first study to explore the long-term impacts of RTIs on the health of individuals in Namibia. Very little research has been done in the rest of Africa. In Malawi, Kohler et al (2017) found that the injured experienced substantial physical morbidity. Although this is generally an overlooked area in research globally, HICs have been conducting more research on this. Follow-up done on road injury survivors in HICs in the short and long-term has shown that many of the injured were still not fully recovered, with pain being a prominent sequela, including for those with minor injuries, and being very costly to public health (Barnes and Thomas, 2006; Batailler et al; 2014; Hours et al, 2013; Hours et al; 2014). The results thus indicate that similar to global findings, RTIs are associated with a high burden of physical morbidity and are costly to the public health system of Namibia.

This is however not only limited to physical health; most of the participants also reported on-going mental health problems with depression, stress, anger, and anxiety being frequently mentioned. Similarly, all the HCWs interviewed reported that road injuries resulted in a decline in the mental health of those injured. Similar to research on the long-term impact of road injuries on physical health, there has been very little research on this globally and specifically in SSA (Iteke et al, 2013). My findings mirror the findings of research done in Africa (Iteke et al, 2013) and globally (Hours et al, 2013, Palmera-Suarez, 2016; Sharma, 2008), which have found that road injuries have both short and long-term psychological outcomes on those affected.

Craig et al (2016) conducted meta-analysis to determine the psychological impact associated with RTI injuries and concluded that psychological distress following a road injury is substantial. Some of the symptoms reported in my study by those injured included depression, hopelessness, anxiety, flashbacks and a phobia of travelling. These are similar to the symptoms reported by both HCWs interviewed and Craig et al (2016). HCWs indicated that, not surprisingly, those who sustained more serious injuries were more likely to be worse affected than those with less serious injuries. This is similar to the findings of Hours et al (2013) and Nhac-Vu et al (2014) who found that those with more severe injuries experience higher levels of PTSD. However, the WHO (2004) argued that severity of road-injury is not always directly proportional to the psychological manifestations and even relatively minor injuries can have profound psychological effects. Adding to this, in their meta-analyses, Craig et al (2016) found psychological distress to be higher in people with less severe injuries (whiplash-associated disorders) than those with more severe injuries (spinal cord injuries and traumatic brain injuries). Craig et al (2016) suggested possible reasons for this was that that people with a spinal cord injury receive substantial inpatient rehabilitation time compared to those with whiplash-associated disorders and this prolonged input may result in reduced risk of psychological distress.

The role of alcohol as a cause of RTIs is well documented (WHO, 2015a), however very few studies have looked at the association between sustaining a road injury and subsequent alcohol misuse. In terms of substances misuse, which also is part of mental health, none of the injured interviewed reported any problems with drugs and alcohol following the road injury. However it must be noted that those with major alcohol or drug problems would

have presumably been less likely to take part in the study or to reveal that they were misusing these.

HCWs reported that road injuries were associated with increased patterns of alcohol misuse in Namibia. They reported the use of alcohol in coping with the situation and in managing the pain. Studies done on this have also reported increased patterns of substance misuse following RTI. Hours et al (2013), for example, identified an increase in usage of psychoactive drug consumption in 15% of those with mild-to-moderate injuries and 27% of the severely injured. Extensive research also shows alcohol abuse often co-exists with mood and anxiety disorders and other mental health problems (Otten et al, 2018). Based on this evidence, given that many of the injured in my study reported mental health problems, it is a possibility that some of them may have had alcohol or substance misuse problems and not been willing to share this. HCWs interviewed also highlighted the mental symptoms of those injured in Namibia could also affect their physical health. This was reported to be due to apathy, with low mood leading to a lack of morale to actively participate in rehabilitation activities led to poorer long-term outcomes. Research by Kendrick et al shows There has been no extensive research on whether there may be an association between poorer outcomes following a road injury and mental health problems but research by Tough et al (2017) has shown that social isolation, which can be a factor related to poor mental health, can have adverse effects on physical health.



### 7.13 ACCESS TO REHABILITATION SERVICES

One of the objectives of this research was to identify the availability of rehabilitation services to road injury survivors. The importance of physical rehabilitation following injury is well documented. Rehabilitation is extremely important for injured people as it utilises strategies and techniques focused on restoring function to the fullest level possible and helps the body achieve normal daily functions (Van Roy et al, 2012). *The World Health Report on Disability* called on governments to organise, strengthen, and expand comprehensive rehabilitation services and programmes to address the burden of disability and improve quality of life for persons with disability worldwide (WHO, 2011b). According to Christian et al (2011) the lack of rehabilitation after trauma is a serious and rising problem in SSA and other low-resource countries; however it has not been widely studied.

Although limited due to the small sample size, the results in my study indicate that most of the injured reported that they had been able to access rehabilitation. HCWs also reported that because of the involvement of the MVAf, most road injury survivors were able to access rehabilitation. They explained that the MVAf case managers made it easier for follow-up of patients to be done once discharged. HCWs reported that the MVAf was also arranging for rehabilitation services to be accessed in private clinics, where services were deemed to be better and the injured could be seen more quickly, without any long waiting lists. In comparison, they reported that access to rehabilitation services for the rest of the population was very low. This was supported by literature findings highlighted in 7.11. Very little research on the accessibility of rehabilitation services following road injury has been done globally. On the African continent, a study was done in Ghana (Christian et al, 2011).

Their results showed that the great majority of people admitted to the trauma service following road injury in Ghana did not receive any rehabilitation services, and the few that did received inadequate services (Christian et al, 2011).

Comparing the findings in my study, which show that most of road injury survivors were able to access rehabilitation services, despite the low general levels of access to rehabilitation with the findings of Christian et al (2011) in Ghana indicates the MVAF has been more successful in helping to facilitate rehabilitation services for injury survivors in Namibia than in Ghana, where MTPL is in place. This makes for a strong argument for other countries in SSA that only have MTPL to adopt a system such as the MVAF as it clearly seems to have augmented access to rehab services for road injury survivors. The role of the MVAF case managers is also important in that they facilitated follow-up treatment and acted as case coordinators in the management of the injury survivors. I already discussed in section 7.11 how having the case managers has been reported in several studies as important in enhancing accessibility to health services following injury.

#### ***7.13.1 Unequal access to rehabilitation services***

Another important finding from both sets of interviews was that although most road injury survivors were able to access them, rehabilitation services were generally lacking in Namibia and were also greatly skewed, with most services located in Windhoek and other regional urban areas, and almost devoid in peri-urban and rural areas. HCWs reported that despite the involvement of the MVAF, including how they were paying for all the

treatment/rehabilitation costs, a considerable proportion of road injury survivors were not able to access rehabilitation services.

Several reasons were given by HCWs and the injured who were interviewed. The main reason given for this was that they lived too far away from these services and accessing transport to travel the long distances services (especially for those with lower limb problems) was difficult, with transport costs being also being a limiting factor. The accounts given by HCWs matched those of the injury survivors who had lived outside Windhoek. They reported that services were concentrated in Windhoek and lacking in other regions or too far away to travel such that some of them had needed to move to Windhoek from their homes in order to access rehabilitation and other health services. HCWs also revealed that there was also a severe shortage of rehabilitation staff generally in Namibia, which was compounded by the fact that Namibia did not have any training facilities for rehabilitation personnel. This scenario has only changed recently with the University of Namibia offering the first Physiotherapy and Occupational Therapy undergraduate places in the 2018 academic year (New Era, 2017, UNAM; 2018). However, despite the advancement, places for the programmes were reported to be very limited at 15 per year and at least 10% of places being reserved for international students to allow the university to benchmark (New Era, 2017).

HCWs also reported that the staff in Windhoek were more specialised and likely to have more experience with RTIs. This matched some of the reports of injury survivors who indicated the service they had received once discharged to the regional towns had not been as good and they had needed to go back to Windhoek to receive additional treatment.

HCWs also revealed that rehabilitation staff outside Windhoek also had a lot of administrative duties and less time for clinical work such that they could only offer patients with road injuries, and others, limited treatment sessions.

The main point HCWs were making, as they explained these regional disparities, was that road injury survivors living in the rural areas were likely to have poorer outcomes as their access to rehabilitation services was more limited, due to these various factors, and was also more likely to be of lesser quality. They were highlighting the fact that those who live in rural areas are disadvantaged in terms of access to rehabilitation and are less likely to reach their full physical potential following an injury despite their ability to access MVAF support.

The findings in my study match findings of other researchers in Namibia. Qualitative work by Van Rooy et al (2012), found that accessing rehabilitation and other health care facilities in rural areas was a major problem for people living with disabilities. They reported that regardless of type of disability, people living with disabilities complained of lack of rehabilitation in almost all of the rural clinics (Van Rooy et al, 2012). Similarly in the study by Pärämäkoski and Sirkka (2012), participants noted that rehabilitation services for people living with disabilities were concentrated mainly in Windhoek, and those in other regions and in rural areas did not have the same opportunities for treatment and rehabilitation. Adding to this, Lang (2008) and Pärämäkoski and Sirkka (2012) reported that skewness of rehabilitation services is partly because of severe shortages of staff such as physiotherapists and orthotists, which also matches the findings from my research.

Similar to my findings, Van Rooy et al (2012) concluded that transportation was one of the biggest problems people living with disabilities face in accessing rehabilitation and other health services, especially for those with lower limb, spinal and neurological disability. In the study, most rural healthcare facilities were found not to have transport facilities and did not arrange transport unless somebody was very sick, which could take long periods (Van Rooy et al, 2012). The researchers also reported that the costs of transportation for people living with disabilities can be prohibitively high (Van Rooy et al, 2012). Other studies in SSA have shown similar findings. In Malawi, Kohler et al (2016) also found that the cost of transportation was exorbitant with participants interviewed recalling long, painful trips walking to the hospital as the only option because of financial problems and sometimes leading to delayed care. Similarly, in Sierra Leone, the findings of Magnusson and Ahlström (2012) showed that patients could not afford transport to rehabilitation centres. Similar findings have even been also noted in HICs. In a study of the experiences of injured patients in Victoria, Australia, Gabbe et al (2013) found that participants reported opting not to attend rehabilitation because of the distance family members had to travel to visit them in inpatient rehabilitation facilities while some expressed the need for rehabilitation but the option of inpatient rehabilitation was not available.

Meanwhile in UK, Sloney et al (2014) reported that although many participants regarded rehabilitation as very important to their recovery, many of them reported not having been able to access it. In addition to this, some of those who did receive rehabilitation in the form of physiotherapy felt it had ended too soon and they had not received enough sessions (Sloney et al, 2014). In this study those who did not receive physiotherapy were reported to

be unsure what to do in order to improve their strength following injury. Also in UK, Christie et al (2016) reported that both injury survivors and service providers reported problems with accessing physiotherapy and limitations in the number of sessions due lack of funding.

HCWs reported other barriers in accessing rehabilitation for road injury survivors. These included culture, lack of knowledge and language barriers. These also correspond with findings by other researchers in Namibia. Van Rooy et al (2012) reported that language barriers are one of the challenges facing people living with disabilities in Namibia when accessing rehabilitation and other healthcare services.

Considering that the majority of people living with disabilities live in rural areas (NSA, 2016), the enhancement of services outside the main cities will not only be of benefit to road injury survivors, but also to many people living with disabilities, and the rest of the population. A big step towards this would be for the government to train more rehabilitation professionals. Another solution would be the training of adjunct multipurpose rehabilitation workers with basic training in a range of disciplines (occupational therapy, physical therapy, speech therapy, for example), or as profession-specific assistants that provide rehabilitation services under supervision.

This has been done successfully in several LMICs: countries such as India, Lebanon, Myanmar, Thailand, Viet Nam, and Zimbabwe, which have all responded to the lack of professional resources by establishing mid-level training programmes (WHO, 1992). The

advantage of mid-level training is that it is less expensive, and although it may be insufficient by itself, it may be an option for extending services in the absence of full professional training (Dunleavy, 2007)). The shortage of rehabilitation personnel in Namibia has also been attributed to brain drain but a positive side-effect of mid-level training is that trained professionals are limited in their ability to emigrate to developed countries (Dunleavy, 2007). These workers could also fill the gap for professionals not wanting to work outside urban areas.

Another solution could be the use of modern technology. In Namibia, most people now own mobile phones. According to Seelman and Hartman (2009), the use of information and communication technologies for rehabilitation is an emerging resource that can enhance the capacity and accessibility of rehabilitation measures by providing interventions remotely. Tele-rehabilitation technologies include video and teleconferencing technologies in accessible formats, mobile phones, and remote data-collection equipment and tele-monitoring (WHO, 2011b). Technology may be used by people with disabilities, rehabilitation workers, peers, trainers, supervisors, and community workers and families. Tele-rehabilitation techniques have successfully enabled people in remote areas to receive expert treatment from specialists located elsewhere in vast areas including cardiac rehabilitation (Kortke et al, 2006), speech and language therapy (Theodoros, 2008), and cognitive rehabilitation for people with traumatic brain injury (Man et al, 2006), as well as training and support of health-care personnel computerized guidelines to help clinicians use appropriate interventions (WHO, 2011b).

#### 7.14 ACCESS TO PSYCHOLOGICAL SUPPORT/COUNSELLING SERVICES

An additional objective of this study related to mental health was to identify the levels of psychological support available to road injury survivors. I chose to explore this, as despite the high burden of post-traumatic illness due to RTIs, this has been reported to be an area lacking in research globally (World Bank, 2014). Instead, timely access to mental health support needs to be a priority for RTI survivors as psychological and emotional wellbeing following injury supports productivity and improved outcomes regarding health, return to work and quality of life (Braaf et al, 2019). The few studies done in HICs have, however, shown that psychological consequences from RTIs are however often neglected by clinical staff treating patients despite the considerable emotional and psychological consequences (Brand et al; 2014). For example, in France, Hours et al (2013) found that only 11% of survivors had received psychological help following the injury. Similarly, in UK, Christie et al (2016) conducted research on injury survivors post-hospitalisation and reported that although some of them felt counselling would have been helpful, they were unable to access this. Adding to this, Sleney et al (2014) report that considering that emotional state of many injury survivors are impacted on, it may be important if at the point of discharge RTI survivors are made aware that they may experience such symptoms and, if they do, given information about where to seek help. Added to this, frontline HCWs in outpatient clinics and health care services should be alerted to the recognition of psychological symptoms and importance of referral to appropriate services (Sleney et al; 2014).

Although having a relatively small sample size, the findings in my qualitative study correlated with these findings. Almost half of the injury survivors had not received any



counselling or psychological support, with half of these reporting they felt they would have benefited from this. Similarly, HCWs reported such services were lacking for road injury survivors, citing a severe shortage of psychologists and counsellors in Namibia as the main reason. These reports by HCWs are congruent with the report given by VSO (2016), which highlighted a severe shortage of counselling services in Namibia. This is also a common issue in LMICs. According to Patel et al (2016), empirically supported psychological treatments are among the most effective mental health interventions for treating mental health problems such as Post Traumatic Stress Disorder but are however not accessible for most populations in most countries. This is particularly true in LMICs, which have a shortage of professionals trained in mental health, resulting in a treatment gap of up to 93% (Chisholm et al, 2016).

An interesting finding in the study was the use of social workers as a substitute for psychologists as counsellors for injury survivors in Namibia. Although no evaluation has been done in Namibia to show this is effective, a recent review by Singla et al (2017) exploring psychological treatments in LMICs by care professionals not trained in a field closely related to mental health such as social workers, midwives, auxiliary health staff, primary care doctors and nurses, found merit to this. They concluded that innovations in global mental health to improve access to psychological treatments by using low-cost and widely available staff with no psychology training was more effective than usual care (Singla et al, 2017). Similarly Christie et al (2016) found that participants in their study repeatedly reported relying on physiotherapists for information and support following their injury and viewed them as having taken the place of counsellors. In section 3.6 I also talked about resilience and how this has been found to enhance recovery following injury. Braaf et al

(2019a) report that HCWs such as OTs could support adaptive self-regulation in injured people by assisting them to set realistic goals and recovery expectations in order to improve perceptions of well-being and to alleviate feelings of helplessness about the future. In order to enhance this current model, other HCWs involved in care of road injury survivors could be trained to also provide counselling services. This model in Namibia is also one that could be used in other countries in SSA and other countries in low resource settings.

Another interesting finding was that some of the participants who had received counselling/therapy reported they had not benefitted from psychological treatment but found peer support groups to be more helpful. I could not find any literature on this in SSA but there is data from HICs. In their systematic review, Campbell et al (2004) reported that a wide range of evaluative studies found improved coping skills, reassurance and a sense of normalcy, reduction in isolation, information sharing, a better understanding of the experience and future, and in some cases, greater confidence in talking to physicians as a result of peer support amongst those burdened with illness. Braaf et al (2019a) also reported that peer support can also provide social support, promote resilience and coping strategies, and sharing of ideas while Braaf et al (2019b) reported that they can also help to cultivate adjustment and enhanced self-efficacy and adjustment following injury which can lead to improved outcome. Following a review on peer support, Repper and Carter (2011) reported that, compared with professional intervention, peer support appears to more successfully promote hope and belief in the possibility of recovery; empowerment and increased self-esteem, self-efficacy and self-management of difficulties; and social inclusion, engagement and increased social networks. As such, there has been exponential

growth in the employment of peer support workers in the US, Australia and New Zealand and UK (Repper and Carter, 2011).

#### **7.15 FACING ECONOMIC HARDSHIPS**

The majority of the injured interviewed reported ongoing severe financial hardship due to the road injury. 71% of the injured had been breadwinners and reported the injury had impacted negatively on the family income, resulting in them being unable to provide for their family as compared with before the injury. The results mirrored the findings from interviews with HCWs, who all reported that road injury survivors faced financial hardships and linked these to loss of employment and ongoing costs associated with the injury. As could be anticipated, those who had lost their jobs or were not employed reported the worst financial difficulties. These findings are similar to research done in other countries in SSA. In Malawi, Kohler et al (2017) found that the injured experienced substantial personal and household economic loss. In Ghana, Mock et al (2003) reported that following injury, family income was reported to decline by almost half in urban and rural households with food production declining in one-third of rural households. In Nigeria, Juillard et al (2010) found that 89% of road injury survivors sustained a reduction in earnings. Some research in HICs has also shown similar findings (Gabbe et al, 2014; Palmera-Suarez, 2015; Tournier et al, 2014). Notably, Gabbe et al (2014) reported that the loss of income was not only reported by the injured individuals, but many of them also reported that family members had needed to take extensive leave from work or to resign from their jobs in order to care for them, which resulted in financial difficulties.

It is important to note that the financial hardships described by injury survivors in my study were occurring despite the support of the MVAf, who were providing for their medical costs and aids/appliances as well as providing a carer's allowance (for those with severe injuries). Similarly the study related to the TAC in Victoria, Australia also showed financial hardships to be prevalent despite support from TAC (Gabbe et al, 2014). In addition in my study, most of the injured were also receiving the disability grant from the Namibian Government. The disability grant is a monthly payment given to those assessed and deemed to meet the criteria. Administered by the Ministry of Labour and Social Welfare, the disability grant amounts to N\$ 1,100 per month (approximately £65). One of the HCWs praised the Namibian government for having this in the first place and reported that in other regional countries no such facilities exist for people living with disabilities. This is confirmed by Lang (2008), who indicated that Namibia is one of the few African countries providing social protection for people living with disabilities.

However, the overwhelming consensus from most of those in receipt of the grant was it was too low and not enough to meet their needs, as some of the recipients were not in work and had no other sources of financial support. This mirrored the responses of the HCWs, who revealed that the majority of those with severe road injuries would end up being dependent on the disability grant as their source of income. This finding is similar to the study done related to the TAC in Victoria by Gabbe et al (2014) which showed that where sources of income were not available, reliance on welfare payments were often needed. All the HCWs reported that the grant was too low and not enough to meet basic needs and highlighted the high costs of living in Namibia, especially in Windhoek and other urban

areas. Similar to my study, the majority of interviewees interviewed by Kiek et al (2016), in a study on disability mainstreaming in Namibia, revealed that the disability grant is not sufficient to cover the overall costs of living an independent life.

In 2008, the grant was N\$ 600 per month (Approximately UK £27). In a review of services in Namibia available for people living with disabilities in 2008, Lang reported that due to the rising inflation rate, this amount was grossly inadequate to cater for even the basic needs of people living with disabilities (Lang, 2008). In the following years inflation has remained high and in January 2017 the National Statistics Agency reported that it stood at 8.2%. Thus although the grant has risen to the aforementioned N\$ 1,100 per month, it is still unlikely to be significantly different to that of 2008.

RTIs are drivers of poverty, even with the support of the MVAf and, for some, the government in the form of disability grants. These results indicate that even with some form of social protection, RTIs can have a devastating impact on the financial status of affected individuals and their families. Some studies in HICs which have established benefits systems in place have shown similar findings. In Spain, Palmera-Suarez (2015) found that individuals with disability due to RTIs were more likely to be unfit for work and living in households with lowest income compared to the general population, with only 24% of them gainfully employed. Similarly, in France, Tournier et al (2014) found that a large percentage of the injured surveyed, despite severity of injury, reported financial difficulties.

More recently, a review by Mitra et al (2017) concluded that individuals with disability have sizeable extra costs, with higher costs observed among persons with severe disabilities

including higher overall disability costs, health-related expenditures, assistance with daily care costs, and transportation costs. The review recommended that quantifying the extra costs of disability could help to inform policy in terms of allocating sufficient resources to provide disability support services (Mitra et al, 2017). They added that this can also provide a basis for devising eligibility and benefit levels for disability support programs and in assessing the adequacy of supports (Mitra et al, 2017). The review also looked at papers which had estimated disability costs against the receipt of income support from governments. The authors concluded that public support programmes are not taking into account sufficiently the extra costs associated with living with a disability (Mitra et al, 2017). This is similar to the situation reported in my study in Namibia for RTI survivors.

Some injured participants interviewed also reported difficulties in accessing the disability grant. This was also reported as a problem by HCWs, who revealed that not all people with road injuries were able to access the grant due to a lack of knowledge and stringent assessment criteria. This is supported by Chiripanhura and Niño-Zarazúa (2013), who report that there are fundamental problems which hinder access to the grants, including: illiteracy and lack of information; isolation of qualifying individuals; and complex claiming procedures. Adding to this, Kiek et al (2016) reported that DPO representatives in Namibia indicated that many people living with disabilities, especially in rural areas, were not aware of the existence of the grant and therefore do not benefit from it. Kiek et al (2016) also noted DPO representatives as having reported the process of acquiring the grant as being not transparent, lengthy, and bureaucratic.

Another problem with access to the grant is that the criteria for eligibility to the grant are also highly medically-based, requiring assessment by a medical practitioner (Lang, 2008). According to the NSA (2016) figures provided by the Ministry of Poverty Eradication and Social Welfare, only 33% of people living with disabilities in Namibia were receiving the grants. Thus, it is likely that a considerable number of road injury survivors in Namibia may not be accessing the grant.

The injury survivors also reported that they were using the funds they were receiving from the MVAf and the disability grant to support immediate and extended family members, which worsened their financial hardships. This was also corroborated by HCWs, who revealed that Namibia has cultural expectations of supporting extended family members. These findings are similar to those of Van Rooy et al (2015) and Kiek et al (2016). Van Rooy et al (2015) found that older adults in rural Namibia receiving social pensions from the Namibian government were using the money they received to help many members of their families because extended family obligations required them to pay for others. Meanwhile, Kiek et al (2016) reported that when people living with disabilities received the disability grant, it was used to support the whole family, which often results in the person with a disability benefiting the least.

These findings show that RTIs have economic consequence in Namibia and those affected and their families and are potential poverty drivers in the country. The nation has one of the highest levels on inequality worldwide which it is trying to reduce (UNDP, 2013). However RTIs add to the burden of inequality because they lead to financial hardships. The results

also show that there is a need for the Namibia to review the disability grant. The reports of survivors, HCWs, and literature findings overwhelmingly show that the funds are too little and insufficient for RTI injury survivors and other people living with disabilities considering, as previously reported, that most of them have difficulty getting back into work and become solely dependent on these grants.

#### **7.16 LOSS OF EMPLOYMENT**

The majority of injured road survivors interviewed reported ongoing problem with employment. Of those who had been employed prior to the injury, 21% had lost their jobs as a result of the injury and remained unemployed, 14% were on extended sick leave, and seven percent were still employed but on modified duties. The participants who had been employed prior to injury each reported having made several efforts to find employment but felt their injuries had prevented them from finding employment. Some of those who had found employment reported they had struggled to find the employment. The results from interviews with HCWs are similar. They all reported that once involved in a road injury, many individuals were unable to get back to their old jobs or to find alternative employment and ended up unemployed and depending on the disability grant for income.

These findings mirror research which has been done in other countries in Africa; in Nigeria, Juillard et al (2010) found that job loss was a direct result of RTI-related disability for 16.7% of study subjects. Similarly in Malawi, Kohler et al (2017) found that the injured experienced substantial work disruption. Research done internationally has also found similar findings. In



Denmark, Dano (2005) identified significantly lower employment rates for road injury survivors in both the long and short-term and concluded that health shocks related to serious road-injuries have large indirect costs with regards to significant loss of production. In Spain, Palmera-Suarez (2015) found that individuals with disability due to RTIs were more likely to be unfit for work compared with the general population, with only 24% of them gainfully employed. Similarly, in Turkey, Esiyok et al (2005) found that about half of their study population reported limited employment opportunities as a result of the road injury. Some of the HCWs reported that those with serious injuries were worst affected in terms of loss of employment, which is quite likely. This could be because of the injuries they are less likely to be able to do the same duties as before. However, others reported that regardless of severity of injury, those with higher educational qualifications were more likely to be able to go back into their old jobs or find alternative employment. The demographic details of the injured survivors interviewed seem to agree with the latter and indicates that education level had more influence. Although this was a relatively small sample and cannot be generalised, almost all of the injured (including those with severe injuries) who had a minimum of Grade 12 (matriculation or A level equivalency) qualifications were able to go back to their jobs or find alternative employment. In comparison, most of those who had qualifications lower than Grade 12, regardless of injury severity, had lost their jobs and not many had found alternative employment.

Confirming this, most of the HCWs interviewed reported that many road injury survivors in Namibia were from poorer socio-economic backgrounds with low educational qualifications and tended to be employed in blue collar jobs involving manual labour, meaning it would

not be physically possible for them to go back to this type of work, even for those with less serious injuries such as fractures. It was also highlighted that most people working in these types of jobs were contract workers, with employers having no obligations to pay them sick pay or to hold their jobs for them. Similarly, in Sudan, Tayeb et al (2016) found that people from low socio-economic strata lost their jobs more frequently due to injuries because they were more likely to be engaged in manual labour work requiring full physical well-being. The same has also been identified in HICs and for example in their longitudinal study in the UK Kendrick et al (2012) also reported lower rates of return to work with increased deprivation and linked this partly to more physically demanding jobs (blue collar jobs).

To add to this, the quantitative research has shown that passengers, pedestrians, motorcyclists and cyclists have greater injury rates and have much higher risk of being injured than motorists. Most of these groups in Namibia are likely to be of similar socio-economic groups. Another consideration in terms of employment is that RTIs result in new disabilities, with individuals needing periods of adjustment to the new situation. This may also be associated with low motivation related to poorer mental health status, which can affect their chances of getting back into employment or gaining employment.

These findings show a socio-economic dynamic to the problem of RTIs in Namibia. On the premise that more of those who are injured are likely to be from lower socio-economic groups and have lower educational attainment, they face a double-edged sword as they are less able to find employment following injury and face financial hardships, thus worsening the levels of poverty and inequality. There is a direct link between loss of employment and

financial difficulties and if more of those injured in RTIs were absorbed in the work force, they would be more financially independent and face less financial hardships, which would also help to reduce poverty and inequality in Namibia (which is a major social problem). Another important note is that returning to work or finding alternative employment could benefit the health of RTI survivors in Namibia. This is supported by Kendrick et al (2017) who report that “Being in work benefits physical and mental health, while being out of work can have negative financial, physical, and psychological consequences” (Kendrick et al, 2017: pg 555). As an example Kendrick et al (2012) report that being in employment has a positive impact on overall health and is actually now being used as a strategy by the UK government in improving the health and well-being of working adults.

#### ***7.16.1 Employer discrimination and enhancement of employment opportunities***

Another important finding from both sets of qualitative interviews related to employment was that employer discrimination was a hurdle faced by people with road injuries in terms of gaining employment. It was revealed that employers thought that due to road injuries, affected individuals would not be able to work to expected levels and also that in cases where adaptations needed to be made, employers were not willing to employ those with injuries due to these extra costs. These findings are congruent with the other research done globally. According to the WHO (2011b), some employers continue to fear that people with long-term injuries and disabilities are unqualified and not productive. These misconceptions about their ability to perform jobs are an important reason for their continued unemployment and may stem from prejudice or from the belief that people with disabilities are less productive than their non-disabled counterparts (WHO, 2011b).

The findings also share similarities with other studies which have been done in Namibia. I could not find specific literature on employer discrimination related to people injured in RTIs in Namibia, however there is evidence with regards to the general disabled population. As reported in section 1.10, despite having progressive employment on disability, the majority of people living with disabilities are still disadvantaged compared with those without disabilities. Lang (2008) adds that similar to many other LMICs, there has been an inadequate regulatory system to ensure that this policy is effectively implemented. Results from a survey by Eide et al (2003), found high unemployment rates among people living with disabilities. On the household level, more than half of the households surveyed which had a person with disability reported that no one was working, compared with just under five percent of households without anyone with a disability (Eide et al, 2003).

Similarly Lang (2008) found that 90% of people living with disabilities were unemployed compared with 78% of those without disabilities. Lang also found that significantly more households with one or more disabled family members have no one employed (56%) compared with non-disabled households (41%). According to Keik et al (2016), people living with impairments and disabilities in Namibia have limited opportunities to find employment because of the discriminatory attitudes of employers and because their ability to participate in public and political life is severely limited. *“A major contributor to the extremely high unemployment rate of persons with disabilities (90%) is associated with a lack of awareness among employers and companies regarding the skills and abilities of persons with disabilities”* (Kiek et al, 2016: p 76).

According to Tesemma (2014), the low level of employment of persons with disabilities may be due to a combination of barriers: preconceived ideas about people with disabilities on the part of employers, lack of physical accessibility to the workplace, and lack of adequate transportation. Adding to this, Kiek et al (2016) found that employers in Namibia primarily focused on obstacles that allegedly prevented them from hiring trainees with disabilities, instead of thinking of easy and affordable adjustments that could be implemented, and highlighted that many people living with disabilities do not need expensive and specific adjustments made to their workplace. To illustrate this, Smith (2017) reported one of the top officials at the University of Namibia had indicated more students living with disabilities were enrolling for degree programmes and graduating, but the majority were having difficulties with finding employment despite being highly qualified because of employers' views that they would not cope with the jobs.

These findings suggests that the Namibian government has been lax in terms of ensuring employers are giving equal employment opportunities to people living with disabilities. One way of combating this would be for the Namibian government and policymakers to involve DPOs in setting up a watchdog organisation which monitors employment practices and collects registers of employment records. Fines could be issued to employers who are noted to have discriminatory practices. These fines could go to a Fund to help people living with disabilities, such as income-generating project funding. It also needs to be emphasised that people living with disabilities are valuable members in society and if they are brought into the work force, this will be beneficial not only for the individual but will also result in improved economic production, lower unemployment levels, and reductions in inequality.

Undoubtedly, greater visibility of people living with disabilities in workplaces across Namibia will also help to dismantle stigma towards them, which Kiek et al (2016) reported to be greatly prevalent, and will also foster community cohesion.

If employers must bear the cost of providing reasonable accommodations, they may be less likely to hire people with disabilities, to avoid perceived additional costs of accommodation or low productivity (WHO, 2011b). To counter these obstacles, companies in Namibia could be offered financial incentives. These could include tax incentives (WHO, 2011b). Notably, one of the activities outlined by the WHO for the Plan for the Decade of Action for Road Safety (as part of the post-crash response) is for governments to provide encouragement and incentives for employers to hire and retain people with disabilities (WHO, 2010).

Workplace modifications could also be supported by the Namibian government. For example in Australia, the Department of Employment and Workplace Relations funds the Workplace Modifications Scheme, which provides up to Australian (A)\$ 10,000 for modifications to accommodate new employees with disabilities (Australian Government, 2017). The MVAf and government could also help injured survivors struggling to find work to start microfinance projects. Funding to help start small businesses can provide an alternative to scarce formal employment and has been shown to have some long-term benefits (WHO, 2011b).

In section 7.14, I discussed how peer support groups can have importance in terms of psychological support for road injury survivors. This is something that could be set up for road injury survivors to improve their previously discussed mental health problems. In light

of these findings showing limited employment opportunities for road injury survivors in Namibia, a system of paid peer support could contribute to providing employment opportunities for them whilst also helping to plug the gap that exists in shortage of psychologists and provision of counselling services.

#### **7.16.2 Accessibility of vocational rehabilitation services**

Vocational rehabilitation services develop or restore the capabilities of people with disabilities so they can participate in the competitive labour market. It has a prominent place in the Sustainable Development Goals (SDGs), and is key to achieving both the fourth SDG, on quality education, and the eighth, on good jobs and economic growth (King, 2016). It is an important tool for a country's social and economic advancement offering an alternative educational path for youths and adults, and at the same time providing qualified manpower needed across all sectors of the economy (King, 2016).

Despite this, all the HCWs interviewed reported either a complete lack or severe lack of vocational retraining centres (VCTs). In fact, most of the HCWs thought there were no VCTs in Namibia. However around the time of interview there were actually reported to be at least three VCTs in Windhoek, Oshakati and Rundu (Kiek et al, 2016). The fact that so many of the HCWs had little knowledge of the availability of VCTs is a cause of concern, considering the need to refer some of the patients with road injuries to these services. It is indicative of a lack of knowledge on the availability of such services and that people with road injuries might not be receiving vocational rehabilitation when it is required. Also, considering the HCWs are more likely to be knowledgeable on the availability of VCTs than

the general public, the lack of knowledge in the general public is likely to be worse. This calls for health and labour officials to engage the public more and disseminate information on VCTs and the importance of vocational rehabilitation, as many people needing this are likely not accessing it due to lack of knowledge.

The HCWs also reported that in order to be accepted onto these VCTs, one needed to have attained at least a grade 12 qualification; those with only lower qualifications were not considered. They also reported that the VCTs were not specifically meant for people with impairments or disabilities but actually open to the general public; it was therefore very competitive to gain admission. These findings are consistent with other research done in Namibia. According to Kiek et al (2016), there is a lack of accessible and adequate vocational education and training programmes, especially in rural areas, which have led to shortcomings in meeting the demands of the national labour market. Lang (2008) also reported on the gross inadequacy in the provision of vocational rehabilitation while analysis by Eide (2012) linked the high levels of unemployment of people living with disabilities to their poor access to VCTs. Similar findings have also been reported in an HIC. In Australia Gabbe et al (2014) found limited access to VCTs as being linked to failure in return to work following RTI. The authors described the scenario as *“a tiered access where appropriate work rehabilitation and other return to work services are not guaranteed, particularly in the absence of injury compensation”* (Gabbe et al: p 1450).

A positive finding regarding VCTs reported by Lang (2008) was that there was recognition in national policy for the need for vocational rehabilitation and training to provide and equip people living with disabilities to effectively compete within the labour market. This resulted



in the amendment of the National Vocational Training Act (1994) so that all vocational training programs were fully accessible to people living with disabilities. However, Kiek et al (2016) found that trainees with disabilities were often regarded as being incapable, dependent, of low intelligence and in need of a cure or special services and support at all times and are consequently seen as a burden, especially at the government-funded centres with less experience in inclusion. *“They assume the intake of trainees with disabilities implies a special approach, with additional time and resource investments required to meet their needs. Discriminating behaviour towards trainees with disabilities can therefore lead to a loss of motivation in learning, through poor self-esteem or a feeling of shame”* (Kiek et al, 2016: p 72). Adding to this, Kiek et al (2016) also reported that the entry tests held to select trainees for enrolment pose a major barrier for trainees with disabilities, with the tests usually not accommodating the individual needs of trainees with disabilities thus many people living with disabilities are rejected because of their scores in the entry tests.

VCTs are important in Namibia because of the high rates of road injuries. They would facilitate those no longer able to do the same type of work to re-train in other fields and take up other forms of employment. This is particularly relevant in Namibia as it has been reported that many of those injured in RTIs have blue collar jobs often involving manual labour. Based on the fact that even minor road injuries are often associated with chronic pain, these individuals may not be able to resume work in their old jobs.

However, the VCTs have high entry points, therefore many individuals are already excluded as most of the blue collar workers have lower educational attainments. The Namibian

government has to be lobbied to increase the availability of VCTs as well as to make them accessible to those with lower educational qualifications. This would not only help road injury survivors, but all people living with disabilities, as it is acknowledged that they have lower educational levels than the general population (NSA, 2016).

### **7.17 SOCIAL PROBLEMS**

Results of this study show that RTIs are associated with on-going social problems. The majority of injured participants reported a decline in their social lives and reported various social problems including social isolation, losing friends, and family neglect. Those with more severe injuries, specifically those with obvious disabilities following the injury (such as wheelchair users), reported a greater decline in social life. In contrast, the only person reporting that her social life was good reported a very good family support network and was still living with her parents, who were providing for her financially.

A major problem is that these social problems can negatively affect their physical and mental health. According to Tough et al (2017), health-related sociological research has consistently shown that social relationships can have a substantial impact on health and social isolation, with conflicting social relationships exerting significant adverse effects on health and survival.

The main reasons given for the decline in social interactions was a lack of accessible public transport, lack of access to public places and buildings, and stigma. Similarly, HCWs reported that road injuries were associated with various social problems, with societal stigma being a prominent problem in Namibian society. These results highlight a significant societal problem affecting not just road survivors, but also all people living with disabilities.

Having read other studies, my findings are not surprising. I could not find any literature specifically related to those who develop long-term disability related to RTIs in Namibia, however there is literature on this issue with regard to people living with disabilities from all causes, including road injuries. As noted in section 1.10, the NSA reported that people living with disabilities remain one of the most marginalised groups. They still endure the worst forms of social stigma in their communities, with many being hidden by their family members because, according to some beliefs, deformation is a shame (NSA, 2016).

Implementation of laws to enhance the lives of people living with disabilities has been sluggish, thus worsening the country's record on being inclusive to citizens living with disability and they are typically overlooked (NSA, 2016). Adding to this, Namibia's overall social environment is hostile towards people living with disabilities, with lay language often still discriminatory and mocking, including frequent use in professional discourse of words such as 'crippled' and 'wheel-chair bound' which focus on the negative aspects and overshadow people's abilities and potential (Smith, 2017). Similarly Haihambo and Lightfoot (2010) found that in different parts of the country, people living with disabilities were not addressed by their names but rather by their disability and derogatory names that

symbolized uselessness and/or inhumanity. Rejection of people living with disabilities was also reported as common, often leading to the point of physical or emotional abuse (Haihambo and Lightfoot, 2010). Similarly, Kiek et al (2016) found that people living with disabilities in Namibia are often perceived as a burden, lacking skills and abilities, and sometimes equated with children.

Haihambo and Lightfoot (2010) surmised that the sluggish implementation of laws to improve equal opportunities for people living with disabilities in schools and the community is down to sociocultural factors, such as cultural myths and beliefs, which are affecting the implementation of these policies. Similarly, Kiek et al (2016) reported that the reason may be because negative cultural beliefs continue to prevail in the country. Persons who become disabled or develop impairments are perceived as being cursed or possessed by evil spirits, which can lead to excluding or even violent behaviour towards them becoming more acceptable (Kiek et al, 2016). However contrary to this, Smith (2017) reports that one expert, who has worked closely with people living with disabilities, reported that policies are not being implemented mainly due to lacklustre efforts from policymakers to the extent that there has been no progress to ensure that people living with disabilities have equal access and opportunities in Namibia.

These reports and the findings from this study call for more to be done to reduce stigma and to improve the social lives of road injury survivors and all other people living with disabilities. Increased employment opportunities would help to increase their visibility and to dismantle negative stereotypes of them being useless. Improved access to public

transport public place such as malls will also help to improve their visibility in society and could foster community cohesion. Increased media awareness of their plight and educational campaigns could also help to reduce negative stereotypes.

Sexuality is likely to be a problem area affecting many people with road injuries, especially those with severe injuries. It is also possible that even those with minor and moderate injuries may have physical restrictions, pain, reduced libido, and in males - erectile dysfunction, which renders them unable to function in such a way. For example, in the study, one of the participants who had become quadriplegic following the road crash reported that due to the injury, his relationship with girlfriend had changed and he had needed to receive psychiatric input. Interviews with HCWs revealed that they had struggled to talk about this with their patients and they expressed a need for this to be addressed in health training. It is also likely that inability in sexual activity contributes to the burden of mental ill health that is experienced by road injury survivors. This is likely to be a similar situation in other countries in SSA but I could not find any literature related to this in SSA with regards to road injuries: this is another potential area for research.

## 7.18 ACCESS TO EDUCATIONAL SERVICES FOLLOWING ROAD INJURY

A very concerning finding in this study was that HCWs reported that the educational prospects of students affected by road injuries, especially children who became permanently disabled, were affected. HCWs reported that many of children with severe injuries were unable to go back to school following a road injury due to lack of accessible schools and disabled bathrooms. For example one of the HCWs reported that in her experience, 70% of children injured in road crashes were not able to go back to school. Mirroring the responses of HCWs, some of those injured as students reported they had been unable to continue in education. Of my interview sample, three people had been injured as students and one of these was unable to complete her course due to the injury.

As expected, those who had already finished their studies or were past school-going age at the time of injury reported having educational attainment comparable with the general population. This is something relevant to RTIs, which is a pattern differing from the broader disability population.

Comparing these results showing the educational prospects of students to be affected by road injuries with other research that has been conducted in Namibia, these findings seem to be consistent. Although I could not find any literature specific to children injured in road crashes in Namibia, there is comprehensive literature on people living with disabilities from all causes, including RTIs. Results from a survey by Eide et al (2003), found that the proportion of people living with disabilities who had never attended school was twice as

high compared with able-bodied people. Although it could be argued that many years have passed since the study by Eide et al (2003), and this situation may have improved, more recent findings show the same trends. Although the government of Namibia passed a National Inclusive Education policy (Lang, 2008), the latest disability report showed that 82% of disabled children aged over five had never attended school in rural areas, and 18% of disabled children in urban areas had never attended school (NSA, 2016). Lang (2008) concluded that in the vast majority of cases, children with disabilities, especially in rural areas, invariably did not attend school.

A likely reason why children injured in road injuries who become permanently impaired or disabled are not able to go back to school is stigma. VSO (2016) reported that, despite the Ministry of Education having some commitment towards inclusive education, physical and attitudinal barriers (among teachers, family and the community) prevent disabled children from attending school. Within the family unit, children with disabilities often suffer neglect and parents have poor expectations as they cannot visualise their child with disabilities achieving independence (Kiek et al, 2016). As such, education is often denied to children with disabilities and consequently, due to not participating in primary education, any secondary education or vocational training will be out of reach for them (Kiek, et al, 2016). Similarly in their study, Haihambo and Lightfoot (2010) found that disability was sometimes associated with a sense of uselessness, and little sense of a need to invest in persons with disabilities, particularly in family or community settings with many parents having a desire for the institutionalisation of children with disabilities.

Contrary to my findings and these reports from other researchers in Namibia, none of the studies done in HIC children highlighted any barriers to children and students being able to continue in education following a road injury. This is likely because of progressive steps made to make all schools inclusive in HICs (WHO, 2011b). According to the United Nations Children's Fund (UNICEF) an inclusive education system provides children who develop impairments and disabilities through RTIs a fair chance to go to school and learn and fulfil their potential (UNICEF, 2017). The children, if segregated into special schools, do not get a fair educational chance and are further isolated from society (UNICEF, 2017). However in Namibia, although steps have been taken to make education inclusive (Lang, 2008; VSO, 2016), there have been problems and this is another reason why children injured in RTIs have difficulties with continuing in education.

According to Lang (2008) and Smith (2017), the Namibian government has not been able to establish an effective administrative infrastructure, in connection with appropriate training for teachers working in mainstream schools, for the principles of inclusive education to become an effective reality within Namibia. On the other hand, the options for parents wanting to send their children to schools that cater for various disabilities, physical and mental, are limited (Smith, 2017). Thus, parents have limited options of schools to send children with disabilities.

It is also likely that many mainstream schools do not have wheelchair accessible entrances and toilets. Physical access to school buildings is an essential prerequisite for educating children with disabilities (WHO, 2011b). Having a policy that all mainstream school be



adapted such that ramps and wheelchair friendly toilets would be installed would be a big step towards improving inclusiveness in education. Another big advantage of this is that having more children with disabilities attending mainstream education would help improve their visibility, which will help to reduce stigma in society with regards to disability. In fact, UNICEF (2017) recommends countries to collect data about disability to make children with disabilities visible and mark progress towards inclusive education. This will also help fellow young children to be normalised to being around people living with disabilities and viewing them as fellows and equals, which would help in the long-term to also suppress the negativity and myths associated with disability in Namibian society.

Another reason for children injured in RTIs not being able to go to school is also due to transport difficulties. In the next section I discuss transport difficulties in detail but in summary, there are transport difficulties in Namibia faced by those with mobility problems, and/or using aids, and they routinely need to pay higher fees to access public transport. According to the WHO (2011b), children with physical disabilities are likely to face difficulties in travelling to school. Adding to this, children of parents from lower socio-economic groups are likely to be worse affected in Namibia. This is because their parents do not own private cars to transport them, and due to the unaffordable higher costs of transport, will end up being possibly pulled out of school, which also highlights another socio-economic consequence of RTIs. To address this, more research is necessary to investigate the reasons why children injured in RTIs are not able to go back to school. The MVAFA is not making any provision for transport needs for non-medical issues, and this is another aspect where they could be lobbied to provide funding for transport to school.

## 7.19 ACCESS TO TRANSPORT SERVICES FOLLOWING ROAD INJURY

Most people injured in RTIs often have restrictions with navigating around their communities. In my study, both sets of interviews revealed that road injury survivors with mobility problems have severe problems with transport. As expected, wheelchair users reported the most severe problems. Only one of those interviewed drove, and the rest were dependent on public transport to get around. They reported that the only reliable form of public transport for them were taxis. One of the participants reported that Windhoek City Council had introduced a wheelchair accessible bus. However she reported that it was limited in capacity and only travelled during peak hours and on a specific route, meaning it was very difficult to access. Participants explained the difficulty they had in accessing taxis, explaining they were often ignored by taxi drivers and, if taken, were overcharged.

Surprisingly, it was reported by both sets of interviewees that even hospital transport was not accessible and the injured, when going to and from the hospital, needed to be lifted by other people to get on and off the transport. HCWs also revealed that hospital bus drivers would sometimes refuse to take wheelchair users, such that they would have extended stays in hospital. The findings in this study correspond with research done in Namibia and highlight that transport is a key issue for road injury survivors who become physically disabled and other people living with disabilities. The findings in my study also match those of Kohler et al (2016) in Malawi. Participants interviewed by the researchers reported how reaching, boarding, and riding minibuses was difficult, uncomfortable, and often not feasible after their injury because of the limited space in crowded buses. They also reported that public transport was not friendly for people with injuries and recounted negative

interactions and altercations with minibuss drivers as a result of their needs and requests (Kohler et al, 2016). Studies in HICs have also shown that severe RTI survivors such as those with spinal cord injury have difficulty with accessing appropriate public and private transport (Barclay et al, 2016; Christie et al, 2017; Carpenter et al, 2007). For example Christie et al (2017) reported that many wheelchair users reported difficulty with accessing transport. Christie et al (2017) report that although many governmental organisations have passed laws to ensure public transport and taxis are accessible, *“research suggests more could be done by transport providers (such as taxi companies) to ensure accessible, available, reliable and reasonably priced services are available for people with mobility impairments”* (Christie et al, 2017: p 90). Another important consideration in terms of RTIs is that those injured have a sudden onset of injuries, thus it is not only that the transportation system is weak, but a reorientation of their expectations based on their new disability status is required.

I could not find literature in Namibia with regards to accessibility of transport specifically for those with long-term road injuries, however there is information on this with regards to all people with physical disabilities including road injuries. The country has a law with regards to the accessibility to transport services and guidelines to make them accessible to all people with disabilities (NSA, 2016). However, according to Madejski et al (2014), due to a lack of reliable and comprehensive public transportation such as public bus services, taxis and minibuses are the main modes of transportation in Namibia to travel within and between the urban centres, with the majority of people dependent on these.

In a study on inclusion of persons with disabilities in Namibia commissioned by the German Development Cooperation, Kiek et al (2016) established that for wheelchair users and other people with mobility problems, access to these services is severely limited due to numerous environmental barriers. This leads to a considerable restriction of their mobility as the taxis and minibuses have not been adapted to their needs and the accessibility for physically-impaired persons using a wheelchair is low due to the lack of storage space in the vehicles or higher prices for transporting a wheelchair (Kiek et al, 2016). Consequently this has various negative implications for their participation in society (such as limited access to health facilities, public places, education services, and workplaces). Kiek et al (2016) also identified that existing taxi ranks are not accessible because of sandy surfaces and high kerbs, with only a few disability-friendly car parks available. The situation in rural areas is reported to be worse. *“In villages, public transport is mainly based on the use of pickups (called bakkies), which are especially unsuitable for physically and visually-impaired persons. There are no alternative modes of transportation such as public buses that could ensure the mobility of persons with disabilities”* (Kiek et al, 2016: p 84). Many public facilities (e.g. hospitals) and shopping malls do not allow taxi drivers to enter their car parks. Passengers with disabilities are therefore dropped off at taxi ranks outside of the location and have difficulties entering the facilities (Kiek et al, 2016).

The experiences of the injured road survivors, that I interviewed, with taxi drivers are also similar to the findings of Kiek et al (2016). Kiek et al (2016) reported the attitudes of taxi and minibus drivers as another major obstacle for people living with disabilities with accessing transport and reported many of the drivers as lacking awareness and knowledge of how to

address the needs of people living with disabilities and showing different forms of discriminating behaviour. Drivers often refused the use of their service to people living with disabilities, especially those using wheelchairs, and were afraid of taking responsibility for passengers with impairments and simply ignored them (Kiek et al, 2016). When drivers did accommodate people living with disabilities in their vehicles, their behaviour was often offensive in that they charged too much money, offered no help while entering or leaving the vehicle, and people living with disabilities were often not dropped at the requested destination (Kiek et al, 2016).

In my study, only one person was driving but was, however, doing so without a licence. She outlined she has been trying for many years to no avail to get a licence and there was no clear government protocol for those with spinal injuries. In the UK and other HICs, schemes such as personal independence payments allow people living with disabilities to access disabled friendly cars and enhance help for people living with disabilities to gain independence. This is something the MVAFF could do to assist people such as this woman. The fact that there is no protocol is itself indicative that some matters concerning people living with disabilities are not adequately addressed and Namibian Transport Information and Regulatory Services (who regulate road licenses) must be lobbied to address this scenario.

This findings show that the Namibian government and policy makers have to prioritise accessible transport for those who have been injured in RTIs and other people living with disabilities in order to improve their access to transport. Limitations in accessing transport

undoubtedly prevent them from accessing essential services they require, such as health, welfare and education services. This also limits them from being able to access public spaces such as shopping centres, malls, and other community services and thereby increases their social isolation, which is likely to impact negatively on their mental health. These sentiments are in line with those of Christie et al (2017) who report that social support after injury is important and the ability to travel connects people to not just health services but also their social networks and enables them to access this support. Diminished access to transport can lead to social isolation which negatively affects the health and wellbeing of injury survivors. *“When a person's mobility is, or becomes restricted this can lead to social exclusion and poor health outcomes”* (Christie et al, 2017: p 85). In addition, increased visibility of people living with disabilities in community places is likely to help to reduce societal stigma and discrimination. Inevitably, it also limits them from being able to travel to workplaces and therefore limits their ability to contribute to the economy. In section 7.15 I discussed how many of the injured individuals I interviewed reported facing financial hardships. The higher charges they have to pay for using public transport add to the financial difficulties they already face.

Having to pay higher fees for public transport is also another form of discrimination that they and other people living with disabilities face in Namibia. The government must be lobbied to put legal penalties for this unofficial system. A suggestion could be penalties being applied to taxi drivers who overcharge. But a problem with this could be that drivers would then completely ignore people living with disabilities. A long-term solution to this would be the establishment of a disabled-friendly public transport system. Although it could

be argued this would be costly, this would be a long-term investment and could also lead to reduction in transport fees and the also the reduction of RTIs, as taxi and minibuses are known to take risks on the roads and drive too fast in order to make as many trips as possible and maximise profits (Madejski, 2014).

Another solution to the problems of transport faced by RTI survivors with long-term disability and people living with disabilities would be for them to be issued with travel concessions. For example, in the UK, those with mobility restriction can apply for “Freedom Passes”, which are travel concessions which allow them to access public transport services for free. This undoubtedly enhances the access to transport of many people living with disabilities, empowers them and gives them independence to not depend on other people to drive them to places, without any cost restrictions. In most countries in SSA, the overall findings in my study are likely to be similar because taxis and minibuses are the main form of transportation and there is a general lack of accessible public transport services. Again, in most countries in SSA, speeding of minibuses and taxis is a big problem and a regulated, accessible public service is an investment which could not only improve access to transport of road injury survivors and other people living with disabilities, but also transform the economies, and also result in a reduction in RTIs.

Transport and lack of access to buildings were also listed as significant problems to maintaining a social life. Not only will improved access to buildings and transport enhance the employment prospects of road injury with severe injuries but also improve their social well-being, which will undoubtedly lead to improved quality of life. Several of the

participants, especially the wheelchair users, reported being limited in terms of access to social places like malls and shopping areas.

## **7.20 ACCESS TO BUILDINGS FOLLOWING ROAD INJURY**

Similar to transport, both sets of interviews revealed that access to buildings for those with lower limb and other mobility impairments was a problem in Namibia, especially for wheelchair users. The injury survivors reported being limited in terms of the places they could get to; having to make enquiries in advance about the accessibility of buildings; needing to travel with another person so that they could be carried up steps (which exposed them to further injury); and also lamented the lack of accessible toilets in public places. The injured survivors also reported on the lack of accessible housing. As highlighted in section 1.10, Namibia has a law with regards to the accessibility to buildings.

However similar to this study, research by Keik et al (2016) found that the lack of access to many public buildings, shopping malls, churches and private houses is one of the biggest environmental barriers for people living with disabilities to participate in daily life in Namibia. Stairs are still a major problem and many facilities have no ramps and lifts to improve access, such that the connectivity and accessibility to public services such as health care and education facilities is insufficient, especially in rural areas (Kiek et al, 2016).



Shockingly, it was also revealed in my study that access even to some key government buildings with offices relevant to people living with disabilities was limited, with inadequate entry facilities for them. For example, one participant reported that the building in which she had to go to in order for the disability grant to be processed was not accessible. Similarly, Van Rooy et al (2012), in a study which investigated the structural-environmental barriers to accessing health facilities for people living with disabilities, found that those with lower-limb disability and in wheelchairs had difficulties accessing entrances and narrow pathways in health centres. In this study, the lack of disabled friendly toilets was also found to be a huge problem for many people living with disabilities (Van Rooy et al, 2012).

These findings inevitably raise questions about how committed the government is to the National Policy on Disability of 1997 if state buildings do not meet the required standards. Additionally, an important link showing accessibility to buildings affected the employment opportunities of injury survivors and other people living with disabilities with mobility problems was made by the HCWs.

Similarly, Kiek et al (2016) also found that poor physical accessibility was a major problem with VCTs. *“A major problem in several training institutions is poor physical accessibility. Buildings are not adapted to the different needs of trainees with physical disabilities such as ramps, elevators or accessible toilets. At present, buildings are still constructed without considering accessibility regulations or internationally accepted practices (such as universal design)”* (Kiek et al, 2016: p 72). Similarly in this study some HCWs has also reported that

Namibia was still using old (pre-independence) regulations for the construction of buildings, which did not fully consider the accessibility of people living with disabilities.

These results suggest that the National Policy on Disability is in most instances being overlooked. There is a need for the Namibian government to be lobbied to ensure that building standards improve and the policy is abided to in all construction such that access for all citizens is guaranteed. Improved access to transport and buildings will help people with mobility problem following RTI injuries as well as other people living with disabilities will help to improve their lives. They will have improved access to health and other social services and thus have improved health outcomes which will in turn help to improve national health indicators. They will be less isolated and have access to leisure activities which will improve their mental health and quality of life. They will integrate better in society, will have greater visibility and this will lead to reduced stigma. Employers may be less likely to discriminate against people living with disabilities because the facilities they will need will already be in place and thus they will not fear the costs related with adaptive changes. Having more people living with disabilities in employment will help to break the cycle of poverty and foster visibility of wheelchair users and foster community engagement and reduce inequality and improve the economy. Having adaptations in places will also help to reduce the risks of those with movement restrictions sustaining further injury.

## 7.21 STRENGTHS AND LIMITATIONS OF STUDY

A major strength of this study is that the quantitative data that was analysed was the most comprehensive data on RTIs in Namibia. Unlike previous reports that were published by NRSC, this data not only contained data for police reports, but also data from calls made to the national accident call centre, and data from claimants involved in RTIs. Another strength is that this data is national level data, and was likely to be more accurate than some of the other studies on RTIs in Africa which have been based on, for instance, data from a specific hospital or a specific area within a region. According to Adeloje et al (2016), registry-based reports in SSA may grossly underestimate the burden of RTIs while population-based studies, which consistently report a higher fatality rate, are more reliable. As such, with the data in this study I can make more generalisations. An additional strength to my study is that, most studies on the long-term impact of road injuries have used Quality of life measurements. Instead of using these, I expanded on the Quality of life measures, adapting these and additional questions into a qualitative component of the study, which allowed both insight and a voice to road injury survivors. As a qualitative study, this approach has revealed nuances and complexities that could have been overlooked with quantitative methods such as Quality of life measurements and thus provides information useful to policy makers.

In terms of limitations, although the data used in this study was at national level, there were some instances where data was missing. This marginally reduces the validity of the findings and the ability to make generalisations as the data is not completely representative of the entire population. Added to this, it is highly probable that they were not all that occurred,

particularly for crashes and for minor injuries, in Namibia over this period. The biggest limitation was the lack of exposure data, which made it not possible to calculate injury or fatality rates per trip, per billion kilometers travelled, or per million hours of travel, which would have given a much more accurate reflection of risk for different travel modes and different age groups and by gender. An additional major limitation was that the hospital data set lacked a case number and as such, it was not possible to merge this with the crash standard report and the casualty report. This would have allowed for greater analysis on injuries. Another limitation was that the hospital data was also lacking important details. For example, injuries were classified by general groups such as orthopaedic but there was no indication of body site affected and the type of injury, such as upper limb fracture or traumatic head injury. This limited my ability to analyse the injury severity. Another limitation to the research is that the qualitative interviews had a total of 35 participants. Although such a sample size is not unusual for qualitative studies, it is not possible to generalise for the whole populations that were sampled.

## 7.22 CONCLUSION TO CHAPTER

In this chapter I have discussed the findings from the quantitative and qualitative studies and compared these findings with other research that has been done in Namibia, SSA and globally in order to draw upon possible reasons for the results. The findings from this study show that RTIs are a major - and largely overlooked - public health issue in Namibia. The major findings discussed were that the rates of RTIs are increasing in Namibia, with vulnerable road users, including pedestrians, passengers, and the elderly, being worse affected. I went on to discuss the role the MVAf is playing in terms of providing for the health needs of road injury survivors and the role they are playing in doing this when compared with survivors of other causes of injury in Namibia, and also other road injury survivors in SSA. In summary, the qualitative data show that the MVAf is an important innovative approach - however there are still gaps in the system. I also discussed the availability of rehabilitation and counselling services to road injury survivors: these have been shown to be lacking and unequally distributed for a variety of reasons. I have also discussed how RTIs have long standing health, economic and social impacts on those affected. An overarching theme highlighted is that road injuries are a socio-economic problem. Like most LMICs, Namibia has a pre-existing social context with regards to people living with disabilities and these factors affect road injury survivors who become permanently impaired and disabled. In the next chapter I will summarise the research and provide a conclusion as well as recommendations to improve policy, and recommendations for further study.

## 8.0 CONCLUSION

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### 8.1 INTRODUCTION

This thesis contributes to the discourse on RTIs, which are now a major global public health challenge and a leading cause of death, injury and long term long-term disability worldwide. However despite the extent of the problem and the fact they are preventable, they are a largely overlooked public health issue in most parts of the world and many countries have not budgeted for RTI research or prevention.

The thesis focused on Namibia, which is one of the countries with the highest rates of RTIs globally. In sections 1.1 and 1.8, I discussed about how much RTIs are now a major cause of injury and death in Namibia. I also discussed in sections 1.13 and 2.2 how despite the high rate of injuries and deaths in Namibia there has been very little research on RTIs. This study was motivated by this lack of research on RTIs in Namibia despite high rates of RTIs. The research was also necessitated by the little research and scarce knowledge on the long-term impact of RTIs; which is much worse in the SSA region, despite it being the region worst affected by RTIs. This study of RTIs in Namibia is important not just in itself but also because it reflects the anticipated transition from middle – to upper income country that many LMIC are in the process of undergoing. To my knowledge, this has also been the first study to look at the long-term impacts of RTIs in Namibia.

Because of the lack of research on long-term impacts of RTIs in Namibia and SSA, there is uncertainty about what happens to the people who become injured in RTIs and how their

injuries impact on their lives over time. There is also lack of clarity as to what levels of support they receive following these injuries in terms of accessing health care including post-trauma, rehabilitation and psychological support. As noted in section 1.1, in most countries in SSA, motor vehicle third-party liability (MTPL) insurance is used to fund for the health care costs of those injured in crashes, otherwise they have to pay for the costs from their own pockets (World Bank, 2009). However, MTPL has been noted to be problematic in various countries and it has been reported that many people are unable to access adequate medical care and rehabilitation following a road injury (World Bank, 2009). This undoubtedly leaves them vulnerable to not reaching full physical potential following injury and, unfortunately, also developing long-term impairment and disability as their injuries will not have been adequately managed with post-trauma care and rehabilitation. Namibia is one of five countries in SSA that uses a system whereby a fuel tax levy Fund has been set up. This Fund, titled the MVAf, is meant to provide support for road injury survivors in terms of funding for all medical costs, aids and appliances required, rehabilitation, and in the event of a serious injury, a lumpsum payment and a caregiver allowance.

I anticipated that the findings of this research could help to reduce the gap of knowledge on RTIs and long-term impact of RTIs in Namibia, and more broadly in SSA. I also anticipated that information on how the MVAf is affecting the lives of RTI survivors could be of benefit to other countries in SSA who have MTPL on the benefits of a motor levy funded system. Thus, given all the above, the aim of this study was to understand the impacts of RTIs for those affected in Namibia and to determine how the motor levy funded system was affecting their lives.

In order to achieve this, I initially investigated the trend of RTIs in Namibia, from 2012 to 2014, using quantitative methods. This involved analysis of data sets on RTIs over the specific years. The goal of this analysis was to characterise the crashes, injuries and deaths, the people affected, and also to examine the trends over this time period, with the understanding that this is a limited time span and in future, analysis of longer term trends would be of interest when such data becomes available. In addition to descriptive analysis, I also conducted calculations of rates of injury and death using several measures (outlined in section 4.5.1.1 and further to this, performed bivariate and multivariate multinomial logistic regression in order to investigate the effects of predictor variables on the likelihood of having been injured or killed, given involvement in a reported crash and the likelihood of having been killed, given transfer to hospital.

The analysis showed that rates of injury and death have risen over this period. This is in keeping with a rise that is regularly seen – and therefore might be predictable and preventable – as countries transition up the economic development ladder. The results also identified pedestrian and rollover crashes are the most prevalent, higher proportions of pedestrians and cyclists (vulnerable road users) having been killed or injured once involved in crashes, males having higher injury and death rates, the 30 to 39 age group having the highest injury rate, and the 80+ age group having the highest death rate. Logistic regression identified the road user group had the greatest risk of being injured and killed and confirmed the fact that vulnerable road users were at much higher risk of being injured or killed than car drivers.



The method of transportation to hospital had the greatest influence on the risk of having been killed among those admitted to hospital. Those transported by police and private cars and the 80+ age group were at highest risk of dying compared with the other factors analysed. A socio-economic aspect to RTIs in Namibia can be seen in the fact that most of those transported to hospital by police and private vehicles were in the remote regions, and had the greater risk of dying compared to the more urban regions, such as Khomas, where the highest proportion of people were transported to hospital by ambulance, and had the least risk of dying.

My concern was not just the statistics but also the human component of what RTI means to those who have been injured. To this end, I linked my statistical review with a qualitative component, conducting interviews with road injury survivors and HCWs involved in caring for them as well as health and disability specialists in Namibia in order to investigate the long-term impacts of RTIs and the availability of rehabilitation and counselling services to road injury survivors in the country.

This data showed that the MVAf is effectively helping to enhance access to rehabilitation and other health services for those injured in road crashes in Namibia. However, the findings also show that despite support from the MVAf, access to these services was limited by various factors including lack of services and personnel, and geographical location. To be more specific, those in remote rural areas were likely not having equal access to services and were more likely to have poorer outcomes in the long-term. Despite support from MVAf, and the government in the form of a disability grant for some, RTIs including minor

ones; are associated with long-term physical and mental health sequelae, financial hardships, a limit in employment opportunities, and various social problems.

The results also show that once injured, the costs related to the injuries to individuals and their families are high in physical, psychological, financial and social terms. Although no Quality of life measurements were taken and the study sample was relatively small, these results are in line with findings in HICs, which indicate that RTIs negatively impact the quality of life of those affected. The results identify a need for extensive Quality of life studies in order to enhance the knowledge on this subject in Namibia.

## **8.2 CONTRIBUTION TO KNOWLEDGE**

In sections 1.5 and 1.12 I discussed how there has been very little research on RTIs in Namibia with most of what is known on RTIs being from the reports produced by the NRSC. I also discussed the fact that the reports produced by the NRSC are based on police reports only. Therefore policymakers have likely been underestimating the severity of the problem which may explain why, as I discussed in section 7.2.1, road funding despite globally significant statistics, has been cut. In my study, the data analysed was at national level, and likely the most comprehensive data on RTIs in Namibia over that specific period as it not only included police data, but also data from calls made to the National Accident Call Centre, and data from claimants involved in RTIs. Therefore not only does this research add to the body of work on RTIs in Namibia and SSA, but these results provide a more accurate picture of the extent of the problem.

In addition to descriptive analyses of crashes, as explained in section 8.1, I also calculated specific rates and conducted regression analysis. For example, when looking at the numbers of people injured and killed, elderly people show the lowest absolute numbers. However, when considering the total population of that age group, they show the highest rates. To my knowledge, no comparable analysis has been done in any of the studies done in Namibia with the NRSC presenting absolute numbers of deaths and injuries for age, gender and road user groupings. Further to this, unlike any other studies on RTIs in Namibia, I have conducted bivariate and multivariate regression analysis and identified the groups with the greatest risks of being injured and killed such as pedestrians and cyclists. I could not find any comparable analysis in the previous reports and studies done in Namibia on RTIs. This new evidence adds to the understanding of RTIs in Namibia and presents new information which can be of use to policymakers in formulating policies to protect those groups who have been identified to be more vulnerable.

In section 1.5 I discussed the global scarcity of accurate data on the long-term health consequences of road-injuries with most research having concentrated on deaths, and having been done in HICs. To my knowledge, this has been the first research to explore the long-term impacts of road injuries in Namibia and one of few such national levels analysis of a country in SSA. It thus contributes to the global knowledge on this subject. More importantly, considering most of the research on long-term impact of RTIs have been done in HICs, the findings of this study presents information from a LMIC setting in SSA which has a significantly different geo-political and socio-economic contexts compared to HICs. The study has provided estimates of outcomes of serious RTI in Namibia, including economic and social costs, and the impact on individuals and families. The study also contributes

information to enable debate about societal context, culture and injury impact of traffic crashes. The findings contribute to the evidence required for generating future investments in RTI prevention and documenting non-fatal outcomes in LMICs settings in order to inform investment prioritisation. Thus, this study not only adds additional knowledge to the existing limited understanding of the long-term impacts on RTIs, but it also presents new knowledge from a LMIC setting; findings that allow a broader comparative international picture to emerge.

An important finding in this study was related to the MVAf. As explained in section 1.7, the MVAf is a parastatal body which was established by the government to provide a free insurance system for road injury survivors and is funded through a national fuel levy. The MVAf is helping many people injured in RTIs to access free health care and rehabilitation services following injury. Many of them would otherwise have difficulty in doing so due to costs - based on the reports of HCWs on the circumstances faced by people injured from comparable non-motor vehicle related causes.

Four other countries in SSA have this type of model. In most other countries in the world, there is MTPL. MTPL has however been shown to be problematic, as explained in section 7.11 in SSA. This is in line with a report by the World Bank (2009) which highlighted the fact that in countries where the system is used, reimbursement rates are low or non-existent; and many drivers do not enrol in MTPL schemes at all. As a result many people injured in traffic accidents are unable to access adequate medical care and rehabilitation following a road injury as they have to pay out-of-pocket for these. Therefore, my research shows that the MVAf model is one that is effective in enhancing the availability of health and rehabilitation

services for injured road survivors and could be applied to other SSA and other LMICs. This would improve access to the services significantly especially when considering the high numbers of people injured in RTIs in SSA, many of whom have no resources to pay out-of-pocket for health and rehabilitation costs following injury as with MTPL.

However there are some problems which have been highlighted with the system such as the individual funding cap. This cap doesn't take into account that RTIs often result in disability which is life long with permanent health needs and increased disability-related costs, especially for those with serious injuries. Therefore information from this study raises issues about the way the system operates and can be useful to policymakers in terms of enhancing the support the MVAf provides support to injured survivors.

### **8.3 IMPLICATIONS FOR POLICY AND PRACTICE, AND RECOMMENDATIONS**

In order for policy makers to come up with effective road safety policies, it is imperative that they have accurate and reliable statistics on crashes, injuries, deaths, and knowledge of which type of road users are most vulnerable. It is also been recommended by the WHO that countries have a lead agency having the authority and responsibility to make decisions, control resources, co-ordinate efforts, adopt a multi-sectoral approach, and adopt specific legislation to improve road safety. The scenario with regards to road safety in Namibia at this point does not reflect these recommendations. Currently there is an uncoordinated approach between different organisations and road safety being overseen by seven different ministries, and underreporting of RTIs; which likely has led to the cuts in road funding because policymakers are not aware of the actual burden of the problem.

Additionally, the NRSC has no regulatory power to enforce traffic laws. This has prevented the body from being able to impose WHO recommended 30 km/hr traffic speeds in urban areas. There has also been a lack of information on how RTIs impact people in the long-term.

## **Recommendations**

As highlighted above, the findings from this study present new information on RTIs in Namibia specifically regarding; road-user groups with the greatest risks of being injured and killed, the long-term impacts of road injuries in Namibia, and the factors related to availability of rehabilitation and counselling services following road injury. This information can enable policymakers in Namibia to transform practice in order to improve road safety as well as to improve the quality of life for those who are injured, or permanently disabled. From the findings, a set of recommendations are made here which could improve road safety in Namibia and also likely improve the outcomes of those injured in RTIs. Additionally, as noted in section 1.4 the WHO Plan for the Decade of Action recommended for countries to implement activities to improve road safety according to five pillars of the “safe system” approach. I also highlighted that in section 1.13 that Namibia launched its Chapter of the Decade of Action 2011-2020 in line with the WHO recommendations. Thus, the recommendations I will present will be framed around this “safe system” approach. These recommendations are targeted towards road safety authorities, public health authorities, policymakers, and civic society and could help generate discussion for them not only in Namibia, but also in countries with similar contexts especially in SSA.

## Recommendations to improve road safety

In line with pillars one, two, three and four: Road safety management, Safer roads and mobility, Safer vehicles, and Safer road users:

1. Coordination is needed, between different organisations and ministries in order for road safety to fall under one ministry which develops a national strategy and coordinates a public health approach to a road safety.
2. As the nominated lead agency for road safety, the NRSC must be given regulatory powers to enforce traffic laws and to ensure that funding is sufficient for activities to be implemented through as recommended by the WHO.
3. A series of measures that global data shows can make a significant reduction in RTI can be implemented quickly, using relatively little resources. These include:
  - Introducing a 30 km/hr speeding restriction to all urban areas.
  - Introduction of more pedestrian crossings.
  - Putting more humps to roads in order to reduce speeds.
  - Ensuring that when new roads are made, there is a consideration for pedestrians and cyclists, with pathways for these being mandatory.
4. Given the problems with underreporting of RTI deaths that I have highlighted due to police data only being captured, health/hospital data must included in RTI data collation and police should receive training on effective data collation on RTIs in order to establish and support effective data capturing and enhancing data systems for on-going monitoring and evaluation.

5. Given the magnitude of RTIs in Namibia and the lack of research on this that I have highlighted in this research, the National Commission on Research, Science and Technology, the University of Namibia, and the Namibia University of Science and Technology should be lobbied to prioritise research on RTIs and for government to be lobbied to support these institutions. This is crucial to establish and support national and local systems to measure and monitor road traffic deaths, injuries and crashes, intermediate outcomes like average speed, outputs of road safety interventions, and economic impact of road traffic injuries.
6. Considering the lack of policing highlighted in this report the Namibian government must be lobbied to fund more training for, and increase the number of, traffic police officers to in order to improve enforcement of traffic laws such as speeding and drink-driving.
7. Considering the high prevalence of roll-over crashes in this research, the Namibian government must be lobbied to adhere to the United Nations recommended regulation for all vehicles to have ESC which has been noted by the WHO to have proven effectiveness in crash avoidance.
8. Considering the high number of pick-ups identified in this research to be involved in crashes, the authorities in Namibia have to seriously consider outlawing the current practice whereby pick-ups can carry unrestrained passengers in the back which this research has shown is likely linked to higher death rates.



## **Recommendations to improve trauma care, access to rehabilitation for road injury survivors**

In line with pillar 5: Post crash response:

1. Given the lack of EMC services highlighted in this research and the high numbers of RTI injured who were shown to be transferred to hospital by the non-ambulance services in this research, the government, the University of Namibia, and the National University of Science and Technology have to be lobbied to expand the training of paramedics and trauma specialists in order to enhance EMC services throughout the country and improve coverage in remote areas as well as to evaluate the quality of care through the implementation of good practices on trauma care systems and quality assurance.
2. Considering that this research has shown that a considerable number of those injured in RTIs are transported by police to hospital, Namibian police should receive training in basic life support (first aid) to enhance the survival chances of those transported by police to hospital.
3. The training of adjunct multipurpose rehabilitation workers with basic training in a range of disciplines such as occupational therapy, physiotherapy, and speech therapy, or as profession-specific assistants that provide rehabilitation services under supervision. This will be crucial in order to provide early rehabilitation and support to injured patients and will enhance their potential for maximal recovery.

4. For rehabilitation practices to adopt Information and communications technology such as video appointments via phone in order to reach RTI survivors in more distant places.

### **Recommendations to improve access to psychological support for road injury survivors**

In line with pillar 5: Post crash response:

1. I have shown that access to psychological support is limited by the acute shortage of psychologists and other professionals trained to deliver counselling services. One clear solution would be the training of more of these staff.
2. Social workers are currently the ones providing most of the counselling services for road injury survivors, due to the shortages of trained personnel. This use of staff (even without any training in psychology/counselling) has been reported in research to have some efficacy. In Namibia, social workers along the other HCWs working with RTI injuries could be given more training to enhance their ability to deliver these services when necessary).
3. Peer support groups have also been shown to have efficacy in terms of providing psychological support following injury. In Namibia, aided by the MVAFA, regional peer support groups could be set up to support injury survivors.

## **Recommendations involving the MVAF**

In line with pillar 5: Post crash response:

1. For the MVAF to be lobbied to rethink longer term planning for those with life-long impairment and disability due to RTI. Currently while the MVAF answers many of the immediate medical needs and rehabilitative support efforts of RTI survivors, there is a significant problem for those whose on-going impairments and disabilities means that they will need life-long support. In these cases, the current individual financial caps are not answering the needs of the people affected. They often go without care or hesitate to get needed support out of fear that they will use all the financial support available to them. A system of assessing and planning for lifelong needs must be addressed for those who fit into this category. This will be a minority of all those supported by the MVAF, but they are currently a group that suffer disproportionately because of the lifetime cap.

## **Recommendations to improve the lives of RTI injury survivors**

In line with pillar 5: Post crash response:

1. For the Namibian Ministry of Labor and Social Welfare to reevaluate the level of the disability grant as this has been shown to be too low especially when considering the

difficulties faced by road injury survivors in finding employment and the general low levels of employment among people living with disabilities in Namibia.

2. For the Namibian government to provide encouragement and incentives for employers to hire and retain people with disabilities as recommended by the WHO.
3. There are also issues relevant to both survivors of RTI and the broader disability community that would benefit all – such as inclusive education and improving accessible transportation and ensuring building standards are maintained to enhance access for those with movement restrictions.

#### **8.4 LIMITATIONS OF RESEARCH**

Although the data used in this research was the most comprehensive data sets current available the findings are still limited because they were incomplete in some sections with missing variables such as age, gender and road user type as highlighted in Chapter 4. I aimed to make more in-depth analysis comparing the information contained in the crash data sets. This limits my ability to make comments on certain aspects of gender, age, road user type, types of crash for those who were injured as well as on types and severity of injuries incurred, and periods of hospitalisation. Linking crash information with hospitalisation records was not possible as there was no common case number to link to the files. This information would have allowed me to provide more analysis linking the severity of injured with the crash types and road user types. In addition, it was also my goal to present a detailed description of the road injuries incurred, such as lower limb fracture, cervical fracture. However, this was not possible because the injuries were given more general

labelling such as orthopaedic and neurologic, which do not allow comprehensive understanding of injury severity.

I also initially intended to conduct a survey on people injured in crashes reported in the quantitative data sets. However this was not possible as explained in sectioned 4.3. Instead, I was able to carry out interviews on people who had been injured in RTIs over various years. This relatively small sample size means that, although the experiences shared by the participants were an invaluable source of information and evidence, their experiences cannot be generalised to the entire population of those injured in RTIs in Namibia.

## **8.5 RECOMMENDATIONS FOR FURTHER STUDY**

This research has identified a number of gaps in the literature with regards to RTIs in Namibia. I thus have some recommendations for further research:

1. Although I speculated on the likely socio-economic groups of the vulnerable road users, based on literature from Namibia and research from other LMICs, I did not investigate the socio-economic backgrounds of those injured. There is need for a study on this in Namibia in order to paint a clearer picture for policymakers that the poorer groups in society are worst affected by RTIs and that policy changes have to be made to protect voiceless vulnerable groups, such as pedestrians and cyclists.
2. I also recommend a Quality of life survey on RTI survivors in order to investigate the impact their injuries have had. In this study, I conducted qualitative interviews with a relatively small sample of injured individuals and the findings cannot be generalised

to the rest of those who have been injured in Namibia. However, there is a need for a large quality of life survey in order to awaken policy makers to the magnitude of the problem.

3. There is a high prevalence of roll-over crashes in Namibia. A study to understand why this is would be useful to provide evidence about how this most dangerous crash type can be reduced.

## **8.6 SUMMARY**

RTIs are a main cause of disability globally. In this thesis I have investigated RTIs in Namibia and how they impact those affected. These findings help to reduce the gap of knowledge on RTI and the related long-term impacts not only in Namibia but add to our understanding of this in SSA and more broadly, to the global discussion around RTI as a major public health concern. The findings have importance in that they also provide new information which can be used by policy makers, public health professionals and road safety bodies in not only enhancing road safety but also putting measures in place to improve the quality of life of those who are injured.

There has been very little research on RTIs in Namibia and I hope that this study will lead to further interest in and study of this subject.

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## APPENDICES

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### **Appendix 1.1: Principles associated with a safe system approach**

- The goal of a safe system is to ensure that accidents do not result in serious human injury
- The approach considers that human limitations - what the human body can stand in terms of kinetic energy - is an important basis upon which to design the road transport system, and that other aspects of the road system, such as the development of the road environment and the vehicle, must be harmonized on the basis of these limitations
- Road users, vehicles and the road network/environment are addressed in an integrated manner, through a wide range of interventions, with greater attention to speed management and vehicle and road design than in traditional approaches to road safety. When an individual does not collect their grant for a continuous period of three months, the grant will be stopped.
- This approach means shifting a major share of the responsibility from road users to those who design the road transport system. System designers include primarily road managers, the automotive industry, police, politicians and legislative bodies.
- However, there are many other players who also have responsibility for road safety, such as health services, the judicial system, schools, and nongovernment organisations.
- The Plan for the Decade also recognizes the importance of ownership at national and local levels, and of involving multiple sectors and agencies.
- Activities towards achieving the goal of the Decade should be implemented at the most appropriate level and the involvement of a variety of sectors (transport, health, police, justice, urban planning etc) should be encouraged.
- Nongovernmental organizations, civil society, and the private sector should be included in the development and implementation of national and international activities towards meeting the Decade's goals.
- Having road safety related legislation in place is essential. Such legislation should be harmonized among countries as much as possible. Therefore the major related United Nations international agreements and conventions should become the basis of global road safety legislation, as indicated in General Assembly resolutions and reports.
- Moreover, special attention should be given to the most vulnerable groups, those living in countries of conflict or where road safety is not embraced as a quality of life concept.

## **Appendix 1.2: Pillars of road safety**

### **Pillar 1: Road safety management**

Adhere to and/or fully implement UN legal instruments and encourage the creation of regional road safety instruments. Encourage the creation of multi-sectoral partnerships and designation of lead agencies with the capacity to develop and lead the delivery of national road safety strategies, plans and targets, underpinned by the data collection and evidential research to assess countermeasure design and monitor implementation and effectiveness.

Activity 1: Adhere to and/or fully implement the major United Nations road safety related agreements and conventions; and encourage the creation of new regional instruments similar to the European Agreement concerning the Work of Crews of Vehicles engaged in International Road Transport (AETR), as required, including: • Convention on Road Traffic, of 8 November 1968, aiming at facilitating international road traffic and at increasing road safety through the adoption of uniform road traffic rules; • Convention on Road Signs and Signals, of 8 November 1968, setting up a set of commonly agreed road signs and signals; • AETR, of 1 July 1970, to be used as a model the creation of regional legal instruments.

Activity 2: Establish a lead agency (and associated coordination mechanisms) on road safety involving partners from a range of sectors through: • designating a lead agency and establishing related secretariat; • encouraging the establishment of coordination groups; and • developing core work programmes.

Activity 3: Develop a national strategy (at a cabinet or ministerial level) coordinated by the lead agency through: • confirming long-term investment priorities; • specifying agency responsibilities and accountabilities for development and implementation of core work programmes; • identifying implementation projects; • building partnership coalitions; • promoting road safety management initiatives such as the new ISO traffic safety management standard ISO 39001; and • establishing and maintaining the data collection systems necessary to provide baseline data and monitor progress in reducing road traffic injuries and fatalities and other important indicators such as cost, etc. Activity 4: Set realistic and long-term targets for national activities based on the analysis of national traffic crash data through: • identifying areas for performance improvements; and • estimating potential performance gains.

Activity 5: Work to ensure that funding is sufficient for activities to be implemented through: • building business cases for sustained funding based on the costs and benefits of proven investment performance; • recommending core annual and medium-term budgetary targets; • encouraging the establishment of procedures for the efficient and effective allocation of resources across safety programs; • utilizing 10% of infrastructure investments for road safety; and • identifying and implementing innovative funding mechanisms.

Activity 6: Establish and support data systems for on-going monitoring and evaluation to include a number of process and outcome measures, including: • establishing and supporting national and local systems to measure and monitor road traffic deaths, injuries and crashes; • establishing and supporting national and local systems to measure and monitor intermediate outcomes, such as average speed, helmet-wearing rates, seat-belt wearing rates, etc.; • establishing and supporting national and local systems to measure and monitor outputs of road safety interventions; • establishing and supporting national and local systems to measure and monitor the economic impact of road traffic injuries; and • establishing and supporting national and local systems to measure and monitor exposure to road traffic injuries.

### **Pillar 2: Safer roads and mobility**

Raise the inherent safety and protective quality of road networks for the benefit of all road users, especially the most vulnerable (e.g. pedestrians, bicyclists and motorcyclists). This will be achieved through the implementation of various road infrastructure agreements under the UN framework, road infrastructure assessment and improved safety-conscious planning, design, construction and operation of roads.

Activity 1: Promote road safety ownership and accountability among road authorities, road engineers and urban planners by: • encouraging governments and road authorities to set a target to “eliminate high risk roads by 2020”; • encouraging road authorities to commit a minimum of 10% of road budgets to dedicated safer road infrastructure programmes; • making road authorities legally responsible for improving road safety on their networks through cost-effective measures and for reporting annually on the safety situation, trends and remedial work undertaken; • establishing a specialist road safety or traffic unit to monitor and improve the safety of the road network; • promoting the safe system approach and the role of self-explaining and forgiving road infrastructure; • Adhere to and/or fully implement the regional road infrastructure Agreements developed under the auspices of the United Nations regional commissions and encourage the creation of similar regional instruments, as required; and • monitoring the safety performance of investments in road infrastructure by national road authorities, development banks and other agencies.

Activity 2: Promoting the needs of all road users as part of sustainable urban planning, transport demand management and land-use management by: • planning land use to respond to the safe mobility needs of all, including travel demand management, access needs, market requirements, geographic and demographic conditions; • including safety impact assessments as part of all planning and development decisions; and • putting effective access and development control procedures in place to prevent unsafe developments.

Activity 3: Promote safe operation, maintenance and improvement of existing road infrastructure by requiring road authorities to: • identify the number and location of deaths and injuries by road user type, and the key infrastructure factors that influence risk for each user group; • identify hazardous road locations or sections where excessive numbers or severity of crashes occur and take corrective measures accordingly; • conduct safety assessments of existing road infrastructure and implement proven engineering treatments to improve safety performance; • take a leadership role in relation to speed management and speed sensitive design and operation of the road network; and • ensure work zone safety.

Activity 4: Promote the development of safe new infrastructure that meets the mobility and access needs of all users by encouraging relevant authorities to: • take into consideration all modes of transport when building new infrastructure; • set minimum safety ratings for new designs and road investments that ensure the safety needs of all road users are included in the specification of new projects; • use independent road safety impact assessment and safety audit findings in the planning, design, construction, operation and maintenance of new road projects, and ensure the audit recommendations are duly implemented.

Activity 5: Encourage capacity building and knowledge transfer in safe infrastructure by: • creating partnerships with development banks, national authorities, civil society, education providers and the private sector to ensure safe infrastructure design principles are well understood and applied; • promoting road safety training and education in low-cost safety engineering, safety auditing and road assessment; and • developing and promoting standards for safe road design and operation that recognize and integrate with human factors and vehicle design.

Activity 6: Encourage research and development in safer roads and mobility by: • completing and sharing research on the business case for safer road infrastructure and the investment levels needed to meet the Decade of Action targets; • promoting research and development into infrastructure safety improvements for road networks in low-income and middle-income countries; and • promoting demonstration projects to evaluate safety improvement innovations, especially for vulnerable road users.

**Pillar 3: Safer vehicles**

Encourage universal deployment of improved vehicle safety technologies for both passive and active safety through a combination of harmonization of relevant global standards, consumer information schemes and incentives to accelerate the uptake of new technologies.

Activity 1: Encourage Member States to apply and promulgate motor vehicle safety regulations as developed by the United Nation’s World Forum for the Harmonization of Vehicle Regulations (WP 29).

Activity 2: Encourage implementation of new car assessment programmes in all regions of the world in order to increase the availability of consumer information about the safety performance of motor vehicles.

Activity 3: Encourage agreement to ensure that all new motor vehicles are equipped with seat-belts and anchorages that meet regulatory requirements and pass applicable crash test standards (as minimum safety features).

Activity 4: Encourage universal deployment of crash avoidance technologies with proven effectiveness such as Electronic Stability Control and Anti-Lock Braking Systems in motorcycles.

Activity 5: Encourage the use of fiscal and other incentives for motor vehicles that provide high levels of road user protection and discourage import and export of new or used cars that have reduced safety standards.

Activity 6: Encourage application of pedestrian protection regulations and increased research into safety technologies designed to reduce risks to vulnerable road users.

Activity 7: Encourage managers of governments and private sector fleets to purchase, operate and maintain vehicles that offer advanced safety technologies and high levels of occupant protection.

**Pillar 4: Safer road users**

Develop comprehensive programmes to improve road user behaviour. Sustained or increased enforcement of laws and standards, combined with public awareness/education to increase seat-belt and helmet wearing rates, and to reduce drink-driving, speed and other risk factors.

Activity 1: Increase awareness of road safety risk factors and prevention measures and implement social marketing campaigns to help influence attitudes and opinions on the need for road traffic safety programmes.

Activity 2: Set and seek compliance with speed limits and evidence-based standards and rules to reduce speed-related crashes and injuries.

Activity 3: Set and seek compliance with drink-driving laws and evidence-based standards and rules to reduce alcohol-related crashes and injuries.

Activity 4: Set and seek compliance with laws and evidence-based standards and rules for motorcycle helmets to reduce head-injuries.

Activity 5: Set and seek compliance with laws and evidence-based standards and rules for seat-belts and child restraints to reduce crash injuries.

Activity 6: Set and seek compliance with transport, occupational health and safety laws, standards and rules for safe operation of commercial freight and transport vehicles, passenger road transport services and other public and private vehicle fleets to reduce crash injuries.

Activity 7: Research, develop and promote comprehensive policies and practices to reduce work-related road traffic injuries in the public, private and informal sectors, in support of internationally recognized standards for road safety management systems and occupational health and safety.

Activity 8: Promote establishment of Graduated Driver Licensing systems for novice drivers.

**Pillar 5: Post crash response**

Increase responsiveness to post-crash emergencies and improve the ability of health and other systems to provide appropriate emergency treatment and longer-term rehabilitation for crash survivors.

Activity 1: Develop prehospital care systems, including the extraction of a victim from a vehicle after a crash, and implementation of a single nationwide telephone number for emergencies, through the implementation of existing good practices.

Activity 2: Develop hospital trauma care systems and evaluate the quality of care through the implementation of good practices on trauma care systems and quality assurance.

Activity 3: Provide early rehabilitation and support to injured patients and those bereaved by road traffic crashes, to minimize both physical and psychological trauma.

Activity 4: Encourage the establishment of appropriate road user insurance schemes to finance rehabilitation services for crash survivors through: Introduction of mandatory third-party liability; and International mutual recognition of insurance, e.g. green card system.

Activity 5: Encourage a thorough investigation into the crash and the application of an effective legal response to road deaths and injuries and therefore encourage fair settlements and justice for the bereaved and injuries.

Activity 6: Provide encouragement and incentives for employers to hire and retain people with disabilities.

Activity 7: Encourage research and development into improving post-crash response.

### Appendix 1.3: Benefits provided by the MVAf

Benefit type	
Medical Benefits	An individual injured in a road crash is eligible for up to a maximum of N\$1,500,000 which provides for medical treatment, injury management, rehabilitation and life enhancement.
Injury Grant	The Fund provides an injury grant to the value of up to N\$100 000.00. This is a cash grant that serves as compensation for injury for any injured person, with certain limitations and exclusions <sup>1</sup> .
Funeral Grant	The Fund provides a funeral benefit to the value of N\$7 000.00 for any person who died in a road crash in Namibia.
Loss of Income	Loss of income may be claimed by a survivor of a road crash and is limited to N\$ 100 000.00, with certain limitations and exclusions.
Loss of Support	Loss of support may be claimed by a dependent of a deceased and is limited to N\$ 100 000.00, with certain limitations and exclusions.

Source (MVAf, 2018)

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-claims should be lodged with the Fund within one year from the date of crash.

-The allocation given to each individual is dependent on the severity of injury. However the Fund is permitted by law to spend a maximum of N\$1.5 million on medical treatment to any injured person depending on the severity of injuries.

-if a driver is deemed to be at fault in a road crash, the benefits awarded are limited to medical benefits only and no other benefits are given to that individual.

-the benefits of passengers travelling at the back of bakkies (mini trucks) are also limited because these vehicles are not designed as vehicles for the transportation of passengers and are not fitted with safety belts. The person will voluntarily assume risk by occupying such a vehicle which might increase the severity of the injuries sustained.

-foreigners are limited to medical treatment and injury management for the period they are in Namibia. In addition they are entitled to N\$ 7000.00 Funeral Grant if the person is killed in a road crash in Namibia. However, a foreigner qualifies for all other benefits if such a person is in possession of a valid work or study permit on the date of a crash. The allocation given to each individual is dependent on the severity of injury. However the Fund is permitted by law to spend a maximum of N\$1.5 million on medical treatment to any injured person depending on the severity of injuries.

### Appendix 3.1 Objective One inclusion and exclusion criteria and search terms

Search terms	Inclusion criteria	Exclusion criteria
1: Road + injury or crash or collision or casualty or accident or incident 2: 1 + Africa 3: 1 + factors or severity 4: 2 + factors or severity	-Studies conducted in Namibia and SSA -Studies reporting on factors associated with RTCs and RTIs -Studies/Articles reported in English or with English translations	-Studies not reporting on factors associated with RTCs and RTIs -Studies/Articles not in English or without English translations -Abstracts without accompanying manuscripts

### Appendix 3.2 Objectives two and three inclusion and exclusion criteria and search terms

Search terms	Inclusion criteria	Exclusion criteria
1: injury + sequale/ or consequences/ or impact/ or outcomes 2: Road + 1 3: Unintentional/traumatic injury + injury 4: 3 + 1	-Studies/Articles reported in English or with English translations -Studies reporting on unintentional injuries including those sustained in road crashes -Studies conducted globally	-Studies/Articles not in English or without English translations -Abstracts without accompanying manuscripts

## **Appendix 4:1: Semi-structured Questionnaire for injured survivors**

### **Part A: Demographic Information**

<b>Age</b>	
<b>Gender</b>	
<b>Level of education</b>	
<b>Type of injury</b>	
<b>Severity of injury</b>	
<b>Current employment status</b>	
<b>Pre-injury employment status and occupation</b>	
<b>Area/Region</b>	

### **Part B: Injury, hospitalisation, rehabilitation and costs**

1. When were you involved in an RTI?
2. Did you receive any emergency care?
  - 2a. If so, can you tell me more about this?
3. Were you hospitalised?
  - 3a. If so, how were you transported to hospital?
- 3b. For how long was the period of hospitalisation?
4. Following discharge, did you receive any follow-up treatment?
  - 4a. If yes, can you tell me more about this?



5. Following the injury, did you receive any medical rehabilitation, either in hospital or once back in the community?
  - 5a. If yes, can you tell me more about this and how many sessions of treatment you had ?
  - 5b. If not, could you tell me why you did not have any medical rehabilitation?
6. Did you receive any post-trauma psychological care/counselling?
  - 6a. If so, could you tell me more about this?
7. Did the injury require you to use any mobility aids?
8. If so, where you able to access these aids?
  - 8a. If so, could you tell more about the process of acquiring them?
- 8b. If not, what were the reasons that that prevented you from being able to access them?
9. Following the injury, were any changes/adaptations required to be made to your home environment?
  - 9a. If so, were these done?
  - 9b. If yes, could you tell me more about the process?
  - 9c. If not, why were the changes/adaptations not carried out?
10. Where there any costs related to the medical care and rehabilitation of your injury/ies?
11. If yes, could you tell me more about how these costs have been met?

**Part C: Health status and well-being**

1. Can you tell more about any changes to your health status since sustaining the injury?
2. How is your current health status in terms of pain levels, mental health, physical and overall well-being?
  3. Has the injury had any effect on your ability to carry out ADLs such as personal care?
    - 3a. If so, could you tell me more about this?
  4. Has your ability to move around the community been affected by the injury such as walking, using public transport?
    - 4a. If so, can you tell me more about this?
5. Has the injury had any effects on your lifestyle and social life?
  - 5a. If so, could you tell me more about them?
6. Has the injury affected how you relate with family members, friends and the wider community?

- 6a. If so could you tell me more about this?
- 7. How have you coped with the injury?
- 8. Has the injury had any effect on your behaviour in terms of drinking or using recreational drugs?

**Part D: Employment, loss of income and vocational rehabilitation**

- 1. Were you employed/studying before the injury?
- 1a. If so, what type of work were you doing?
- 2. What is your current employment status?
- 3. Has the injury had any effects on your employment situation or prospects?
- 3a. If yes, could you tell me more about this and whether there have been any opportunities to train to do other types of work?
- 4. Has the injury had any effects on your personal and household income?
  - 4a. If yes, could you please tell me more about this?
- 5. Did you need to sell any family property or take any loans following the injury?
  - 5a. If yes, could you tell me more about this?
- 6. Following the injury, have you had any financial and/or social-welfare support?
  - 6a. If so, could you tell more about it and the sources who have provided this?
  - 6b. If not, could you tell me some of the reasons?

**Are there any other issues/comments regarding this subject that I haven't asked about but you think is important for me to know?**

## **Appendix 4:2: Semi-structured Questionnaire for HCWs and advocates**

### **Part A: Demographic Information**

<b>Age</b>	
<b>Gender</b>	
<b>Level of education</b>	
<b>Profession</b>	
<b>Number of years worked</b>	
<b>Current position</b>	
<b>Level of position</b>	
<b>Area/Region</b>	

1. Could you tell me more about your professional background and job?
2. How long have you been with this organisation?
3. How is the organisation involved in road safety in Namibia?
4. Are you aware of any other organisations involved in road safety in Namibia?
  - 4a. If yes, could you tell me more about these organisations and how they are involved in road safety?

### **Part B: Magnitude of RTIs and access to rehab following injury**

1. Can you tell me about road-injuries in Namibia?
2. Are they regarded as a public health problem in Namibia?
  - 2a. If so, could you tell me more about this?

3. Does your service provide any care to road-injury survivors?
  - 3a. If so, could you tell me more about the severity and type of injuries that you mostly encounter?
4. Are you aware of any other services which provide rehabilitation to people with road-injuries?
  - 4a. If so, could you tell me about these?
5. Could you tell me more about the proportions of road-injury survivors needing rehabilitation who do receive this in Namibia?
6. Are there any differences between rural and urban areas and regional differences?
  - 6a. If so, could you tell me more about this?
7. Are there any gender and age differences?
  - 7a. If so, could you tell me more about them?
8. Are you aware of any barriers that limit people from road injuries from accessing rehabilitation services?
  - 8a. If so, could you tell me more about them?

**Part C: Aids, long-term impairment and disability**

1. Could you tell me more about the availability of gait aids and provision of household adaptations to those who require them following a road injury?
2. Once someone has been involved in a serious RTI, is there any long-term follow-up on their situation and condition?
  - 2a. If so, could you tell me more about this?
3. Are there any statistics as to how many people sustain permanent impairments or become disabled due to RTIs each year?
  - 3a. If so, could you tell me about these figures and how the information is collected?
  - 3b. If not, could you be aware of the reasons this information is not available?
4. Are there any statistics as to the total proportion of people living with permanent impairment/disability due to RTIs?
  - 4a. If so, could you tell me more about the levels?
5. Are you aware of any long-term impacts of RTIs on those who sustain permanent impairment/disability?
  - 5a. If so, could you tell me more about them?

6. Are there any measures in place to support those who have sustained long-term impairments and permanent disability?
  - 6a. If so could you tell me more about these?
  - 6b. Could you also tell me about any regional differences or rural/urban differences if they exist?

**Part D: Employment, loss of income and vocational rehabilitation**

1. Do road-injuries have any impact on the employment situations/prospects of survivors?
  - 1a. If yes, could you tell me more about this?
2. Do they have any effect on personal and household income?
  - 2a. If yes, could you explain further?
3. Are there any vocational rehab services for those unable to maintain same jobs due to disability?
  - 3a. If yes, could you tell me more?

**Part E: Psychological and social support**

1. Following road injury, do survivors receive any psychological support/counselling?
  - 1a. If so, could you tell me about this?
2. Are there any social welfare schemes in place to support them and family members?
  - 2a. If so, could you tell me about them?

**Are there any other issues/comments regarding this subject that I haven't asked about but you think is important for me to know?**

**Appendix 5.1: Road crashes in Namibia, 2012-2014**

Year	Crashes (N)	Registered vehicles (N)	Estimated population (World Bank, million)	Crashes/1,000 registered vehicles	Crashes/10 <sup>6</sup> Vehicle km travelled (VKT)	Crashes/10 <sup>5</sup> population
2012	3,800	275,504	2.264	13.8	4.7	167.8
2013	4,105	286,292	2.317	14.3	5.1	177.2
2014	4,305	306,701	2.371	14.0	5.3	181.6
<i>Total</i>	<i>12,210</i>	<i>868,497</i>	<i>2.317 (mean)</i>	<i>14.1</i>	<i>5.0 (mean)</i>	<i>175.5 (mean)</i>
% change 2012 to 2014	+13.3	+11.3	+4.7	+1.4	+12.8	+8.2

crashes ( $\chi^2 (2) = 31.8, p = 0.05$ )

injuries ( $\chi^2 (2) = 24.8, p = 0.05$ );

deaths ( $\chi^2 (2) = 7.9, p = 0.05$ )

**Appendix 5.2: Injuries and deaths due to RTIs in Namibia, 2012-2014**

Year	Individuals involved in crashes				Injury rate per 100 reported crashes	Injuries per 1,000 registered vehicles	Injuries per 10 <sup>6</sup> Vehicle km travelled (VKT)	Injuries/10 <sup>5</sup> population	Death rate per 100 reported crashes	Deaths per 1,000 registered vehicles	Deaths per 10 <sup>6</sup> Vehicle km travelled (VKT)	Deaths/10 <sup>5</sup> population
	Non-injured (N)	Injured (N)	Killed (N)	All (N)								
2012	3,179	6,546	601	10,326	172	23.8	8.1	289.1	15.8	2.2	0.7	26.5
2013	3,711	6,762	677	11,150	164	23.6	8.4	291.8	16.4	2.4	0.8	29.2
2014	3,799	7,121	698	11,618	165	23.2	8.8	300.3	16.2	2.3	0.9	29.4
Total	10,689	20,459	1,976	33,094	167	23.6	8.4 (average)	293.7 (average)	16.2	2.3	0.8 (average)	28.4 (average)

<i>% change 2012 to 2014</i>	+19.5	+8.8	+16.1	+12.5	-4.0	-0.8	+3.7	+3.9	+2.5	+4.5	+28.6	+1.1
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### Appendix 5.3: Descriptions of individuals included in the datasets

	<b>Crash, not injured</b> N (%)	<b>Injured</b> N (%)	<b>Killed</b> N (%)	<b>Total</b> N (%)
<b>Road user group</b>				
Driver	6,578 (59)	4,196 (37)	438 (4)	11,212 (100)
Motorcyclist	1 (3)	32 (82)	6 (15)	39 (100)
Cyclist	17 (5)	317 (86)	35 (9)	369 (100)
Passenger	2,599 (18)	10,786 (76)	856 (6)	14,241 (100)
Pedestrian	101 (3)	2,795 (80)	593 (17)	3,489 (100)
Other	15 (27)	39 (71)	1 (2)	55 (100)
<b>Vehicle type</b>				
Bus	792 (30)	1,744 (66)	112 (4)	2,648 (100)
Motorcycles	59 (22)	190 (71)	19 (7)	268 (100)
Sedans	4,434 (35)	7,669 (61)	689 (5)	12,792 (100)
SUVs	431 (34)	760 (60)	73 (6)	1,264 (100)
Pick-ups	3,809 (32)	7,522 (62)	772 (6)	12,103 (100)
Vans	79 (32)	142 (59)	21 (9)	242 (100)
Trucks	733 (33)	1,306 (58)	194 (9)	2,233 (100)
<b>Gender</b>				
Male	7,928 (36)	12,855 (58)	1,432 (6)	22,215 (100)
Female	1,673 (18)	7,145 (76)	531 (6)	9,349 (100)

<b>Age group</b>				
0-17	338 (13)	2,022 (77)	257 (10)	2,617 (100)
18-29	1,962 (23)	5,883 (70)	540 (7)	8,385 (100)
30-39	2,521 (33)	4,669 (61)	460 (6)	7,650 (100)
40-49	1,443 (33)	2,625 (60)	276 (7)	4,344 (100)
50-59	752 (32)	1,425 (60)	196 (8)	2,373 (100)
60-69	298 (30)	584 (60)	97 (10)	979 (100)
70-79	79 (23)	222 (64)	47 (13)	348 (100)
80+	20 (19)	59 (56)	26 (25)	105 (100)
<b>Region</b>				
Khomas	2,926 (35)	5,195 (62)	228 (3)	8,349 (100)
Ohangwena	423 (31)	826 (61)	116 (8)	1,365 (100)
Omusati	307 (27)	725 (64)	100 (9)	1,132 (100)
Kavango	259 (22)	723 (63)	168 (15)	1,150 (100)
Oshikoto	711 (30)	1,476 (62)	179 (8)	2,366 (100)
Oshana	684 (30)	1,466 (64)	147 (6)	2,297 (100)
Erongo	977 (30)	2,085 (64)	175 (6)	3,237 (100)
Otjozondjupa	1,005 (33)	1,831 (59)	250 (8)	3,086 (100)
Caprivi	179 (32)	309 (56)	66 (12)	554 (100)
Kunene	300 (32)	552 (59)	81 (9)	933 (100)

Hardap	540 (33)	994 (60)	116 (7)	1,650 (100)
Karas	361 (32)	680 (61)	80 (7)	1,121 (100)
Omaheke	269 (29)	604 (64)	69 (7)	942 (100)
<b>Day of week</b>				
Monday	1,176 (32)	2,243 (62)	209 (6)	3,628 (100)
Tuesday	1,068 (33)	2,016 (61)	209 (6)	3,293 (100)
Wednesday	1,010 (33)	1,816 (60)	205 (7)	3,031 (100)
Thursday	1,115 (31)	2,270 (63)	203 (6)	3,588 (100)
Friday	1,560 (32)	2,961 (62)	283 (6)	4,804 (100)
Saturday	1,657 (31)	3,327 (62)	376 (7)	5,360 (100)
Sunday	1,356 (30)	2,835 (63)	290 (7)	4,481 (100)
<b>Method of transportation to hospital once injured in crash</b>				
Private vehicle	N/A	2,177		
State ambulance	N/A	5,201		
Private ambulance	N/A	5,803		
Police	N/A	1,017		

**Appendix 5.4: Vehicles involved in road crashes in Namibia, 2012-4**

Type of vehicle	Crashes (N)	% (95%CI)	Injuries (N)	Deaths (N)	Injury rate per 100 reported crashes	Death rate per 100 reported crashes
Sedans	6,725	48.0 (47.2-48.9)	7,669	689	114	10.3
Pick-ups	4,765	34.0 (33.3-34.8)	7,522	772	158	16.2
Trucks	1,012	7.2 (6.8-7.7)	1,306	194	129	19.2
Bus	583	4.2 (3.8-4.5)	1,744	112	299	19.2
SUVs	560	4.0 (3.7-4.3)	760	73	136	13.0
Motorcycles	240	1.7 (1.5-1.9)	190	19	792	7.9
Vans	112	0.8 (0.7-1.0)	142	21	127	18.8
<i>Total</i>	<i>13,997</i>	<i>100</i>	<i>19,333</i>	<i>1,880</i>	<i>138</i>	<i>134.3</i>

**Appendix 5.5: Distribution of vehicle occupants involved in crashes, injured, and killed in Namibia, 2012-4 by vehicle type**

Type of vehicle	Crashes, % (95%CI)	Injured, % (95%CI)	Killed, % (95%CI)
Bus	4.1 (3.8-4.5)	9.0 (8.6-9.4)	5.9 (4.9-7.1)
Motorcycles	16.9 (16.3-17.5)	1.0 (0.9-1.1)	1.0 (0.6-1.6)
Sedans	17.4 (16.7-18)	39.7 (39.0-40.4)	36.6 (34.5-38.9)
SUVs	3.9 (3.6-4.3)	3.9 (3.7-4.2)	3.9 (3.1-4.9)
Pick-ups	42.5 (41.1-43.8)	38.9 (38.2-39.6)	41.1 (38.9-43.3)
Vans	0.3 (0.2-0.4)	0.7 (0.6-0.9)	1.1 (0.7-1.7)
Trucks	14.9 (14.1-15.2)	6.8 (6.3-7.3)	10.3 (8.9-12.2)
<i>Total</i>	<i>100</i>	<i>100</i>	<i>100</i>

### Appendix 5.6: Distribution of road crash types in Namibia, 2012-2014

Type of crash	N	% (95%CI)
Collision with pedestrians	2,767	24.5 (23.7-25.3)
Roll-overs	2,681	23.8 (23.0-24.5)
Head Side collision	957	8.5 (8.0-9.0)
Head rear collision	690	6.1 (5.7-6.6)
Hit and run	538	4.8 (4.4-5.2)
Head-on collision	497	4.4 (4.0-4.8)
Collision with fixed object	362	3.2 (2.9-3.5)
Lost control	359	3.2 (2.9-3.5)
Collision with cyclist	346	3.1 (2.8-3.4)
Side wipe collisions	296	2.6 (2.3-2.9)
Fell from moving vehicle	250	2.2 (1.9-2.7)
Collision with animal (domestic)	245	2.2 (1.9-2.5)
Chain collision	214	1.9 (1.7-2.2)
Collision with wild animal	213	1.9 (1.7-2.2)
Burst tyre	182	1.6 (1.4-1.9)
Single vehicle overturned	85	0.8 (0.6-0.9)
Collision with quad bike	78	0.7 (0.6-0.9)
Side swipe: opposite direction	71	0.6 (0.5-0.8)
Sudden mechanical failure	43	0.4 (0.3-0.5)
Side swipe: same direction	40	0.4 (0.3-0.5)
Collision with train	11	0.1 (0.05-0.2)

Other/unknown	328	3.0 (2.5-3.5)
<i>Total</i>	<i>11,253</i>	<i>100</i>

**Appendix 5.7: Distribution of road crashes, injuries, and deaths by day in Namibia, 2012-4**

Day	Crashes		Injuries		Deaths		Injury rate per 100 reported crashes	Death rate per 100 reported crashes
	Number (N)	% (95% CI)	Number (N)	% (95% CI)	Number (N)	% (95% CI)		
Monday	1,557	12.8 (12.2-13.5)	2,243	12.8 (12.4-13.3)	209	11.8 (10.4-14.4)	114	13.4
Tuesday	1,439	11.7 (11.3-12.1)	2,016	11.5 (11.1-12.0)	209	11.8 (10.4-13.4)	140	14.5
Wednesday	1,393	11.4 (10.9-12.0)	1,816	10.4 (10.0-10.9)	205	11.5 (10.1-13.1)	130	14.7
Thursday	1,546	12.7 (12.1-13.3)	2,270	13.0 (12.5-13.5)	203	11.4 (10.0-13.0)	146	13.1
Friday	2,085	17.1 (16.5-17.8)	2,961	17.0 (16.4-17.5)	283	15.9 (14.3-17.7)	142	13.6
Saturday	2,297	18.9 (18.2-19.6)	3,327	19.0 (18.5-19.6)	376	21.2 (19.3-23.1)	144	16.4
Sunday	1,851	15.2 (14.6-15.9)	2,835	16.2 (15.7-16.8)	290	16.3 (14.7-18.1)	153	15.7



<i>Total</i>	12,168	100	17,468	100	1,775	100	143	14.6
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**crashes ( $\chi^2 (6) = 416.4, p = 0.05$ )**

**injuries ( $\chi^2 (6) = 733.2, p = 0.05$ )**

**deaths ( $\chi^2 (6) = 96.3, p = 0.05$ ).**

**Appendix 5.8: Distribution of injuries by day of week for each road user group, 2012-2014**

<b>Day</b>	<b>Cyclist, % (95% CI)</b>	<b>Drivers, % (95% CI)</b>	<b>Motorcyclist, % (95% CI)</b>	<b>Passengers, % (95% CI)</b>	<b>Pedestrians, % (95% CI)</b>
Monday	16.2 (12.5-20.8)	12.9 (11.8-14.1)	15.5 (13.4-18.0)	11.8 (11.0-12.7)	13.7 (12.8-14.7)
Tuesday	12.9 (9.6-17.2)	11.3 (10.3-12.4)	12.0 (10.1-14.2)	10.9 (10.1-11.7)	12.0 (11.4-12.9)
Wednesday	11.9 (8.7-16.1)	10.6 (9.6-11.7)	11.5 (9.6-13.6)	9.6 (8.9-10.4)	10.9 (10.1-11.8)
Thursday	13.9 (10.4-18.3)	13.1 (12.0-14.3)	13.3 (11.3-15.6)	13.0 (12.2-13.9)	12.9 (12.0-13.9)
Friday	17.9 (14.0-21.6)	16.3 (15.1-17.6)	15.5 (13.4-18.0)	18.3 (17.3-19.3)	15.8 (14.8-16.8)
Saturday	16.2 (12.5-20.8)	18.6 (17.3-19.9)	18.2 (15.8-20.7)	19.3 (18.4-20.3)	19.6 (18.6-20.8)
Sunday	10.9 (7.9-15.0)	17.2 (16.0-18.4)	14.1 (12.0-16.4)	17.0 (16.1-18.0)	15.1 (14.1-16.1)
<i>Total</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>

**Appendix 5.9: Distribution of deaths by day of week for each road user group, 2012-2014**

<b>Day</b>	<b>Cyclist, % (95% CI)</b>	<b>Drivers, % (95% CI)</b>	<b>Motorcyclist, % (95% CI)</b>	<b>Passengers, % (95% CI)</b>	<b>Pedestrians, % (95% CI)</b>
Monday	11.8 (4.4-27.8)	13.7 (10.6-17.5)	14.1 (9.9-19.7)	11.7 (9.2-14.7)	10.0 (7.8-12.6)
Tuesday	5.9 (1.4-21.0)	12.1 (9.2-15.7)	13.6 (9.5-19.2)	12.4 (9.8-15.6)	10.9 (8.7-13.6)
Wednesday	11.8 (4.4-27.8)	12.4 (9.4-16.0)	13.6 (9.5-19.2)	8.7 (6.6-11.5)	12.5 (10.2-15.4)
Thursday	17.6 (8.1-34.4)	11.1 (8.3-14.6)	10.6 (7.0-15.7)	10.9 (8.5-13.9)	11.7 (9.4-14.5)
Friday	17.6 (8.1-34.4)	13.4 (10.4-17.1)	16.7 (12.1-22.5)	18.1 (15.0-21.6)	15.3 (12.7-18.3)
Saturday	14.7 (6.2-31.1)	22.4 (18.5-26.8)	20.7 (15.6-26.9)	19.0 (15.9-22.7)	23.2 (20.0-26.6)
Sunday	20.6 (10-37.6)	14.9 (11.7-18.9)	10.6 (7.0-15.7)	19.2 (16.0-22.9)	16.4 (13.7-19.5)
<i>Total</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>

**Appendix 5.10: Distribution of road crashes, injuries and deaths in Namibia by month, 2012-2014**

Day	Crashes	Injuries	Deaths	Injury rates per 100 crashes	Death rate per 100 crashes
January	807	1,475	148	183	18.3
February	929	1,659	115	179	12.4
March	1,088	1,664	178	153	16.4
April	966	1,657	164	172	17.0
May	1014	1,618	162	160	16.0
June	1,039	1,557	151	150	14.5
July	1,100	1,761	191	160	17.4
August	1,136	1,926	198	170	17.4
September	978	1,638	170	167	17.4
October	1,014	1,780	154	176	15.2
November	990	1,555	142	157	14.3
December	1,149	2,169	203	189	17.7
<i>Total</i>	<i>12,210</i>	<i>20,459</i>	<i>1,976</i>	<i>168</i>	<i>16.2</i>

**crashes ( $\chi^2$  (11) = 83.6, p = 0.05)**

**injuries ( $\chi^2$  (11) = 199.6, p = 0.05)**

**deaths ( $\chi^2$  (11) = 42.8, p = 0.05)**

**Appendix 5.11: Place of death of individuals involved in road crashes in Namibia, 2012-2014, by road user group**

Road user group	At scene of crash, % (95% CI)	Being transported, % (95% CI)	At Hospital, % (95% CI)	Total (%)
Cyclists	75.9 (56.9-88.2)	0	24.1 (11.8-43.1)	100
Drivers	71.7 (67.0-75.9)	1.5 (0.7-3.3)	26.8 (22.7-31.4)	100
Motorcyclists	68.3 (61.1-74.7)	3.9 (1.9-8.0)	27.8 (21.7-34.8)	100
Passengers	68.6 (65.3-71.8)	3.9 (2.8-5.5)	27.5 (24.5-30.7)	100
Pedestrians	68.2 (64.0-72.2)	2.2 (1.2-4.0)	29.5 (25.7-33.7)	100

**Appendix 5.12: Method of transportation to hospital of individuals injured in road crashes in Namibia, 2012-2014, by road user group**

Road user group	Police % (95% CI)	Private Ambulance % (95% CI)	State Ambulance % (95% CI)	Private vehicle % (95% CI)	Total %
Cyclists	12.3 (8.8-17.0)	50.0 (43.8-56.1)	18.7 (14.3-24.0)	19.0 (14.7-24.4)	100
Drivers	14.8 (13.7-16.0)	39.5 (38.0-41.1)	13.8 (12.7-14.9)	31.9 (30.4-33.4)	100
Motorcyclists	15.6 (13.6-17.9)	49.9 (47.0-52.8)	18.0 (15.8-20.3)	16.6 (14.5-18.9)	100
Passengers	13.9 (13.0-14.9)	25.0 (23.8-26.2)	15.7 (14.8-16.7)	45.4 (44.0-46.7)	100
Pedestrians	12.3 (11.4-13.2)	39.4 (38.1-40.7)	13.8 (12.9-14.8)	34.5 (33.3-35.8)	100

**Appendix 5.13: Method of transportation to hospital of individuals injured in road crashes in Namibia, 2012-2014, by region**

Region	Police % (95% CI)	Private ambulance % (95% CI)	Private vehicle % (95% CI)	State ambulance % (95% CI)	Total, %
Khomas	0.5 (0.3-0.7)	82.9 (81.6-84.0)	6.0 (5.2-6.8)	10.7 (9.8-11.8)	100
Ohangwena	24.4 (21.2-27.9)	10.8 (8.6-13.4)	38.8 (35.0-42.6)	26.1 (22.8-29.7)	100
Omusati	24.2 (20.7-28.0)	1.1 (0.5-2.4)	40.6 (36.5-44.8)	34.1 (30.3-38.2)	100
Kavango	21.5 (17.2-26.5)	0	22.1 (17.8-27.2)	56.4 (50.7-61.9)	100
Oshikoto	5.1 (4.1-6.4)	21.7 (19.7-23.9)	8.5 (7.1-10.0)	64.7 (62.1-67.1)	100
Oshana	13.3 (11.2-15.7)	9.6 (7.8-11.7)	25.9 (23.1-28.9)	51.2 (48.0-54.5)	100
Erongo	1.0 (0.6-1.7)	59.0 (56.5-61.6)	8.4 (7.1-10.0)	31.5 (29.2-34.0)	100
Otjozondjupa	3.9 (2.1-7.2)	8.7 (5.8-12.8)	14.1 (10.4-19.0)	73.2 (67.4-78.3)	100
Caprivi	28.8 (23.2-35.3)	0.9 (0.2-3.7)	28.8 (23.2-35.3)	41.4 (35.0-48.1)	100
Kunene	19.4 (15.6-23.9)	1.4 (0.6-3.3)	20.6 (16.7-25.1)	58.6 (53.4-63.6)	100
Hardap	3.5 (2.3-5.2)	5.4 (3.9-7.4)	10.4 (8.3-12.9)	80.8 (77.6-83.6)	100
Karas	4.3 (2.8-6.7)	7.5 (5.4-10.3)	12.5 (9.7-15.9)	75.7 (71.5-79.5)	100
Omaheke	6.5 (4.5-9.4)	2.5 (1.3-4.6)	17.7 (14.3-21.8)	73.3 (68.8-77.4)	100

*The regions are presented in descending order, in terms of population size, with Khomas at the top as it contains the largest population*

#### Appendix 5.14: Regional distribution of people involved in crashes by travel mode

Region	Cyclists, % (95%CI)	Drivers, % (95%CI)	Motorcyclists , % (95%CI)	Passengers, % (95%CI)	Pedestrians , % (95%CI)	Regional total for all road users, % (95%CI)
Khomas	41.6 (36.5-46.8)	35.2 (34.3-36.2)	52.1 (49.3-55.0)	17.6 (16.8-18.5)	29.0 (27.9-30.1)	30.2 (29.6-30.7)
Ohangwena	2.6 (1.3-4.9)	4.5(4.1-4.9)	3.6 (2.7-4.9)	5.7(5.3-6.3)	5.0 (4.5-5.6)	4.8 (4.6-5.0)
Omusati	4.6 (2.8-7.3)	3.4 (3.1-3.8)	2.2 (1.5-3.2)	4.7 (4.3-5.2)	4.1 (3.7-4.7)	3.9 (3.7-4.2)
Kavango	8.2 (5.6-11.6)	2.9 (2.5-3.2)	6.4 (5.1-7.9)	4.2 (3.8-4.5)	5.6 (5.1-6.2)	4.0 (3.8-4.3)
Oshikoto	4.3 (2.6-7.0)	7.0 (6.5-7.5)	3.6 (2.6-4.8)	12.5 (11.8-13.3)	7.3 (6.7-8.0)	8.3 (8.0-8.6)
Oshana	8.8 (6.3-12.3)	9.4 (8.9-10.0)	10.7 (9.0-12.5)	6.2 (5.7-6.7)	9.3 (8.6-10.0)	8.1 (7.8-8.4)
Erongo	14.5 (11.2-18.6)	12.6 (11.9-13.2)	8.7 (7.2-10.5)	11.5 (10.8-12.2)	10.2 (9.5-11.0)	11.5 (11.1-11.8)
Otjozondjupa	4.6 (2.8-7.3)	10.0 (9.4-10.6)	3.6 (2.7-4.9)	13.4 (12.6-14.1)	11.3 (10.6-12.1)	10.9 (10.6-11.3)
Caprivi	2.6 (1.3-4.9)	1.9 (1.6-2.2)	2.0 (1.4-3.0)	1.9 (1.6-2.2)	2.3 (2.0-2.7)	2.0 (1.8-2.1)
Kunene	0.6 (0.1-2.3)	2.2 (1.9-2.5)	1.4 (0.8-2.2)	4.5 (4.0-4.9)	3.4 (3.0-3.9)	3.2 (3.0-3.5)
Hardap	3.7 (2.2-6.3)	5.2 (4.7-5.6)	2.9 (2.1-4.0)	7.5 (7.0-8.1)	4.6 (4.1-5.1)	5.8 (5.6-6.1)
Karas	3.1 (1.7-5.6)	3.5 (3.1-3.8)	2.0 (1.4-3.0)	5.5 (5.1-6.0)	3.6 (3.2-4.1)	3.9 (3.7-4.2)
Omaheke	0.6 (0.14-2.3)	2.2 (2.0-2.6)	0.8 (0.4-1.5)	4.6 (4.2-5.1)	3.9 (3.5-4.5)	3.3 (3.1-3.5)
<i>Total</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>

**Appendix 5:15: Regional distribution of crashes, population, area, and population density**

Region	Proportion of crashes, 2012-2014 (%)	Regional proportion of population (2011 National Census)	Area in square meters	Population density (2011 National census)/ per 1,000m <sup>2</sup>	Average crashes/1,000 m <sup>2</sup> , 2012-2014
Khomas	37.9 (37.0-37.8)	16.2	36,964	9.3	41.7
Ohangwena	4.7 (4.4-5.1)	11.6	10,706	22.9	18.0
Omusati	3.2 (3.0-3.6)	11.5	26,551	9.2	5.0
Kavango	4.4 (4.0-4.8)	10.6	48,742	4.6	3.7
Oshikoto	6.5 (6.0-6.9)	8.6	38,685	4.7	6.8
Oshana	9.3 (8.8-9.8)	8.3	8,647	20.4	43.8
Erongo	11.7 (11.1-12.2)	7.1	63,539	2.4	7.5
Otjozondjupa	8.0 (7.5-8.5)	6.8	105,460	1.4	3.1
Caprivi	1.9 (1.7-2.2)	4.3	14,785	6.1	5.3
Kunene	2.3 (2.1-2.6)	4.2	115,260	0.8	0.8
Hardap	4.6 (4.3-5.0)	3.8	109,781	0.7	1.7
Karas	3.3 (3.0-3.6)	3.6	161,514	0.5	0.8
Omaheke	2.1 (1.9-2.4)	3.4	84,981	0.8	1.0
<i>Total</i>	<i>100</i>	<i>100</i>	<i>825,615</i>	<i>17 466</i>	<i>(National)</i> <i>4.9</i>



**Appendix 5.16: Regional distribution of crashes, deaths and injuries**

Region	Crashes (N)	Injuries		Deaths		Injury rate per 100 reported crashes	Death rate per 100 reported crashes
		Number (N)	% (95%CI)	Number (N)	% (95%CI)		
Khomas	4,628	5,195	29.7 (29.1-30.4)	228	12.8 (11.4-14.5)	112	49.3
Ohangwena	577	826	4.7 (4.4-5.1)	116	6.5(5.5-7.8)	143	20.1
Omusati	398	725	4.2 (3.9-4.5)	100	5.6 (4.7-6.8)	182	25.1
Kavango	534	723	4.1 (3.9-4.4)	168	9.5 (8.2-10.9)	135	31.5
Oshikoto	788	1,476	8.5 (8.1-8.9)	179	10.1 (8.8-11.6)	187	22.7
Oshana	1,136	1,466	8.4 (8.0-8.8)	147	8.3 (7.1-9.7)	129	12.9
Erongo	1,423	2085	11.9 (11.5-12.4)	175	9.9 (8.6-11.3)	147	12.3
Otjozondjupa	975	1,831	10.5 (10.0-10.9)	250	14.1 (12.5-15.6)	188	25.6
Caprivi	234	309	1.8 (1.6-2.0)	66	3.7 (2.9-4.7)	132	28.2
Kunene	285	552	3.2 (2.9-3.4)	81	4.6 (3.7-5.6)	194	28.4
Hardap	565	994	5.7 (5.4-6.0)	116	6.5 (5.5-7.8)	176	20.5

Karas	406	680	3.9 (3.6-4.2)	80	4.5 (3.6-5.6)	167	19.7
Omaheke	261	604	3.5 (3.2-3.7)	69	3.8 (3.1-4.9)	231	26.4
<i>Total</i>	<i>12,210</i>	<i>17,466</i>	<i>100</i>	<i>1,775</i>	<i>100</i>	<i>143</i>	<i>14.5</i>

**Appendix 5.17: Regional distribution of injuries by specific road user**

Region	Cyclists, % (95%CI)	Drivers, % (95%CI)	Motorcyclists, % (95%CI)	Passengers, % (95%CI)	Pedestrians, % (95%CI)	Total, % (95%CI)
Khomas	4.3 (3.8-4.9)	26.8 (25.4-28.3)	57.9 (44.7-70.0)	19.2 (18.2-20.3)	33.9 (32.6-35.2)	29.7 (29.1-30.4)
Ohangwena	2.0 (0.9-4.4)	5.1 (4.4-5.8)	1.8 (0.2-11.6)	5.4 (4.9-6.1)	4.7 (4.1-5.3)	4.7 (4.4-5.1)
Omusati	3.6 (2.0-6.5)	4.1 (3.5-4.8)	1.8 (0.2-11.6)	4.7 (4.2-5.3)	3.9 (3.4-4.5)	4.2 (3.9-4.5)
Kavango	7.6 (5.1-11.2)	3.0 (2.5-3.6)	1.8 (0.2-11.6)	4.5 (4.0-5.0)	5.1 (4.6-5.8)	4.1 (3.9-4.4)
Oshikoto	3.6 (2.0-6.5)	7.9 (7.1-8.8)	3.5 (0.8-13.1)	12.3 (11.5-13.1)	6.3 (5.1-7.1)	8.5 (8.1-8.9)
Oshana	9.3 (6.5-13.1)	9.4 (8.5-10.4)	3.5 (0.8-13.1)	6.9 (6.3-7.5)	9.9 (9.1-10.8)	8.4 (8.0-8.8)
Erongo	16.2 (12.5-20.8)	15.1 (13.9-16.3)	12.3 (5.9-23.7)	11.4 (10.7-12.3)	10.2 (9.4-11.1)	11.9 (11.5-12.4)
Otjozondjupa	3.6 (2.0-6.5)	11.6 (10.6-12.7)	3.5 (0.8-13.1)	12.4 (11.6-13.2)	10.1 (9.3-10.9)	10.5 (10.0-10.9)
Caprivi	2.3 (1.1-4.8)	1.7 (1.3-2.2)	5.3 (1.7-15.2)	1.8 (1.4-2.2)	1.8 (1.5-2.2)	1.8 (1.6-2.0)
Kunene	0.3 (0.04-2.3)	2.6 (2.2-3.1)	1.8 (0.2-11.6)	4.2 (3.7-4.7)	2.6 (2.2-3.1)	3.2 (2.9-3.4)

Hardap	4.0 (2.3-6.9)	5.7 (4.9-6.5)	1.8 (0.2-11.6)	7.3 (6.7-8.0)	4.5 (4.0-5.1)	5.7 (5.4-6.0)
Karas	3.0 (1.6-5.6)	4.5 (3.8-5.2)	5.3 (1.7-15.2)	5.3 (4.8-5.9)	3.2 (2.8-3.8)	3.9 (3.6-4.2)
Omaheke	0.7 (0.2-2.6)	2.7 (2.2-3.3)	0	4.6 (4.1-5.2)	3.7 (3.2-4.3)	3.5 (3.2-3.7)
<i>Total (%)</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>

**Appendix 5.18: Regional distribution of fatalities by specific road user**

Region	Cyclists, % (95%CI)	Drivers, % (95%CI)	Motorcyclists, % (95%CI)	Passengers, % (95%CI)	Pedestrians, % (95%CI)	All road travel deaths, % (95%CI)
Khomas	17.6 (8.1-34.4)	12.9 (9.9-16.6)	0	7.4 (5.4-9.9)	13.8 (11.3-16.8)	12.8 (11.4-14.5)
Ohangwena	5.9 (1.4-21.0)	6.7 (4.6-9.7)	14.3 (1.7-62.1)	5.6 (3.9-8.0)	6.8 (5.0-9.0)	6.5(5.5-7.8)
Omusati	14.7 (6.2-31.1)	5.9 (4.0-8.8)	14.3 (1.7-62.1)	5.2 (3.6-7.5)	5.6 (4.1-7.7)	5.6 (4.7-6.8)
Kavango	17.6 (8.1-34.4)	4.4 (2.7-6.9)	14.3 (1.7-62.1)	7.2 (5.2-9.8)	11.6 (9.3-14.3)	9.5 (8.2-10.9)
Oshikoto	11.8 (4.4-27.8)	9.3 (6.8-12.6)	0	10.3 (7.9-13.2)	10.8 (8.6-13.5)	10.1 (8.8-11.6)
Oshana	2.9 (0.4-18.6)	10.6 (7.9-14.0)	0	4.7 (3.1-6.9)	9.5 (7.4-12.1)	8.3 (7.1-9.7)
Erongo	2.9 (0.4-18.6)	10.1 (7.4-13.5)	14.3 (1.7-62.1)	11.5 (9.0-14.5)	9.5 (7.4-12.1)	9.9 (8.6-11.3)
Otjozondjupa	11.8 (4.4-27.8)	15.2 (12.0-19.1)	28.6 (6.4-70.2)	20.4 (17.1-24.1)	10.9 (8.7-13.6)	14.1 (12.5-15.6)
Caprivi	5.9 (1.4-21.0)	3.1 (1.8-5.4)	0	3.7 (2.4-5.7)	3.9 (2.6-5.7)	3.7 (2.9-4.7)
Kunene	0	5.2 (3.3-7.9)	0	5.6 (3.9-8.0)	4.7 (3.3-6.6)	4.6 (3.7-5.6)
Hardap	2.9 (0.4-18.6)	8.0 (5.7-11.1)	0	8.3 (6.2-11.1)	5.0 (3.5-7.0)	6.5 (5.5-7.8)

Karas	5.9 (1.4-21.0)	5.7 (3.8-8.5)	0	4.7 (3.1-6.9)	4.2 (2.9-6.1)	4.5 (3.6-5.6)
Omaheke	0	3.1 (1.8-5.4)	14.3 (1.7-62.1)	5.4 (3.8-8.8)	3.9 (2.6-5.7)	3.8 (3.1-4.9)
<i>Total (%)</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>

**Appendix 5.19: Distribution of people involved in road crashes, injured and killed in Namibia, 2012-2014**

Year	Crashes		Injured		Death		Injury rate per 1,000 road users groups of same road user type	Death rate per 1,000 road users groups of same road user type
	Number (N)	% (95%CI)	Number (N)	% (95%CI)	Number (N)	% (95%CI)		
Cyclists	369	1.3 (1.1-1.4)	317	1.7 (1.6-1.9)	35	1.8 (1.3-2.5)	859.1	94.9
Drivers	11,212	38.1 (37.6-38.7)	4,196	23.1 (22.5-23.7)	438	22.7 (20.9-24.6)	374.2	39.1
Motorcyclists	39	0.13 (0.097-0.18)	32	0.6 (0.4-0.8)	6	1.0 (0.5-2.1)	820.5	153.8
Passengers	14,241	48.4(47.9-49.0)	10,786	59.4 (58.7-60.1)	856	44.4 (42.2-46.6)	757.4	60.1
Pedestrians	3,489	11.9 (11.5-12.2)	2,795	15.4 (14.9-15.9)	593	30.7 (28.7-32.8)	801.1	170.0
Other	55	0.2 (0.14-0.24)	39	0.2 (0.16-0.29)	1	0.05 (0.007-0.4)	709.1	18.2
<i>Total</i>	<i>29,405</i>	<i>100</i>	<i>18,165</i>	<i>100</i>	<i>1,929</i>	<i>100</i>	<i>617.8</i>	<i>65.6</i>

**Appendix 5.20: Casualty status of different groups involved in road crashes in Namibia, 2012-2014**

Casualty status	Cyclists, % (95%CI)	Drivers, % (95%CI)	Motorcyclists, % (95%CI)	Passengers, % (95%CI)	Pedestrians, % (95%CI)	Other, % (95%CI)
Not injured	4.6 (2.9-7.3)	58.7 (57.8-59.6)	2.6 (0.4- 16.4)	18.3 (17.6-18.8)	2.7 (2.2-3.3)	27.7 (17.1-40.1)
Injured	85.9 (82.0-89.1)	37.4 (36.6-38.3)	82.1 (66.6-91.3)	75.8 (75.1-76.5)	80.2 (78.9-81.5)	70.9 (57.5-81.4)
Deceased	9.5 (6.9-12.9)	3.9 (3.6-4.3)	15.4 (7.0-30.5)	6.0 (5.6-6.4)	17.0 (15.8-18.3)	1.8 (0.3-12.0)
<i>Total</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>



**Appendix 5.21: Gender distribution of people involved in road crashes, injured and killed in Namibia, 2012-2014**

	Crashes		Non-Injured		Injured		Deaths		Injury rate per 100 people of same gender involved in crashes	Death rate per 100 people of same gender involved in crashes	Injuries per 10 <sup>5</sup> population	Deaths per 10 <sup>5</sup> population
	Number (N)	% (95% CI)	Number (N)	% (95% CI)	Number (N)	% (95% CI)	Number (N)	% (95% CI)				
Female	9,349	29.6 (29.1-30.2)	1,673	17.4 (16.7-18.2)	7,145	35.7 (35.1-36.4)	531	27.1 (25.1-29.1)	76.0	5.7	214.4	16.0
Males	22,215	70.4 (69.8-70.9)	7,928	82.6 (81.8-83.3)	12,855	64.3 (63.6-64.9)	1,432	72.9 (70.9-74.9)	57.4	6.4	639.4	45.8
<i>Total</i>	<i>31,564</i>	<i>100</i>	<i>9,601</i>	<i>100</i>	<i>20,000</i>	<i>100</i>	<i>1,963</i>	<i>100</i>	<i>62.9</i>	<i>6.2</i>	<i>309.2</i>	<i>30.4</i>

**Appendix 5:22: Gender distribution of road users involved in road crashes, injuries and killed in Namibia, 2012-2014**

	Crashes				Injuries				Deaths			
	Female		Male		Female		Male		Female		Male	
	Number (N)	% (95% CI)	Number (N)	% (95% CI)	Number (N)	% (95% CI)	Number (N)	% (95% CI)	Number (N)	% (95% CI)	Number (N)	% (95% CI)
Cyclists	16	4.4 (2.7-7.0)	347	95.6 (92.9-97.3)	15	4.8 (2.9-7.8)	298	95.2 (92.2-97.1)	0	0	35	1
Drivers	1,151	10.6 (10.1-11.2)	9,668	89.4 (88.8-89.9)	606	14.7 (13.6-15.8)	3,528	85.3 (84.3-86.4)	26	6.0 (4.1-8.6)	409	94.0 (91.4-95.9)
Motorcyclists	5	12.8 (5.4-27.8)	34	87.2 (72.4-94.6)	5	15.6 (6.6-32.8)	27	84.4 (67.2-93.4)	0	0	6	100
Other	16	30.2 (19.3-43.9)	37	69.8 (56.1-80.7)	11	28.2 (16.2-44.3)	28	71.8 (55.7-83.8)	0	0	1	100
Passengers	6,013	43.2 (42.3-44.0)	7,914	58.8 (56.0-57.6)	4,767	44.8 (43.9-45.8)	5,867	55.2 (54.2-56.1)	330	38.8 (35.6-42.1)	521	61.2 (57.9-64.4)
Pedestrians	1,194	34.8 (33.2-36.4)	2,241	65.2 (63.6-66.8)	992	36.0 (34.3-37.9)	1,760	63.9 (62.1-65.7)	166	28.2 (24.7-32.0)	422	71.8 (68.0-75.2)

<i>Total</i>	8,395	100	20,241	100	6,396	100	11,508	100	522	100	1,394	100
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**Appendix 5:23: Gendered injury and death/crash rates of road users involved in crashes in Namibia, 2012-2014**

	Crashes		Injuries		Injury rate per 100 people of same gender and road user category involved in crashes		Deaths		Death rate per 100 people of same gender and road user category involved in crashes	
	Female (N)	Male (N)	Female (N)	Male (N)	Female	Male	Female (N)	Male (N)	Female	Male
Cyclists	16	347	15	298	93.8	85.9	0	35	0	10.1
Drivers	1,151	9,668	606	3,528	52.7	36.5	26	409	2.3	0.004
Motorcyclists	5	34	5	27	100.0	79.4	0	6	0	17.7
Other	16	37	11	28	68.8	75.7	0	1	0	2.1
Passengers	6,013	7,914	4,767	5,867	79.3	74.1	330	521	5.5	6.6
Pedestrians	1,194	2,241	992	1,760	83.1	78.5	166	422	13.9	18.8
<i>Total</i>	<i>8,395</i>	<i>20,241</i>	<i>6,396</i>	<i>11,508</i>	<i>76.2</i>	<i>56.9</i>	<i>522</i>	<i>1,394</i>	<i>6.2</i>	<i>6.9</i>

**Appendix 5.24: Age distribution of individuals involved in road crashes, injured and killed in Namibia, 2012-2014**

Age group	Crashes		Injuries		Deaths		Injury rate per 100 people of same age group involved in crashes	Injuries per 100,000 population	Death rate per 100 people of same age group involved in crashes	Deaths per 100,000 population
	Number (N)	% (95% CI)	Number (N)	% (95% CI)	Number (N)	% (95% CI)				
0-17	2,623	9.8 (9.4-10.1)	2,022	11.6 (11.1-12.0)	257	13.5 (12.1-15.1)	77.1	59.4	9.8	22.6
18-29	8,399	31.3 (30.7-31.8)	5,883	33.6 (32.9-34.3)	540	28.4 (26.5-30.5)	69.5	450.0	6.4	41.3
30-39	7,665	28.5 (28.0-29.1)	4,669	26.7 (26.0-27.4)	460	24.2 (22.3-26.2)	61.3	508.9	6.0	50.1
40-49	4,355	16.2 (15.8-16.7)	2,625	15.0 (14.5-15.5)	276	14.5 (13.0-16.2)	60.3	414.1	6.3	45.3
50-59	2,377	8.9 (8.5-9.2)	1,425	8.1 (7.8-8.5)	196	10.3 (9.0-11.8)	60.0	357.4	8.3	49.1
60-69	979	3.6 (3.4-3.9)	584	3.3 (3.1-3.6)	97	5.1 (4.2-6.2)	59.7	255.1	9.9	42.4

70-79	348	1.3 (1.2-1.4)	222	1.3 (1.1-1.4)	47	2.5 (1.9-3.3)	63.8	199.0	13.5	42.1
80+	105	0.4 (0.3-0.5)	59	0.3 (0.2-0.4)	26	1.4 (0.9-2.0)	56.2	163.5	24.8	72.1
Total	26,851	100	17,489	100	1,899	100	65.1		7.1	

#### Appendix 5.25: Severity of road injuries in Namibia, 2012-2014

	Number (N)	% (95% CI)	Injuries per 100 reported crashes
Slight	653	18.6 (17.4-19.9)	5.4
Moderate	2,112	60.2 (58.6-61.8)	17.3
Severe	741	21.1 (19.8-22.5)	6.1
Overall	3,506	100	6.0

#### Appendix 5.26: Type of road injuries in Namibia, 2012-2014

	Number (N)	% (95% CI)
Orthopedic	1,954	54.5 (52.8-56.1)
General surgical	922	25.7 (24.3-27.2)
Neurosurgery	587	16.4 (15.2-17.6)
Maxillo-Facial	80	2.2 (1.8-2.8)
Ophthalmological	13	0.4 (0.2-0.6)
Urological	5	0.1 (0.06-0.3)
ENT <sup>a</sup>	3	0.1 (0.0-0.3)
Gynaecological	2	0.1 (0.0-0.2)
Other	21	0.6 (0.4-0.9)
<i>Total</i>	<i>3,587</i>	<i>100</i>

<sup>a</sup> ENT: Ear, Nose, and Throat

**Appendix 5.27: Distribution of specific road injuries in Namibia, 2012-2014, by severity**

	Slight		Moderate		Severe		Total
	Number (N)	% (95% CI)	Number (N)	% (95% CI)	Number (N)	% (95% CI)	
Orthopedic	230	6.2 (5.1-7.4)	1,300	79.7 (77.7-81.6)	101	14.1 (12.5-15.9)	1,631
General surgical	216	29.8 (26.6-33.2)	136	51.4 (47.8-55.1)	373	29.8 (26.6-33.2)	725
Neurosurgery	7	1.5(0.7-3.2)	173	38.3 (33.9-42.9)	272	1.5(0.7-3.2)	452
Maxillo-Facial	5	7.4(3.1-16.8)	44	65.7 (53.5-76.0)	18	26.9 (17.6-38.7)	67
Ophthalmological	0	0	10	90.9 (53.6- 98.9)	1	9.1 (1.1-46.4)	11
Urological	0	0	2	66.7 (9.6-97.4)	1	33.3 (2.6-90.4)	3
ENT	1	100	0	0	0	0	1
Gynaecology	1	100	0	0	0	0	1



Other	6	66.7 (31.5-89.7)	2	22.2(5.1-60.2)	1	11.1 (1.4- 53.2)	9
<i>Total</i>	<i>338</i>		<i>1,904</i>		<i>658</i>		<i>2,900</i>

<sup>a</sup> ENT: Ear, Nose, and Throat

**Appendix 5.28: Relative risk ratios from bivariate and multivariate multinomial regression**

	Bivariate regression <sup>a</sup>		Multivariate regression <sup>a,b</sup>	
	Injured RRR (95% CIs)	Killed RRR (95% CIs)	Injured RRR (95% CIs)	Killed RRR (95% CIs)
<b>Road user group</b>				
Driver (reference)	1	1	1	1
Motorcyclist	<b>66.0 (44.0-99.1)</b>	<b>132.7 (86.1-204.4)</b>	<b>82.1 (47.2-142.9)</b>	<b>202.1 (112.7-362.7)</b>
Cyclist	<b>28.0 (17.4-45.1)</b>	<b>29.1(16.4-51.6)</b>	<b>53.8 (23.9- 121.4)</b>	<b>57.3 (23.6-139.5)</b>
Pedestrian	<b>8.8 (8.1-9.5)</b>	<b>10.1 (8.9-11.6)</b>	<b>12.6 (11.2-14.2)</b>	<b>15.8 (13.2-18.9)</b>
Passenger	<b>6.3 (5.9-6.7)</b>	<b>4.9 (4.3-5.6)</b>	<b>7.3 (6.6-8.1)</b>	<b>6.1 (5.2-7.2)</b>
Other	<b>10.1 (5.2-19.7)</b>	<b>11.6 (4.6-29.6)</b>	<b>10.1 (4.0-25.8)</b>	<b>13.6 (4.1-44.7)</b>
<b>Vehicle type</b>				
Bus (reference)	1	1	1	1
Motorcycles	<b>1.5 (1.1-2.0)</b>	<b>2.3 (1.3-4.0)</b>	<b>2.8 (1.8-4.4)</b>	<b>4.6 (2.2-9.5)</b>
Sedans	<b>0.8 (0.7-0.9)</b>	1.1 (0.9-1.4)	1.1 (0.9-1.2)	<b>1.5 (1.2-2.0)</b>
SUVs	<b>0.8 (0.7-0.9)</b>	1.2 (0.9-1.7)	1.2 (0.9-1.5)	<b>1.6 (1.1-2.3)</b>
Pick-ups	0.9 (0.8-1.0)	<b>1.4 (1.2-1.8)</b>	1.2 (1.0-1.4)	<b>1.6 (1.3-2.1)</b>
Vans	0.8 (0.6-1.1)	<b>1.9 (1.1-3.2)</b>	0.8 (0.5-1.2)	1.8 (1.0-3.5)
Trucks	<b>0.8 (0.7-0.9)</b>	<b>1.9 (1.5-2.5)</b>	1.1 (0.9-1.4)	<b>2.7 (2.0-3.7)</b>
<b>Gender</b>				
Male (reference)	1	1	1	<b>1</b>

Female	<b>2.6 (2.5-2.8)</b>	<b>1.8 (1.6-2.0)</b>	<b>1.5 (1.4-1.7)</b>	1.0 (0.9-1.2)
<b>Age group</b>				
0-17	<b>3.2 (2.9-3.7)</b>	<b>4.2 (3.4-5.0)</b>	<b>0.8 (0.7-0.9)</b>	1.0 (0.8-1.3)
18-29	<b>1.6 (1.5-1.7)</b>	<b>1.5 (1.3-1.7)</b>	1.1 (1.0-1.2)	1.1 (1.0-1.4)
30-39 (reference)	1	1	1	1
40-49	1.0 (0.9-1.1)	1.0 (0.9-1.2)	1.0 (0.9-1.1)	1.1 (0.9-1.3)
50-59	1.1 (0.9-1.1)	<b>1.4 (1.2-1.7)</b>	1.1 (0.9-1.3)	<b>1.5 (1.2-1.8)</b>
60-69	1.1 (0.9-1.2)	<b>1.8 (1.4-2.3)</b>	1.0 (0.8-1.2)	<b>1.7 (1.3-2.3)</b>
70-79	<b>1.5 (1.2-2.0)</b>	<b>3.3 (2.2-4.7)</b>	1.1 (0.8-1.6)	<b>2.1 (1.3-3.3)</b>
80+	<b>1.6 (1.0-2.7)</b>	<b>7.1 (3.9-12.9)</b>	0.8 (0.4-1.6)	<b>3.6 (1.6-8.0)</b>
<b>Region</b>				
Khomas (Reference)	1	1	1	1
Ohangwena	1.1 (1.0-1.2)	<b>3.5 (2.8-4.5)</b>	1.2 (1.0-1.4)	<b>4.4 (3.3-5.9)</b>
Omusati	<b>1.3 (1.2-1.5)</b>	<b>4.2 (3.2-5.4)</b>	<b>1.4 (1.1-1.7)</b>	<b>6.0 (4.4-8.3)</b>
Kavango	<b>1.6 (1.4-1.8)</b>	<b>8.3 (6.6-10.5)</b>	1.7 (1.4-2.1)	9.4 (6.0-12.8)
Oshikoto	<b>1.2 (1.1-1.3)</b>	<b>3.2 (2.6-4.0)</b>	1.1 (0.9-1.2)	<b>3.7 (2.9-4.8)</b>
Oshana	<b>1.2 (1.1-1.3)</b>	<b>2.8 (2.2-3.4)</b>	<b>1.3 (1.2-1.6)</b>	<b>3.3 (2.6-4.2)</b>
Erongo	<b>1.2 (1.1-1.3)</b>	<b>2.3 (1.9-2.8)</b>	<b>1.4 (1.3-1.6)</b>	<b>3.2 (2.6-4.1)</b>
Otjozondjupa	1.0 (0.9-1.1)	<b>3.2 (2.6-3.9)</b>	<b>1.3 (1.1-1.4)</b>	<b>4.7 (3.7-5.9)</b>
Caprivi	1.0 (0.8-1.2)	<b>4.7 (3.5-6.5)</b>	<b>1.3 (0.9-1.7)</b>	<b>6.8 (4.5-10.2)</b>
Kunene	1.0 (0.9-1.2)	<b>3.5 (2.6-4.6)</b>	<b>1.4 (1.1-1.8)</b>	<b>6.0 (4.2-8.6)</b>

Hardap	1.0 (0.9-1.2)	<b>2.8 (2.2-3.5)</b>	<b>1.4 (1.2-1.7)</b>	<b>4.4 (3.3-5.8)</b>
Karas	1.1 (0.9-1.2)	<b>2.8 (2.1-3.8)</b>	<b>1.5 (1.2-1.8)</b>	<b>4.0 (2.8-5.5)</b>
Omaheke	<b>1.3 (1.1-1.5)</b>	<b>3.3 (2.4-4.4)</b>	<b>1.3 (1.1-1.7)</b>	<b>4.2 (2.9-6.0)</b>
<b>Day of week</b>				
Monday (reference)	1	1	1	1
Tuesday	1.0 (0.9-1.1)	1.1 (0.9-1.4)	1.0 (0.8-1.1)	1.1 (0.8-1.4)
Wednesday	0.9 (0.8-1.0)	1.1 (0.9-1.4)	1.0 (0.8-1.1)	1.2 (0.9-1.6)
Thursday	1.1 (1.0-1.2)	1.0 (0.8-1.3)	1.0 (0.9-1.2)	1.0 (0.8-1.2)
Friday	1.0 (0.9-1.1)	1.0 (0.9-1.2)	1.0 (0.9-1.2)	1.1 (0.9-1.4)
Saturday	1.1 (1.0-1.2)	<b>1.3 (1.1-1.5)</b>	1.1 (1.0-1.3)	<b>1.6 (1.2-1.9)</b>
Sunday	1.1 (1.0-1.2)	1.2 (1.0-1.5)	1.2 (1.0-1.4)	<b>1.4 (1.1-1.8)</b>

Results significant at the 5% level are shown in bold.

<sup>a</sup> The outcome reference category for the logistic regression was 'uninjured'.

<sup>b</sup> The relative risk ratios are mutually adjusted for all the other variables presented in the table.

**Appendix 5.29 Relative risk ratios from bivariate and multivariate logistic regression for “killed” compared with “injured”**

	Bivariate regression <sup>a</sup>	Multivariate regression <sup>a,b</sup>
<b>Road user group</b>		
Driver	1	1
Motorcyclist	<b>2.0 (1.7-2.4)</b>	<b>2.7 (2.0-3.6)</b>
Cyclist	1.0 (0.7-1.5)	1.0 (0.5-1.9)
Pedestrian	1.2 (1.0-1.3)	<b>1.4 (1.1-1.8)</b>
Passenger	<b>0.8 (0.7-0.9)</b>	0.8 (0.7-1.0)
Other	1.1 (0.5-2.4)	1.8 (0.6-5.6)
<b>Vehicle type</b>		
Bus (reference)	1	1
Motorcycles	1.5 (0.9-2.6)	2.2 (0.9-5.3)
Sedans	<b>1.4 (1.1-1.7)</b>	1.3 (0.9-1.8)
SUVs	<b>1.5 (1.1-2.1)</b>	1.1 (0.7-1.8)
Pick-ups	<b>1.6 (1.3-2.0)</b>	1.2 (0.9-1.7)
Vans	<b>2.3 (1.4-3.8)</b>	1.6 (0.7-3.6)
Trucks	<b>2.3 (1.8-3.0)</b>	<b>2.2 (1.4-3.2)</b>
<b>Gender</b>		
Male (reference)	1	1
Female	<b>0.7 (0.6-0.8)</b>	<b>0.8 (0.6-0.9)</b>

<b>Age group</b>		
0-17	<b>1.3 (1.1-1.5)</b>	<b>1.5 (1.1-1.9)</b>
18-29	0.9 (0.8-1.1)	1.1 (0.9-1.3)
30-39 (reference)	1	1
40-49	1.1 (0.9-1.2)	1.2 (0.9-1.5)
50-59	<b>1.4 (1.2-1.7)</b>	<b>1.6 (1.2-2.1)</b>
60-69	<b>1.7 (1.3-2.1)</b>	<b>1.8 (1.3-2.7)</b>
70-79	<b>2.1 (1.5-3.0)</b>	<b>2.1 (1.2-3.5)</b>
80+	<b>4.5 (2.7-7.1)</b>	<b>6.4 (2.6-15.5)</b>
<b>Region</b>		
Khomas (Reference)	1	1
Ohangwena	<b>3.2 (2.5-4.0)</b>	<b>0.4 (0.3-0.6)</b>
Omusati	<b>3.1 (2.5-4.0)</b>	<b>0.5 (0.4-0.8)</b>
Kavango	<b>5.3 (4.3-6.6)</b>	1.0 (0.6-1.5)
Oshikoto	<b>2.8 (2.3-3.4)</b>	0.8 (0.6-1.1)
Oshana	<b>2.3 (1.8-2.8)</b>	<b>0.5 (0.4-0.7)</b>
Erongo	<b>1.9 (1.6-2.3)</b>	1.3 (1.0-1.8)
Otjozondjupa	<b>3.1 (2.6-3.8)</b>	1.4 (1.0-1.9)
Caprivi	<b>4.9 (3.6-6.5)</b>	<b>0.6 (0.3-0.9)</b>
Kunene	<b>3.3 (2.6-4.4)</b>	<b>0.6 (0.4-0.9)</b>
Hardap	<b>2.7 (2.1-3.4)</b>	1.0 (0.7-1.5)

Karas	<b>2.7 (2.1-3.5)</b>	1.0 (0.6-1.5)
Omaheke	<b>2.6 (2.0-3.5)</b>	0.9 (0.6-1.3)
<b>Day of week</b>		
Monday	1	1
Tuesday	1.1 (0.9-1.4)	1.1 (0.8-1.4)
Wednesday	1.2 (1.0-1.5)	1.1 (0.8-1.5)
Thursday	1.0 (0.8-1.2)	0.9 (0.6-1.2)
Friday	1.0 (0.9-1.2)	1.1 (0.9-1.5)
Saturday	1.2 (1.0-1.4)	1.2 (0.9-1.5)
Sunday	1.1 (0.9-1.3)	1.1 (0.8-1.4)
<b>Method of transportation to hospital once injured in crash</b>		
Private ambulance	1	1
Police	<b>53.5 (43.7-65.5)</b>	<b>93.0 (70.0-123.5)</b>
State Ambulance	<b>2.3 (1.8-2.9)</b>	<b>3.0 (2.2-4.0)</b>
Private vehicle	<b>2.4 (1.8-3.1)</b>	<b>3.5 (2.5-4.9)</b>

Results significant at the 5% level are shown in bold.

<sup>a</sup> The outcome reference category for the logistic regression was ‘injured, but not fatally, and taken to hospital’.

<sup>b</sup> The relative risk ratios are mutually adjusted for all the other variables presented in the table.

### Appendix 5.30: Relative risk ratio of being injured or killed as a result of crash type

Type of crash	Injured	Killed
Collision with pedestrians	1.0 (0.8-1.2)	<b>5.8 (3.2-10.5)</b>
Roll-overs	<b>2.7 (2.3-3.2)</b>	<b>7.6 (4.2-13.7)</b>
Head Side collision	<b>1.3 (1.1-1.6)</b>	1.9 (1.0-3.6)
Head rear collision	1.1 (0.9-1.3)	0.9 (0.5-1.9)
Hit and run	<b>4.7 (3.6-6.3)</b>	<b>26.5 (13.8-50.8)</b>
Head-on collision	<b>2.2 (1.9-2.7)</b>	<b>10.8 (5.9-19.7)</b>
Collision with fixed object	<b>1.9 (1.5-2.4)</b>	<b>4.0 (2.0-7.8)</b>
Lost control	<b>1.7 (1.4-2.1)</b>	<b>3.0 (1.5-6.0)</b>
Collision with cyclist	1.1 (0.9-1.4)	<b>3.6 (1.8-7.2)</b>
Side wipe collisions	<b>1.4 (1.1-1.8)</b>	<b>2.5 (1.2-5.2)</b>
Fell from moving vehicle	1.0 (0.7-1.3)	<b>4.7 (2.3- 9.5)</b>
Collision with animal (domestic)	1.1 (0.9-1.4)	1.6 (0.7-3.5)
Chain collisions (Reference)	1	1
Collision with wild animal	<b>1.7 (1.4-2.1)</b>	<b>2.7 (1.3-5.6)</b>
Burst tyre	<b>2.5 (1.9-3.2)</b>	<b>5.3 (2.6-10.6)</b>
Single vehicle overturned	<b>1.6 (1.2-2.2)</b>	<b>5.1 (2.3-11.1)</b>
Collision with quad bike	1.0 (0.8-1.2)	<b>5.4 (3.0-10.0)</b>
Side swipe: opposite direction	<b>2.3 (1.9-2.8)</b>	<b>6.1 (3.4-11.1)</b>
Sudden mechanical failure	<b>2.4 (1.7-3.3)</b>	<b>4.4 (1.9-10.5)</b>
Side swipe same direction	1.3 (1.0-1.7)	2.0 (0.8-4.7)
Collision with train	1.5 (0.7-3.4)	<b>11.1 (3.0-41.2)</b>



Other/unknown	<b>2.0 (1.5-2.5)</b>	<b>5.8 (2.8-11.7)</b>
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Results significant at the 5% level are shown in bold.