

# AFCAP

Africa Community  
Access Partnership



## The magnitude and characteristics of road traffic injury in Kilolo District, Tanzania

Final Report



**Tom Bishop, George Malekela and Duncan Matheka  
Amend**

*TAN2015B / SC14060*

**May 2015**

**AMEND**ORG

The views in this document are those of the authors and they do not necessarily reflect the views of the Africa Community Access Partnership (AFCAP) or Cardno Emerging Markets (UK) Ltd for whom the document was prepared

Cover Photo:

A motorcycle pulling wooden planks, rural Kilolo District. *George Malekela*

<i>Quality assurance and review table</i>			
<i>Version</i>	<i>Author(s)</i>	<i>Reviewer(s)</i>	<i>Date</i>
First Draft	Tom Bishop, George Malekela and Duncan Matheka		9 <sup>th</sup> April 2015
		Annabel Bradbury	17 <sup>th</sup> April 2015
		Paul Starkey	17 <sup>th</sup> April 2015
Second Draft	Tom Bishop, George Malekela and Duncan Matheka		19 <sup>th</sup> May 2015
		Annabel Bradbury	22 <sup>nd</sup> May 2015
Final	Tom Bishop, George Malekela and Duncan Matheka		28 <sup>th</sup> May 2015
		Paul Starkey	16 <sup>th</sup> June 2015

AFCAP/ASCAP Project Management Unit  
Cardno Emerging Market (UK) Ltd  
Oxford House, Oxford Road  
Thame  
OX9 2AH  
United Kingdom



## **Abstract**

This is the final report of the study into the magnitude and characteristics of road traffic injury on two low volume rural roads in Kilolo District, Tanzania.

After providing the background to the study, the report details the study's three data collection activities: traffic counts, household surveys and motorcycle driver surveys, and then discusses their findings and implications.

The motorcycle driver survey identified a far greater magnitude of crashes than the household survey, with higher numbers of crashes and greater severity. 24% of motorcycle drivers had been involved in a crash in the past three months, while only 1% of all household members had been involved in a crash in the past three months, rising to over 5% among household heads. For crashes identified through the motorcycle driver survey, the number of days of normal activity missed as a result of the crash was double that of the crashes identified through the household survey.

The characteristics of all crashes – both those identified through the household survey and those identified through the motorcycle driver survey – are similar: involving young men with motorcycles, no training and no licences. The most common contributory factors were related to road user behaviour, the design and condition of the road, and environmental conditions.

## **Key words**

Boda-boda, household, motorcycle, pedestrian, piki-piki, road traffic injury, rural road

### **AFRICA COMMUNITY ACCESS PARTNERSHIP (AFCAP) Providing solutions for safe and sustainable rural access across Africa**

AFCAP is a research programme, funded by UK Aid, with the aim of promoting safe and sustainable rural access for all people in Africa. AFCAP supports knowledge sharing between participating countries in order to enhance the uptake of low cost, proven solutions for rural access that maximise the use of local resources. The AFCAP programme is managed by Cardno Emerging Markets (UK) Ltd.

**See [www.afcap.org](http://www.afcap.org)**

## **Acronyms, Units and Currencies**

AFCAP	Africa Community Access Partnership
Cardno-ITT	Cardno IT Transport
HIV/AIDS	Human Immunodeficiency Virus / Acquired Immune Deficiency Syndrome
IFRTD	International Forum for Rural Transport and Development
NIMR	National Institute for Medical Research
OECD	Organization for Economic Cooperation and Development
RA	Research Assistant
RTI	Road Traffic Injury
Tsh, TZS	Tanzania shilling (USD 1 ≈ TZS 2000; GBP 1 ≈ TZS 3000)
UKAid	United Kingdom Aid (Department for International Development, UK)
WHO	World Health Organization

## Contents

Abstract	3
Key words	3
Acronyms, Units and Currencies	4
<b>1 Executive summary .....</b>	<b>7</b>
<b>2 Background .....</b>	<b>8</b>
2.1 Context	8
2.2 Research project background	8
2.3 Research objectives	9
<b>3 Methodology .....</b>	<b>9</b>
3.1 Obtaining permissions and cooperation	9
3.2 Identification of sites	10
3.3 Data collection	10
3.3.1 <i>Traffic count, speed surveys and observations</i>	10
3.3.2 <i>Household survey methodology</i>	10
3.3.3 <i>Motorcycle driver survey methodology</i>	11
3.4 Data entry, analysis and presentation	11
<b>4 Description of study areas .....</b>	<b>12</b>
4.1 Kilolo District	12
4.2 Boma la Ng'ombe to Mwatasi study area	14
4.2.1 <i>Boma la Ng'ombe village</i>	14
4.2.2 <i>Mwatasi village</i>	16
4.2.3 <i>Boma la Ng'ombe to Mwatasi road</i>	17
4.3 Ihimbo to Itimbo study area	17
4.3.1 <i>Ihimbo village</i>	17
4.3.2 <i>Itimbo village</i>	17
4.3.3 <i>Ihimbo to Itimbo road</i>	18
4.4 Weather and road conditions during data collection	18
4.5 Road safety issues in Kilolo District and the study areas	19
<b>5 Results of traffic counts and observations .....</b>	<b>20</b>
5.1 Overall numbers	20
5.2 Pedestrians	21
5.3 Bicycles	21
5.4 Motorised vehicles	21
5.4.1 <i>Four-wheeled motorised vehicles</i>	21
5.4.2 <i>Motorcycles</i>	21
<b>6 Results of household surveys .....</b>	<b>22</b>
6.1 Numbers and locations of interviews	22
6.2 Demographics of household members	22
6.3 Travel behaviour and vehicle ownership	22
6.4 Risk Perceptions	23
6.5 Magnitude of crashes	23
6.5.1 <i>Number of crashes</i>	23
6.5.2 <i>Severity of crashes</i>	23
6.6 Characteristics of crashes	25
6.6.1 <i>Demographics of those involved in a crash</i>	25
6.6.2 <i>Mode of travel</i>	25
6.6.3 <i>Crash location and time</i>	25
6.6.4 <i>Crash contributory factors</i>	26
6.6.5 <i>Police informed</i>	27
<b>7 Results of motorcycle surveys .....</b>	<b>27</b>
7.1 Numbers and locations of interviews	27
7.2 Demographics of motorcycle drivers	28

7.3	Driving experience	29
7.4	Travel behaviour and vehicle ownership	29
7.5	Risk perceptions	29
7.6	Magnitude of crashes	30
7.6.1	<i>Number of crashes</i>	30
7.6.2	<i>Severity of crashes</i>	30
7.7	Characteristics of crashes	31
7.7.1	<i>Demographics of those involved in a crash</i>	31
7.7.2	<i>Mode of travel</i>	32
7.7.3	<i>Crash location and time</i>	32
7.7.4	<i>Crash contributory factors</i>	32
7.7.5	<i>Police informed</i>	34
7.7.6	<i>Use of helmets</i>	34
<b>8</b>	<b>Discussion on findings .....</b>	<b>34</b>
8.1	Road and vehicle use	34
8.1.1	<i>Pedestrians</i>	34
8.1.2	<i>Motorcycles</i>	34
8.1.3	<i>Other vehicles</i>	35
8.1.4	<i>Vehicle ownership</i>	35
8.1.5	<i>Perceptions of safety</i>	35
8.2	Magnitude of crashes	36
8.2.1	<i>Magnitude of crashes identified through motorcycle driver survey</i>	36
8.2.2	<i>Magnitude of crashes identified through household survey</i>	36
8.3	Characteristics of crashes	37
8.3.1	<i>Characteristics of crashes identified through motorcycle driver survey</i>	38
8.3.2	<i>Characteristics of crashes identified through household survey</i>	38
<b>9</b>	<b>Implications and recommendations .....</b>	<b>39</b>
9.1	Implications	39
9.2	Recommendations	40
9.2.1	<i>Recommendations related to implications</i>	40
9.2.2	<i>Recommendations related to methodology</i>	41
<b>10</b>	<b>References .....</b>	<b>43</b>
<b>11</b>	<b>Annexes .....</b>	<b>43</b>

See separate document for Annexes:

- Annex A: Detailed methodology
- Annex B: Letters of permission and support
- Annex C: Data collection worksheets
- Annex D: Crash descriptions

## **1 Executive summary**

Sub-Saharan Africa has some of the most dangerous roads in the world. It has an average road fatality rate of 24.1 per 100,000 people, while the global average fatality rate is 18.0 per 100,000 people (World Health Organization, 2013a).

In Tanzania, official figures show that in 2014 over 3,760 people were killed on the roads, and a further 14,530 were injured (Tanzania Traffic Police, 2015). However, the real figures are likely to be far higher than these due to under-reporting of crashes, especially in rural areas.

The Tanzanian Government, with the support of multiple donor partners, is committed to improving the country's rural roads. It is well established that improving rural roads can bring economic and social benefits. However, improved roads also result in increased traffic and often in higher speeds, which can create safety risks. It is important that the benefits of improved roads are not offset by an increase in road deaths and injuries and the associated negative economic and social consequences.

This study provides a snapshot of the magnitude and characteristics of road traffic injury in Kilolo District, in Tanzania's Southern Highlands. The specific areas selected for the study were chosen because a separate 2013 AFCAP-funded project had identified them as not being dominated by motorcycles, the use of which has become widespread in Tanzania in recent years. In selecting these areas, the idea was to understand rural road safety issues prior to the arrival of motorcycles, assuming that motorcycles would become more widespread in the areas in the near future.

While this study found that the dominant mode of travel in the study areas was foot, it also found that motorcycles were already by far the most common type of vehicle. Traffic counts showed that the number of motorcycles using the roads was more than double the number of bicycles and more than six times the number of other motorised vehicles.

The vast majority of crashes identified through the study involved a motorcycle. Around 24% of motorcycle drivers were found to have experienced a crash in the past three months, with the most serious injuries identified being broken bones and dislocations.

Around 5% of the heads of households living alongside the roads in the study areas were found to have been involved in a crash in the past three months, and these crashes were less severe than those of motorcycle drivers.

The data collection for this study was carried out during the rainy season, which may explain the nature of many of the crashes identified, including that the road condition and environmental conditions were common contributory factors. Road user behaviour was also identified as a common contributory factor.

This report adds to previous similar AFCAP-funded research, helping to build an understanding of the magnitude and characteristics of road traffic injury on rural roads in Tanzania. Building this understanding is essential to assist decision-makers to ensure that the country's rural road network and transport services provide safe access for all.

For a full understanding of the study, this report and its annexes should be read in full. However, it is the authors' intention that a reader who chooses to read only the sections entitled *Background*, *Discussion on findings* and *Implications and recommendations* will have a good understanding of the study and its findings and implications.

## **2 Background**

### **2.1 Context**

Worldwide, over 1.2 million people are killed each year on the roads. Fifty million more are seriously injured. Road traffic injuries (RTI) are the number one leading cause of death for people aged between 15 and 29. For all age groups, RTIs are forecast to jump from the ninth to the fifth leading cause of death by 2030, higher than HIV/AIDS, malaria and tuberculosis (World Health Organization, 2013b).

Over 90 percent of the world's traffic fatalities occur in low and middle-income countries. Sub-Saharan Africa has some of the most dangerous roads in the world, with an average road fatality rate of 24.1 per 100,000 people, while the global average fatality rate is 18.0 per 100,000 people (World Health Organization, 2013a). It is estimated that the situation in sub-Saharan Africa will become worse in the upcoming years. By 2050, the population of Africa will grow by more than a billion people. Africa's rate of motorisation is one of the fastest in the world, with thousands of cars added to the roads every day. Globally, the number of private motor vehicles is forecast to triple by 2050. Two-thirds of this explosive growth will take place in non-OECD countries such as those in sub-Saharan Africa (International Energy Agency, 2008). With more vehicles, there will be a greater risk of injury and death, unless effective measures are taken to improve road safety.

In Tanzania, official figures show that in 2014 over 3,760 people were killed on the roads, and a further 14,530 were injured (Tanzania Traffic Police, 2015).

### **2.2 Research project background**

The Africa Community Access Partnership (AFCAP) aims to promote safe and sustainable rural access for all people in Africa, sharing knowledge in order to enhance the uptake of low cost, proven solutions for rural access that maximise the use of local resources. This includes improving roads and transport services.

It is well established that improving rural roads can bring economic and social benefits. However, improved roads also result in increased traffic and often in higher speeds, which can create safety risks. It is important that the benefits of improved roads are not offset by an increase in road deaths and injuries and the associated negative economic and social consequences.

Previous research by Amend, funded under the first phase of AFCAP and carried out in the Kilimanjaro and Pwani regions, found that around 90% of motorised vehicles using low-volume rural roads are motorcycles, and that motorcycle-related injury rates are high and increasing (Amend, 2013). As a result, Amend's subsequent research aimed to understand motorcycle-related RTI.

However, in more remote areas of Tanzania, it is possible that motorcycles have not yet become dominant, with modes such as foot, bicycle and bus dominating rural access.

This research aimed to provide an understanding of the magnitude and characteristics of RTI on low-volume rural roads in an area where motorcycles are not yet dominant. It also aimed to provide an understanding of the number and type of vehicles and road users using such roads.

This research was carried out during the first few months of the second phase of AFCAP, and was part of a trial of a new approach to AFCAP's Transport Services work: a 'cluster' approach, providing a 'snapshot' of the existing situation.



The cluster approach involves undertaking a number of small projects in the same location to provide a basic understanding of a range of transport-related issues. This research into rural RTI was coordinated with three other studies under the second phase of AFCAP: one by HelpAge International into transport issues faced by elderly people, and two by the International Forum for Rural Transport and Development (IFRTD) into rural transport indicators and also how transport influences the price of tomatoes. All studies were carried out in broadly the same geographical location.

Providing a snapshot of the existing situation involves collecting data in a short amount of time with a limited budget. Information is gathered from a number of different sources, enabling a picture of the 'real situation' to be built. None of the findings are derived from random samples and none are statistically significant. They cannot be considered to be representative of a wider area or population other than that covered by the study.

The results of this study and the wider cluster of studies will be of use not only to those involved in the second phase of AFCAP, but to all involved in the development and management of rural roads and rural access in Tanzania and elsewhere.

The research supports the goal and objectives of the United Nations endorsed Decade of Action for Road Safety (2011 to 2020), and Tanzania's National Road Safety Strategy.

### **2.3 Research objectives**

The objectives of the research were:

- To understand the magnitude and describe the characteristics of road traffic injury among people living alongside and using low-volume rural roads in an area where the motorcycle is not the dominant mode of transport, establishing a baseline against which to assess future changes
- To understand the number and type of vehicles and road users using such roads
- To develop a simple and replicable methodology for data collection and analysis, enabling future comparison with the baseline

## **3 Methodology**

As explained in Section 2, this study was designed to provide a snapshot of the magnitude and characteristics of road traffic injury on low-volume rural roads.

One of the objectives of this project was to develop a simple and replicable methodology for data collection and analysis to allow the study to be replicated at some point in the future.

This section briefly summarises the methodology used for this specific study in Kilolo District. Annex A contains a full step-by-step description of the methodology.

### **3.1 Obtaining permissions and cooperation**

At the national level, we obtained ethical clearance for the research from the National Institute of Medical Research (NIMR). In Iringa Region and Kilolo District, we obtained permission from the Regional Administrative Secretary and District Executive Director, and secured the cooperation and support of officials of the wards and villages in which we worked.

Letters of permission and support are included in Annex B.

### **3.2 Identification of sites**

The south west of Kilolo District was suggested as a possible study area by AFCAP's Transport Services Manager, whose intention was to support a 'cluster' of projects in the same area in order to build a detailed picture of rural transport issues, and also to build on a previous study of rural transport along the Iringa to Kilolo Highway.

Following an initial site visit, during which we took advice of local officials and explored potential roads in the south west of Kilolo District, the areas around the Boma la Ng'ombe to Mwatasi road and the Ihimbo to Itimbo road were selected as the study areas. The study areas are described in Section 4.

### **3.3 Data collection**

Data was collected in the Boma la Ng'ombe to Mwatasi study area from Monday 16<sup>th</sup> to Saturday 21<sup>st</sup> February 2015, and in the Ihimbo to Itimbo study area from Monday 23<sup>rd</sup> to Saturday 28<sup>th</sup> February 2015.

Data was collected through three different activities, carried out by Research Assistants (RAs):

- Traffic counts, speed surveys and observation of road user behaviour along the study roads
- A cross-sectional survey of members of households within the study area
- A cross-sectional survey of motorcycle taxis operating in the study area

#### *3.3.1 Traffic count, speed surveys and observations*

The purpose of the traffic counts, speed surveys and observations of road user behaviour was to understand the numbers, types and behaviours of vehicles and road users using the study roads, and to set the context for comparison against data collected through future studies.

The following data was recorded:

- Numbers and types of 4-wheeled vehicles, including their speeds (using a radar speed gun)
- Numbers of motorcycles (including motorised tricycles), including their speeds, number and gender of passengers, whether helmets were worn by the driver and any passengers, whether a load was carried, and whether the driver was distracted in any way, such as using a mobile phone, listening to music or talking to a passenger
- Numbers of bicycles, including number and gender of passengers, whether a load was carried, and whether the bicycle was being ridden or pushed
- Numbers, genders and ages of pedestrians, and whether a load was carried

#### *3.3.2 Household survey methodology*

The purpose of the household survey was to understand demographics, travel behaviour, risk perception, and the magnitude and characteristics of road crashes among household members living in the study areas.

The main part of the questionnaire was divided into four sections:

- A. Demographics
- B. Risk Perception
- C. Crash Questionnaire (Basic)
- D. Crash Questionnaire (Detailed)

All household heads were asked the questions in Sections A and B. Those household heads who had themselves been involved in a crash within the previous three months were asked the questions in Section C – these questions are basic, and so it was assumed that people would be able to remember the details accurately for up to three months. Only those people who had been involved in a crash

within the previous one month were asked the questions in Section D – these questions were more detailed, and included a full description of the crash, and so it was assumed that people would only be able to remember the details accurately for up to one month.

Following the interview with the household head, any other members of the household who had been involved in a crash in the past three months were also asked to respond to Parts A, B and C of the questionnaire, and possibly Part D – dependent on whether the crash had occurred within the last one month.

### **3.3.3 Motorcycle driver survey methodology**

Motorcycle drivers were included in the study because through the initial pre-study visit to the study roads, it was identified that, while motorcycles were not as dominant as they have been seen to be in other areas of Tanzania, they still provide an important role in accessibility and mobility in the study areas.

The purpose of the motorcycle driver survey was to understand demographics, travel behaviour, risk perception, and the magnitude and characteristics of road crashes among motorcycle drivers using the roads in the study areas.

The motorcycles using the roads in the study areas can be grouped into two categories:

- Private motorcycles, known as ‘piki-pikis’, used by the owner to make personal trips
- For-hire motorcycles, known as ‘boda-bodas’, with drivers charging a fare to customers either to ride as a passenger or to transport goods. In some cases the driver is the owner, while in other cases the driver rents the motorcycle from a third party for a fee

The questionnaire was similar to that used in the household survey, although with a number of questions specific to motorcycles included. As with the household survey, the questionnaire was divided into four sections:

- A. Demographics
- B. Risk Perception
- C. Crash Questionnaire (Basic)
- D. Crash Questionnaire (Detailed)

All drivers were asked the questions in Sections A and B. Those drivers who had been involved in a crash within the previous three months were asked the questions in Section C – these questions are basic, and so it was assumed that drivers would be able to remember the details accurately for up to three months. Only those drivers who had been involved in a crash within the previous one month were asked the questions in Section D – these questions were more detailed, and include a full description of the crash, and it was assumed that drivers would only be able to remember the details accurately for up to one month.

Data collection worksheets are included in Annex C.

## **3.4 Data entry, analysis and presentation**

Following completion of data collection, the data were cleaned and entered into an Excel database. The data were analysed using Excel. Cross-referencing was carried out by correlating various variables with the crashes reported. Tables, percentages and charts were generated to present the data in a simple and clear way. Descriptive data were summarized and reported.

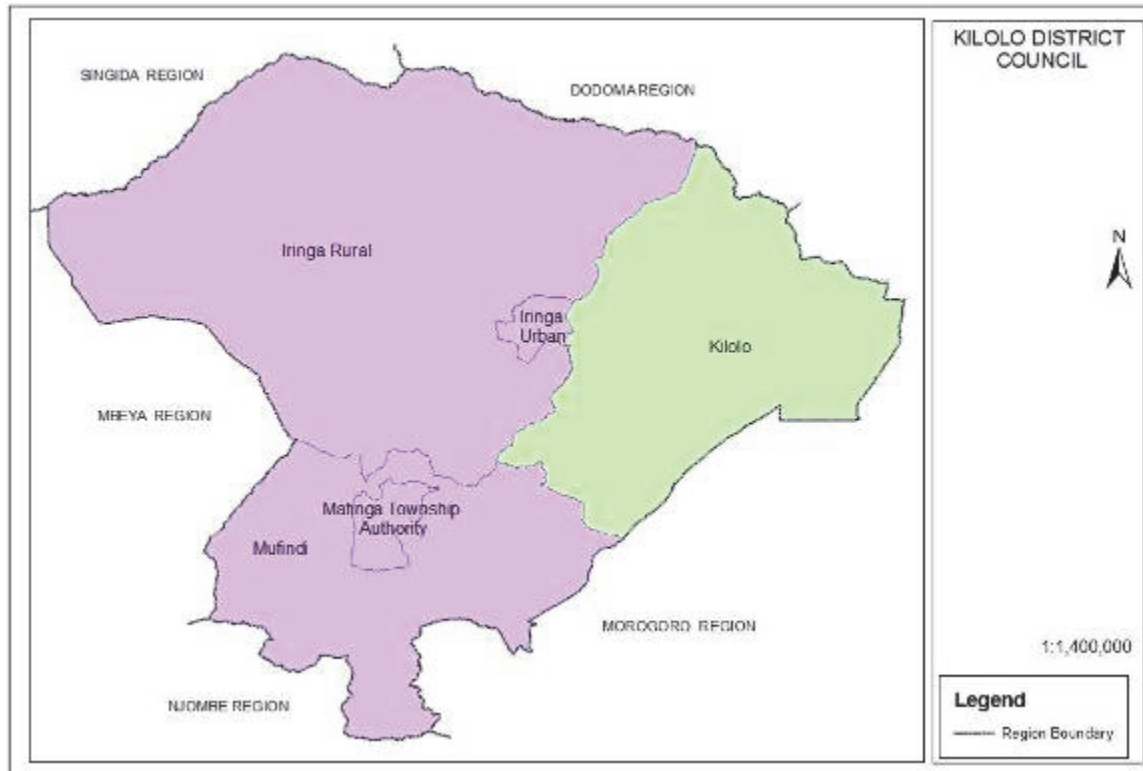
## 4 Description of study areas

This section introduces Kilolo District and provides detail of the two study areas included in this research.

### 4.1 Kilolo District

Kilolo District is one of five districts in Iringa Region, in the Southern Highlands Zone of Tanzania. Kilolo District makes up the eastern portion of the Iringa Region, bordering Dodoma Region to the north and Morogoro Region to the east and south. This is shown in the map in Figure 1 below.

Figure 1: Kilolo District, within Iringa Region



Source: Kilolo District Council, 2013

Much of the district is mountainous, with steep hills, ridges, valleys and escarpments. More than half (54%) of the total land area is arable, almost a quarter (24%) is forest, and the remainder (22%) is used for grazing (Kilolo District Council, 2013)

Two study areas within Kilolo District were included in this study. These were:

1. The villages of Boma la Ng'ombe and Mwatasi, and the road between them
2. The villages of Ihimbo and Itimbo, and the road between them

Boma la Ng'ombe, Mwatasi and the road between the two are situated within Boma la Ng'ombe ward. Ihimbo, Itimbo and the road between the two are situated within Ihimbo ward. Both of these wards are found in the south-west corner of Kilolo District, as shown in Figure 2.

Figure 2: Locations of Boma la Ng'ombe and Ihimbo wards



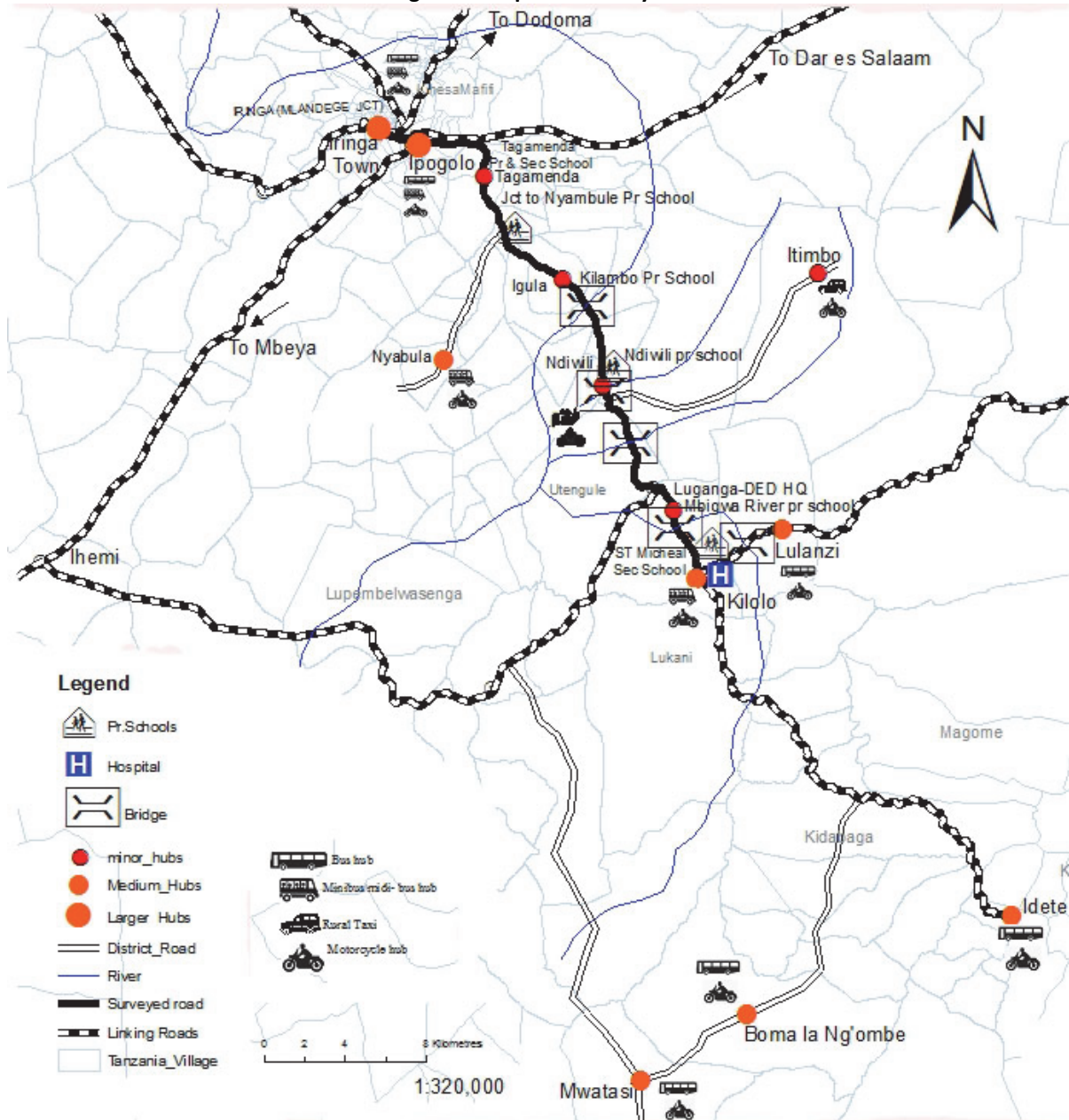
Source: Kilolo District Council, 2013

These study areas were identified during an initial site visit to Kilolo District, and were found to meet the criteria for inclusion in the research – including that the motorcycle is not the dominant mode of transport. Rather, the vast majority of trips are made on foot.

Boma la Ng'ombe, Mwatasi and Itimbo are shown on the map in Figure 3. Ihimbo is approximately 10 km from Itimbo, west along the marked district road, before the junction with the road marked 'Surveyed road'.

*(Note that this map has been borrowed from the final report of a previous AFCAP study 'Rural Transport Service Indicators: Report of the Iringa – Kilolo Road, Tanzania'. The annotation 'Surveyed road' refers to the road surveyed for the previous study, and does not refer to this study.)*

Figure 3: Map of the study areas



Source: Willilo and Starkey, 2013

#### 4.2 Boma la Ng'ombe to Mwatasi study area

Both Boma la Ng'ombe and Mwatasi are within the larger Boma la Ng'ombe ward. The ward has a population of around 11,000 people (National Bureau of Statistics, 2013).

##### 4.2.1 Boma la Ng'ombe village

The Boma la Ng'ombe village centre is made up of an estimated 400 to 500 houses. The road through the village centre is mainly used by pedestrians, especially in the early morning when people leave home to go to their farms. There are also many motorcycles available for hire (boda-bodas).

On market days many people from nearby villages visit Boma la Ng'ombe village.

**Picture 1: Boma la Ng'ombe village centre**



*(Note – all*

*three vehicles shown in this picture were being used by the study team for the initial site visits)*

**Picture 2: Boma la Ng'ombe village centre on market day**



*(Note – the vehicle shown in this picture belonged to the study team)*

#### *4.2.2 Mwatasi village*

Mwatasi village is smaller than Boma la Ng'ombe village, with an estimated 200 to 300 houses. Again, the road through the village is mainly used by pedestrians.

**Picture 3: Mwatasi village**



*(Note – the vehicle shown in the centre of this picture belonged to the study team)*

**Picture 4: The road through Mwatasi village**





#### **4.2.3 Boma la Ng'ombe to Mwatasi road**

The road between Boma la Ng'ombe and Mwatasi is approximately 9 km in length. It is an earth road, characterised by hills, forests and farming activities. There are an estimated 50 houses along the road.

Along this road, pedestrians are the most common type of road user, many carrying timber, firewood and agricultural produce on their heads. There are a high number of pedestrians, especially early in the morning, with people going to their farms and students going to secondary school in the nearby Lyamko village.

#### **4.3 Ihimbo to Itimbo study area**

Both Ihimbo and Itimbo are within the larger Ihimbo ward. The ward has a population of around 10,000 people (National Bureau of Statistics, 2013).

##### **4.3.1 Ihimbo village**

The Ihimbo village centre is made up of an estimated 100 to 150 houses. The road through the village centre is mainly used by pedestrians. The presence of locally-constructed speed humps on the road through the village indicates that local people consider road safety to be an issue.

**Picture 5: The road through Ihimbo village, with a locally-constructed speed hump**



##### **4.3.2 Itimbo village**

The Itimbo village centre is made up of an estimated 150 to 200 houses. The road through the village centre is mainly used by pedestrians.

**Picture 6: Itimbo village centre**



#### *4.3.3 Ihimbo to Itimbo road*

The road between Ihimbo and Itimbo is approximately 10 km in length. It is an earth road, largely flat, but narrow in places and with some large stones. It is bordered by open farmland; crops grown include maize and tomatoes. There are an estimated 150 houses along the road, some of which are grouped together in small villages.

Along this road, pedestrians are the most common type of road user, many carrying agricultural produce on their heads.

**Picture 7: The Ihimbo to Itimbo road**



#### **4.4 Weather and road conditions during data collection**

Data collection took place during the last two weeks of February 2015. This is approximately during the middle of the rainy season, as can be seen from the rainfall chart in Annex A.

In the surveys, when respondents were asked if they had been involved in a crash within the last three months, the majority of these three months would have been during the rainy season.

Anecdotal information from village and district officials suggests that the 2014-15 rainy season was an 'average' rainy season – not noticeably more wet or dry than usual. The study team found that it was often raining, and that the roads were often wet and slippery, during the data collection period.

#### **4.5 Road safety issues in Kilolo District and the study areas**

Through observations and conversations with local officials and members of the Traffic Police during the initial site visit, we identified the following anecdotes related to local road safety issues in Kilolo District:

- The vast majority of motorised vehicles using rural roads are motorcycles, and include both piki-pikis and boda-bodas. Many of the drivers of these motorcycles have received no formal training, have no licence or insurance, and do not use personal safety equipment such as helmets
- The main Tanzania-Zambia (TANZAM) Highway runs through Kilolo District. As a result, much of the effort of the district's Traffic Police is concentrated on this route. Few resources remain for policing rural roads
- There are many crashes on rural roads, but the majority go un-reported. The reasons for this include:
  - Lack of police presence in rural areas
  - Reluctance of those involved in crashes to report them
- The reasons why people involved in rural crashes do not want to report to police include that many drivers do not have a driving licence and insurance
- Most of the crashes on rural roads involve motorcycles
- In 2014, there were at least two serious incidents involving motorcycles in Kilolo District:
  1. Two deaths resulting from a crash between two motorcycles
  2. Five injuries resulting from a motorcycle hitting a group of pedestrians
- The number of motorcycles using rural roads in Kilolo District is increasing rapidly

## 5 Results of traffic counts and observations

Traffic counts were carried out along both study roads to understand the volume, types and behaviours of vehicles and road users. Each count was for a 12-hour period, from 6am to 6pm.

Three counts were carried out along the Boma la Ng'ombe to Mwatasi road: on 18<sup>th</sup>, 20<sup>th</sup> and 21<sup>st</sup> February, including a weekday, a weekend day and a market day.

Two counts were carried out along the Ihimbo to Itimbo road: on 27<sup>th</sup> and 28<sup>th</sup> February, including a weekday, and a weekend day. There was no market day along this road during the study period.

**Picture 8: A Research Assistant taking a speed reading along the Ihimbo to Itimbo road**



### 5.1 Overall numbers

Table 1 summarises the overall numbers observed through the traffic counts:

**Table 1: Observed numbers of vehicles and road users**

<i>Study road</i>	<i>Day and date</i>	<i>Type of day</i>	<i>Pedestrians</i>	<i>Motorcycles</i>	<i>Bicycles</i>	<i>4-wheel motor vehicles</i>
<i>Boma la Ng'ombe to Mwatasi</i>	<i>Wed 18 Feb</i>	<i>Weekday, market day</i>	726	150	65	24
<i>Boma la Ng'ombe to Mwatasi</i>	<i>Fri 20 Feb</i>	<i>Weekday, non-market day</i>	665	107	44	17
<i>Boma la Ng'ombe to Mwatasi</i>	<i>Sat 21 Feb</i>	<i>Weekend, non-market day</i>	729	115	52	8
<i>Ihimbo to Itimbo</i>	<i>Fri 27 Feb</i>	<i>Weekday, non-market day</i>	219	94	6	5
<i>Ihimbo to Itimbo</i>	<i>Sat 28 Feb</i>	<i>Weekend, non-market day</i>	172	86	8	4
<b>TOTALS</b>			<b>2,511</b>	<b>552</b>	<b>175</b>	<b>58</b>

The table shows that the busiest day and location was the market day along the Boma la Ng'ombe to Mwatasi road. At the weekend, along the same road, the number of pedestrians was slightly higher than on the market day, while the numbers of motorised vehicles and bicycles were lower.

The numbers of vehicles and road users using the Ihimbo to Itimbo road were far less than those using the Boma la Ng'ombe to Mwatasi road.

## **5.2 Pedestrians**

The total number of pedestrians observed was 2,511. Of these:

- 1,472 (59%)<sup>1</sup> were female
- 1,028 (41%) were observed (as estimated by the RAs) to be children of 15 years or less
- Only 100 (4%) were observed to be over 50 years old, and less than 0.2% over 70 years old
- 771 (31%) were carrying loads. 534 (69%) of those carrying loads were female

## **5.3 Bicycles**

The total number of bicycles observed was 175. Of these:

- 175 (100%) riders were male
- A total of only 12 passengers were observed (eight (67%) male and 4 (33%) female)
- 59 (34%) were being used to carry a load (other than a passenger)
- 134 (77%) were being ridden, while the remaining 41 (23%) were being pushed

## **5.4 Motorised vehicles**

The total number of motorised vehicles observed was 610. Of these:

- 552 (90%) were motorcycles (one in fact being a motorised tricycle), while the remaining 58 (10%) were four-wheeled vehicles

### *5.4.1 Four-wheeled motorised vehicles*

Of the 58 four-wheeled vehicles:

- 30 (52%) were small cars or four-wheel-drives
- Others were large trucks, often used for carrying timber in the forested areas around the Boma la Ng'ombe to Mwatasi study area
- Very few were observed using the Ihimbo to Itimbo road
- The average speed observed was 27 kph. The maximum speed observed was 55 kph, being driven by a lorry or truck

### *5.4.2 Motorcycles*

Of the 552 motorcycles:

- 552 (100%) drivers were male
- A total of 356 passengers were observed (256 (72%) male and 100 (28%) female)
- 264 (48%) were carrying no passengers (52% along the Ihimbo to Itimbo road and 44% along the Boma la Ng'ombe road)
- 226 (41%) were carrying one passenger
- 56 (10%) were carrying two passengers
- Six (1%) were carrying three passengers
- 172 (31%) were carrying loads (other than a passenger)
- 278 (50%) drivers and only 14 (4%) passengers were wearing helmets

---

<sup>1</sup> All percentages presented in the results section of this report are rounded to the nearest percent. In some cases, this may result in the totals stated not adding up to 100%.

- 181 (33%) drivers were seen to be distracted

The average speed of all motorcycles observed was 36 kph, with a higher average among motorcycles using the Ihimbo to Itimbo road (39 kph) than among motorcycles using the Boma la Ng'ombe to Mwatasi road (34 kph). The highest speed was 69 kph, being observed along the Ihimbo to Itimbo road.

## 6 Results of household surveys

### 6.1 Numbers and locations of interviews

A total of 267 household heads were interviewed. Table 2 below shows the numbers of interviews carried out at the different study locations.

**Table 2: Numbers and locations of household head interviews**

<i>Study area</i>	<i>Location</i>	<i>Number of household heads interviewed</i>
<i>Boma la Ng'ombe to Mwatasi study area</i>	<i>Boma la Ng'ombe to Mwatasi road</i>	<i>21</i>
	<i>Boma la Ng'ombe village</i>	<i>41</i>
	<i>Mwatasi village</i>	<i>65</i>
	<b>Total</b>	<b>127</b>
<i>Ihimbo to Itimbo study area</i>	<i>Ihimbo to Itimbo road</i>	<i>20</i>
	<i>Ihimbo village</i>	<i>62</i>
	<i>Itimbo village</i>	<i>58</i>
	<b>Total</b>	<b>140</b>

The table shows that 127 (48%) of the interviews were carried out in the Boma la Ng'ombe to Mwatasi study area and 140 (52%) were carried out in the Ihimbo to Itimbo study area.

**Picture 9: Research Assistants carrying out a household interview**

### 6.2 Demographics of household members

The total number of people living in the 267 households was 1,252. This equates to an average household size of 4.7 people. Of the total 1,252 people, 688 (56%) were female and 564 (44%) were male.

Of the 267 household heads interviewed:

- Their mean age was 38 years, with an age range between 18 and 75 years
- 151 (57%) were female while 116 (43%) were male
- 159 (60%) said that their highest level of education was to complete primary school
- 213 (79%) said that their primary occupation was farmer
- Other than farmer, the most common primary occupation was shop-keeper or businessman/woman, followed by teacher

### 6.3 Travel behaviour and vehicle ownership

Interviewees were asked what is their main means of transport for day-to-day activities in the study area, and whether anyone in the household owned any type of vehicle, including non-motorised.

Of the 267 household heads:

- 219 (82%) said that walking was their main means of transport.

- 35 (13%) said that they use either piki-pikis or boda-bodas either as driver or passenger
- The remainder use bicycle
- 84 (31%) said that a bicycle was owned by someone in their household
- 54 (20%) said that a motorcycle was owned by someone in their household
- Three (1%) said that a car was owned by someone in their household
- 162 (61%) said that no vehicle was owned by anyone in their household

#### **6.4 Risk Perceptions**

Interviewees were asked if they feel safe when using the roads in the study areas, what factor they thought caused the biggest risk of a crash, and whether they had witnessed a crash within the last three months.

Of the 267 household heads:

- 247 (93%) said they feel unsafe when using the study roads
- Only 20 (7%) said that they feel safe
- 143 (54%) said that some element of the road design or road condition was the greatest risk of causing a crash
- 102 (38%) said that road user behaviour caused the greatest risk
- The remainder said that environmental conditions presented the greatest risk
- 67 (25%) said that they had witnessed a crash within the last three months

#### **6.5 Magnitude of crashes**

The magnitude of crashes is judged based on the number of crashes and their severity.

##### *6.5.1 Number of crashes*

Of the 267 household heads, 14 (5%) said that they had been involved in a crash within the last three months. Of those who had been involved in a crash within the last three months, six (43%) of the crashes had occurred within the last one month. The remaining eight (57%) of the crashes had occurred between one and three months prior to the interview.

Through the interviews with household heads, we also identified a further five crashes in which other members of their households had been involved. This brings the total number of people who had been involved in a crash to 19, equalling 1.5% of the total household population of 1,252.

Of the total of 19 people who had been involved in a crash, we were able to interview 17: all 14 household heads, and three of the five other household members. The two other household members were unavailable to be interviewed.

##### *6.5.2 Severity of crashes*

In order to understand the severity of crashes, all 17 household members who had been involved in a crash were asked the following:

- Which part of their body was most severely injured
- What type of injury they sustained
- Whether anybody else was injured

The responses to these questions are shown in Table 3 below.

**Table 3: Characteristics of injuries sustained**

<b>Characteristics</b>	<b>No. of respondents (n = 17)</b>	<b>%</b>
<b>Body part most severely injured</b>		
Lower limbs	12	71%
Upper limbs	1	6%
Face	1	6%
No injury	3	18%
<b>Type of injury incurred</b>		
Bruising / general body pain	8	47%
Burn	3	18%
Cut	2	12%
Broken bone or dislocation	1	6%
No injury	3	18%
<b>Other person injured</b>		
Motorcycle driver	1	6%
Motorcycle passenger	1	6%
None	15	88%

The table shows that injury was sustained by the household member in the majority (82%) of crashes, and that the majority of those injuries were to lower limbs, with bruising or general pain being the most common type of injury. Another person was injured in only 12% of crashes.

To further understand the severity of crashes, the eight household members who had been involved in a crash within the last one month were asked whether they had:

- Missed any days of normal activity as a result of the crash
- Sought treatment
- Lost any income or incurred any financial cost

The responses to these questions are shown in Table 4.

**Table 4: Characteristics of social and economic impact**

<b>Characteristics</b>	<b>No. of respondents (n = 8)</b>	<b>%</b>
<b>Days of normal activity missed</b>		
0 days	3	38%
1-2 days	2	25%
3-4 days	1	13%
5-6 days	1	13%
7 days	1	13%
<b>Location of treatment sought</b>		
Clinic	3	38%
Hospital	1	13%
Pharmacy	1	13%
No treatment	3	38%
<b>Lost income or incurred financial cost</b>		
Yes	4	50%
No	4	50%



The table shows that at least one day of normal activity was missed in the majority (63%) of crashes. The greatest number of days missed was seven. Treatment was sought as a result of the majority (63%) of crashes, with the most common location for treatment being a clinic. Half of the household members involved in a crash lost some income or incurred some cost as a result.

## 6.6 Characteristics of crashes

### 6.6.1 Demographics of those involved in a crash

Table 5 below compares the demographics of those 17 household members who had been involved in a crash with the demographics of the 253 who had not.

**Table 5: Demographics of those involved in a crash and those not involved in a crash**

<b>Demographic variables</b>	<b>Household members involved in a crash (n=17)</b>	<b>Household members not involved in a crash (n=253)</b>
Gender	14 (82%) male	104 (41%) male
Mean age	28 years	38 years
Main means of day-to-day transport	11 (65%) motorcycle 6 (35%) walking	216 (85%) walking 24 (9%) motorcycle 13 (5%) bicycle
Level of education	5 (29%) completed basic secondary or higher	41 (16%) completed basic secondary or higher
Primary occupation	12 (71%) farmer 1 (6%) boda-boda driver	202 (80%) farmer 1 (<1%) boda-boda driver

The table shows that, in comparison with those household members who had not been involved in a crash within the last three months, those who had been involved in a crash were:

- More likely to be male
- Younger
- More likely to use a motorcycle as their main means of transport
- More likely to have completed secondary school
- Less likely to be a farmer

### 6.6.2 Mode of travel

Of the 17 crashes in which the household members had been involved within the last three months, 15 (88%) had occurred while he or she was on a motorcycle either as driver or passenger.

Of the 15 crashes in which the household member was on a motorcycle at the time of the crash, in 11 (73%) of the crashes, he was the driver of a piki-piki. In three (20%) the he or she was a boda-boda passenger, and in the remaining one (7%) a boda-boda driver.

In the two crashes in which the household member was not on a motorcycle at the time of the crash, one (7%) of them was walking and the other one (7%) was riding a bicycle.

### 6.6.3 Crash location and time

Of the 17 crashes in which the household members had been involved within the last three months, seven (41%) had occurred on the Ihimbo to Itimbo study road and five (29%) had occurred on the Boma la Ng'ombe to Mwatasi study road. This is despite the fact that the Ihimbo to Itimbo road is far quieter in terms of numbers of road users and vehicles than the Boma la Ng'ombe to Mwatasi road, and could perhaps be a reflection of the higher speeds used along the Ihimbo to Itimbo road and/or the fact that motorcycles are less likely to carry a passenger.

Four (24%) of the crashes had occurred on other unsealed roads in Kilolo District, meaning that a total of 16 (94%) crashes had occurred on unsealed roads in Kilolo District.

Of the 17 crashes in which the household members had been involved within the last three months, 15 (88%) had occurred during daylight hours. The remaining two (12%) had occurred during the dark.

#### 6.6.4 Crash contributory factors

The factors that contributed to the crashes were investigated through two different questions of the survey – firstly by asking the household member what they thought the primary contributory factor was, and secondly through the RA’s interpretation of the household member’s description of the crash.

The household member was asked their opinion in all 17 crashes that had occurred within the past three months. The RAs only obtained the crash description<sup>2</sup> from those household members who had been involved in a crash in the past one month, and so their interpretation was only made for the eight crashes that occurred in the month prior to the interview.

Household members and RAs were asked to choose from one of five categories of contributory factors:

1. Road user behaviour: Defined broadly as ‘some element of human error’
2. Road design and condition: Defined broadly as ‘some element of road engineering’
3. Environmental conditions: Defined broadly as ‘some element of the immediate environmental conditions’
4. Vehicle condition: Defined broadly as ‘some element of the condition of one or more vehicles involved’
5. Other (specify)

These categories are defined in more detail in Annex A.

As crashes commonly have more than one contributory factor, the RAs were asked to select two contributory factors for each crash – one primary factor and one secondary.

#### Household members’ identification of contributory factors

Table 6 shows the contributory factors as allocated by the household members interviewed.

**Table 6: Crash primary contributory factors as allocated by household members**

<i>Contributory factor category</i>	<i>Crashes identified through survey at Boma la Ng’ombe to Mwatasi (n=9)</i>	<i>Crashes identified through survey at Ihimbo to Itimbo (n=8)</i>	<i>Total crashes (n=17)</i>
<i>Road user behaviour</i>	1	2	3
<i>Road design and condition</i>	6	0	6
<i>Environmental conditions</i>	1	5	6
<i>Vehicle condition</i>	1	1	2
<i>Other</i>	0	0	0

Of the 17 crashes in which the household members had been involved within the last three months, each of the environmental conditions and road design and condition were identified as being the primary cause in six (35%) of the crashes.

<sup>2</sup> Descriptions of crashes identified through the household survey are included in Annex D.

At the Boma la Ng'ombe to Mwatasi study area, road design and condition was identified as the most common primary contributory factor, while at the Ihimbo to Itimbo study area, environmental conditions were identified as the most common primary contributory factor.

### Research Assistants' identification of contributory factors

Table 7 below shows the contributory factors as allocated by the RAs.

**Table 7: Crash primary and secondary contributory factors as allocated by RAs**

Contributory factor category	Crashes identified in survey at Boma la Ng'ombe to Mwatasi (n=3)			Crashes identified in survey at Ihimbo to Itimbo (n=5)			Total crashes (n=8)		
	Pri.	Sec.	Tot.	Pri.	Sec.	Tot.	Pri.	Sec.	Tot.
Road user behaviour	0	1	1	1	2	3	1	3	4
Road design and condition	2	2	4	0	3	3	2	5	7
Environmental conditions	1	0	1	3	0	3	4	0	4
Vehicle condition	0	0	0	1	0	1	1	0	1
Other	0	0	0	0	0	0	0	0	0

The table shows that, according to the RAs, road design and condition was a factor in seven (88%) of the eight crashes. However, in the majority of cases (71%), it was identified as being the secondary contributory factor, while it was identified as the primary factor in two (just 29%) of the crashes.

Road user behaviour and environmental conditions were each identified as a contributory factor in four (50%) of the crashes, although for environmental conditions it was identified as the primary contributory factor in all four cases, while for road user behaviour it was identified as the secondary contributory factor in three (75%) of the four cases.

Road user behaviour and environmental conditions were more commonly identified as contributory factors in the Ihimbo to Itimbo study area, while road design and condition was most commonly identified in the Boma la Ng'ombe to Mwatasi study area.

#### 6.6.5 Police informed

Of the eight crashes in which the respondents had been involved within the last one month, none of the respondents said that the police were informed of the crash.

## 7 Results of motorcycle surveys

### 7.1 Numbers and locations of interviews

A total of 125 motorcycle drivers were interviewed. Table 8 below shows the numbers of interviews carried out at the different study locations.

**Table 8: Numbers and locations of motorcycle driver interviews**

Study area	Location	Number of motorcycle drivers interviewed
Boma la Ng'ombe to Mwatasi study area	Boma la Ng'ombe to Mwatasi road	0
	Boma la Ng'ombe village	48
	Mwatasi village	24
	<b>Total</b>	<b>72</b>
Ihimbo to Itimbo study area	Ihimbo to Itimbo road	21
	Ihimbo village	11
	Itimbo village	21
	<b>Total</b>	<b>43</b>

The table shows that the majority of interviews were carried out in the Boma la Ng'ombe to Mwatasi study area: 72 (58%) interviews were carried out here, while 53 (42%) were carried out in the Ihimbo to Itimbo study area.

Picture 10: A Research Assistant carrying out a motorcycle interview



## 7.2 Demographics of motorcycle drivers

The mean age of the 125 motorcycle drivers was 30 years, with the age range being from 18 years to 58 years. All motorcycle drivers were male.

54 (43%) were operating as boda-boda drivers, while the remaining 71 (57%) were piki-piki drivers. Those who were interviewed while operating as boda-boda drivers all said that boda-boda driving was their primary occupation. Among the piki-piki drivers, farmer was the most common primary occupation, followed by teacher and shop-keeper.

Of the 125 motorcycle drivers, 81 (65%) said that their highest level of education was to complete primary school. 39 (31%) respondents had completed secondary education or higher. Five (4%) did not complete primary school.

Some differences in demographics were identified between boda-boda drivers and piki-piki drivers. These are shown in Table 9 below.

Table 9: Demographics of boda-boda drivers and piki-piki drivers

<b>Demographic variables</b>	<b>Boda-boda drivers (n=54)</b>	<b>Piki-piki drivers (n=71)</b>
Mean age	25 years	34 years
Relationship to motorcycle	24 (54%) were owners	71 (100%) were owners
Level of education	15 (28%) completed basic secondary or higher	24 (34%) completed basic secondary or higher

The table shows that, in comparison with piki-piki drivers, boda-boda drivers are:

- Younger
- Less likely to own the motorcycle they use
- Less likely to have completed basic secondary school

### 7.3 Driving experience

Of the 125 motorcycle drivers, 55 (44%) said that they had over two years of experience driving a motorcycle. Only 31 (25%) said that they own a driving licence, while the remaining 94 (75%) do not own a licence.

This question on how the motorcycle driver learned to drive was added part-way through the study, and so was asked to motorcycle drivers in the Ihimbo to Itimbo study area, but not in the Boma la Ng'ombe to Mwatasi study area. Of the 53 respondents, 44 (83%) said that they had been taught to drive a motorcycle by a relative or friend. Only two (4%) had attended a formal training course. The remaining seven (13%) were self-taught.

Some differences in driving experience were identified between boda-boda drivers and piki-piki drivers. These are shown in Table 10 below.

**Table 10: Driving experience of boda-boda drivers and piki-piki drivers**

<b>Demographic variables</b>	<b>Boda-boda drivers (n=54)</b>	<b>Piki-piki drivers (n=71)</b>
<i>Driving experience</i>	21 (39%) had more than one year of experience	34 (48%) had more than one year of experience
<i>Formal training received</i>	(NB: n=22) 0 (0%) attended formal training	(NB: n=31) 2 (6%) attended formal training
<i>Driving licence</i>	47 (87%) not licensed	47 (66%) not licensed

The table shows that, in comparison with piki-piki drivers, boda-boda drivers are:

- Less likely to have more than one year of experience
- Less likely to have attended formal training
- Less likely to be licensed

### 7.4 Travel behaviour and vehicle ownership

Motorcycle drivers were asked what is their main means of transport for day-to-day activities in the study area, and whether anyone in the household owned any type of vehicle, including non-motorised.

Of the 125 motorcycle drivers:

- 123 (98%) said that motorcycle (either piki-piki or boda-boda) was their main means of transport, with the remaining two (2%) saying walking
- 115 (92%) said that within their household, either they or someone else owns a motorcycle. Between them, their households own a total of 134 motorcycles
- Seven (6%) said that someone in their household owns a car

### 7.5 Risk perceptions

Motorcycle drivers were asked if they feel safe when using the roads in the study areas, what factors they thought caused the biggest risk of a crash, and whether they had witnessed a crash within the last three months.

Of the 125 motorcycle drivers:

- 121 (97%) said they feel unsafe when driving a motorcycle on the study roads. Only 4 (3%) said that they feel safe
- 69 (55%) said that they consider some element of road design or road condition to present the greatest risk of causing a crash
- 48 (38%) said that they consider road user behaviour to be the greatest risk factor
- 52 (42%) said that they had witnessed a crash within the last three months

## 7.6 Magnitude of crashes

The magnitude of crashes is judged based on the number of crashes and their severity.

### 7.6.1 Number of crashes

Of the 125 motorcycle drivers, 30 (24%) said that they had been involved in a crash within the last three months. Of those who had been involved in a crash within the last three months, 12 (40%) of the crashes had occurred within the last one month. The remaining 18 (60%) of the crashes had occurred between one and three months prior to the interview.

### 7.6.2 Severity of crashes

In order to understand the severity of crashes, all 30 motorcycle drivers who had been involved in a crash were asked the following:

- Which part of their body was most severely injured
- What type of injury they sustained
- Whether anybody else was injured

The responses to these questions are shown in Table 11.

**Table 11: Characteristics of injuries incurred**

<i>Characteristics</i>	<i>No. of respondents (n = 30)</i>	<i>%</i>
<b><i>Body part most severely injured</i></b>		
<i>Lower limbs</i>	19	63%
<i>Upper limbs</i>	5	17%
<i>Head</i>	1	3%
<i>Face</i>	1	3%
<i>No injury</i>	4	13%
<b><i>Type of injury incurred</i></b>		
<i>Bruising / general body pain</i>	17	33%
<i>Cut</i>	6	20%
<i>Broken bone or dislocation</i>	3	10%
<i>No injury</i>	4	13%
<b><i>Other person injured</i></b>		
<i>Motorcycle passenger</i>	7	23%
<i>Pedestrian</i>	2	7%
<i>None</i>	21	70%

The table shows that injury was sustained by the motorcycle driver in the majority (87%) of crashes, and that the majority of those injuries were to lower limbs, with bruising or general pain being the most common type of injury. Another person was injured in 30% of crashes.

To further understand the severity of crashes, the 12 motorcycle drivers who had been involved in a crash within the last one month were asked whether they had:

- Missed any days of normal activity as a result of the crash
- Sought treatment
- Lost any income or incurred any financial cost

The responses to these questions are shown in Table 12.

The table shows that at least one day of normal activity was missed by the motorcycle driver as a result of the crash in the vast majority (92%) of cases. Half (50%) missed five days or more. The greatest number of days missed was 14. Treatment was sought as a result of three-quarters (75%) of crashes, with the most common location for treatment being a clinic. The majority (83%) of drivers involved in a crash lost some income or incurred some cost as a result.

**Table 12: Characteristics of social and economic impact**

<b>Characteristics</b>	<b>No. of respondents (n = 12)</b>	<b>%</b>
<b>Days of normal activity missed</b>		
0 days	1	8%
1-2 days	4	33%
3-4 days	1	8%
5-6 days	1	8%
7-8 days	2	17%
9-10 days	0	0%
11-12 days	0	0%
13-14 days	3	25%
<b>Location of treatment sought</b>		
Clinic	5	42%
Hospital	1	8%
Pharmacy	3	25%
No treatment	3	25%
<b>Lost income or incurred financial cost</b>		
Yes	10	83%
No	2	17%

## 7.7 Characteristics of crashes

### 7.7.1 Demographics of those involved in a crash

Table 13 below compares the demographics of those 30 motorcycle drivers who had been involved in a crash with the demographics of the 95 who had not. The table shows that, in comparison with those motorcycle drivers who had not been involved in a crash within the last three months, those who had been involved in a crash were:

- Younger
- More likely to be a boda-boda driver
- Less likely to own the motorcycle they use
- Less likely to have more than one year of experience
- More likely to have been trained by a friend or relative
- Less likely to be licensed

- Less likely to have completed secondary school

**Table13: Demographics of those involved in a crash and those not involved in a crash**

<b>Demographic variables</b>	<b>Motorcycle drivers involved in a crash (n=30)</b>	<b>Motorcycle drivers not involved in a crash (n=95)</b>
Gender	30 (100%) male	95 (100%) male
Mean age	27 years	31 years
Nature of motorcycle	16 (53%) were boda-boda drivers 14 (47%) private piki-piki drivers	38 (40%) were boda-boda drivers 57 (60%) private piki-piki drivers
Relationship to motorcycle	18 (60%) were owners	77 (81%) were owners
Driving experience	19 (63%) had more than one year of experience	74 (78%) had more than one year of experience
Formal training received	(NB: n=10) 9 (90%) taught by friend or relative	(NB: n=43) 35 (81%) taught by friend or relative
Driving licence	26 (87%) not licensed	68 (72%) not licensed
Level of education	7 (23%) completed basic secondary or higher	32 (34%) completed basic secondary or higher

### 7.7.2 Mode of travel

Of the 30 crashes in which the motorcycle drivers had been involved within the last three months, 15 (50%) had occurred while the respondent was driving a boda-boda, and 14 (47%) while the respondent was driving a piki-piki. One of the boda-boda drivers interviewed had been involved in a crash which had occurred while he was riding a bicycle.

### 7.7.3 Crash location and time

Of the 30 crashes in which the motorcycle drivers had been involved within the last three months, ten (33%) had occurred on the Boma la Ng'ombe to Mwatasi study road and nine (30%) had occurred on the Ihimbo to Itimbo study road. This is despite the fact that the Ihimbo to Itimbo road is far quieter in terms of numbers of road users and vehicles than the Boma la Ng'ombe to Mwatasi road, and could perhaps be a reflection of the higher speeds used along the Ihimbo to Itimbo road and/or the fact that motorcycles are less likely to carry a passenger.

Seven (23%) of the 30 crashes had occurred on other unsealed roads in Kilolo District, meaning that a total of 26 (87%) crashes had occurred on unsealed roads in Kilolo District.

Of the 30 crashes in which the motorcycle drivers had been involved within the last three months, 25 (83%) had occurred during daylight hours. The remaining five (17%) had occurred during the dark.

### 7.7.4 Crash contributory factors

The factors that contributed to the crashes were investigated through two different questions of the survey – firstly by asking the motorcycle driver what he thought the primary contributory factor was, and secondly through the RA's interpretation of the motorcycle driver's description of the crash.

The drivers were asked their opinion in all 30 crashes that had occurred within the past three months. The RAs only obtained the crash description<sup>3</sup> from those drivers who had been involved in a crash in the past one month, and so their interpretation was only made for the 12 crashes that occurred in the month prior to the interview.

<sup>3</sup> Descriptions of crashes identified through the motorcycle driver survey are included in Annex D.



1. Road user behaviour: Defined broadly as 'some element of human error'
2. Road design and condition: Defined broadly as 'some element of road engineering'
3. Environmental conditions: Defined broadly as 'some element of the immediate environmental conditions'
4. Vehicle condition: Defined broadly as 'some element of the condition of one or more vehicles involved'
5. Other (specify)

These categories are defined in more detail in Annex A.

As crashes commonly have more than one contributory factor, the RAs were asked to select two contributory factors for each crash – one primary factor and one secondary.

### Motorcycle drivers' identification of contributory factors

Table 14 below shows the contributory factors as allocated by the motorcycle drivers interviewed.

**Table 14: Crash primary contributory factors as allocated by motorcycle drivers**

<b>Contributory factor category</b>	<b>Crashes identified through survey at Boma la Ng'ombe to Mwatasi (n=20)</b>	<b>Crashes identified through survey at Ihimbo to Itimbo (n=10)</b>	<b>Total crashes (n=30)</b>
Road user behaviour	8	2	10
Road design and condition	4	4	8
Environmental conditions	5	4	9
Vehicle condition	1	0	1
Other	2	0	2

Of the 30 crashes in which the motorcycle drivers had been involved within the last three months, road user behaviour was the most commonly-identified primary contributory factor, being selected in ten (33%) cases. Environmental conditions and road design and condition were also commonly identified. In both cases where 'Other' was selected, the cause was an animal.

Of the ten crashes in which road user behaviour was identified as the primary contributory factor, eight (80%) were identified through interviews with drivers at the Boma la Ng'ombe-Mwatasi study area, with only two (20%) identified at the Ihimbo to Itimbo study area.

### Research Assistants' identification of contributory factors

Table 15 below shows the contributory factors as allocated by the RAs.

**Table 15: Crash primary and secondary contributory factors as allocated by RAs**

<b>Contributory factor category</b>	<b>Crashes identified through survey at Boma la Ng'ombe to Mwatasi (n=7)</b>			<b>Crashes identified through survey at Ihimbo to Itimbo (n=5)</b>			<b>Total crashes (n=12)</b>		
	<b>Pri.</b>	<b>Sec.</b>	<b>Tot.</b>	<b>Pri.</b>	<b>Sec.</b>	<b>Tot.</b>	<b>Pri.</b>	<b>Sec.</b>	<b>Tot.</b>
Road user behaviour	4	3	7	0	5	5	4	8	12
Road design and condition	1	4	5	2	0	2	3	4	7
Environmental conditions	1	0	1	3	0	3	4	0	4
Vehicle condition	0	0	0	0	0	0	0	0	0
Other	1	0	1	0	0	0	1	0	1

The table shows that, according to the RAs, road user behaviour was a factor in all 12 of the crashes. However, in the majority of cases (67%), it was identified as being the secondary contributory factor: it was identified as the primary factor in four (just 33%) of the crashes.

Environmental conditions were also identified as being the primary contributory factor in four of the crashes, but the secondary factor in no crashes.

Road design and condition was identified as the primary contributory factor in three of the crashes, and the secondary factor in four of the crashes.

Road user behaviour was the most commonly-identified contributory factor in both study areas. Road design and condition was more commonly-identified as a contributory factor in the Boma la Ng'ombe to Mwatasi study area, compared to the Ihimbo to Itimbo study area. Environmental conditions were more commonly-identified as a contributory factor in the Ihimbo to Itimbo study area, compared to the Boma la Ng'ombe to Mwatasi study area.

#### *7.7.5 Police informed*

Of the 12 crashes in which the motorcycle drivers had been involved within the last one month, only one (8%) said that the police were informed of the crash. The crash was not reported to the police in the remaining 11 (92%) cases.

#### *7.7.6 Use of helmets*

Of the 12 crashes in which the drivers had been involved within the last one month, ten drivers (83%) said that they had been wearing a helmet at the time. The remaining two (17%) had not been wearing a helmet.

## **8 Discussion on findings**

This section discusses the most interesting findings of the study, providing a 'snapshot' of the situation in the study areas in late 2014 and early 2015. These findings may be used as a baseline against which to compare any future changes, although it must be recognised that the findings are not statistically significant.

### **8.1 Road and vehicle use**

As possible indicators of development and the availability of transport services, it will be interesting to compare the numbers and types of road users identified through this study with comparable data in the future.

#### *8.1.1 Pedestrians*

The traffic counts found that pedestrians were by far the most common form of road user, averaging over 700 per day along the Boma la Ng'ombe to Mwatasi study road, and almost 200 per day along the Ihimbo to Itimbo study road. 82% of the household heads who were interviewed said that walking is their most common means of transport for daily activities. The majority of pedestrians identified through the traffic count were female.

#### *8.1.2 Motorcycles*

Motorcycles were by far the most common form of vehicle using the roads in the study areas, representing 90% of all motorised vehicles. This is comparable with the findings of similar studies elsewhere in Tanzania (Amend, 2013).

Motorcycles were being used as both private piki-pikis and for-hire boda-bodas, with slightly more piki-piki drivers than boda-boda drivers being identified and interviewed through the motorcycle driver survey. All motorcycle drivers were male, and the majority of motorcycle passengers were also male.

Comparing the demographics and driving experience of piki-piki drivers and boda-boda drivers, the study found that boda-boda drivers were:

- Younger, with an average age of 25 years, compared to 34 years among piki-piki drivers
- Less likely to own the motorcycle they use, with 54% of boda-boda drivers owning the motorcycle
- Less likely to have completed basic secondary school, with only 28% of boda-boda drivers having completed basic secondary school
- Less likely to have more than one year of experience, with 61% of boda-boda drivers having less than one year
- Less likely to have attended formal training, with none of the boda-boda drivers having been formally trained
- Less likely to be licensed, with only 13% of boda-boda drivers having a licence

Previous research (Amend, 2014) has found, with statistical significance, that drivers who are 25 years old and less, and drivers who do not own the motorcycle they use, are more likely to have been involved in a crash within the last three months.

The fact that 13% of boda-boda drivers have driving licences, but none of them have received training, indicates that it is possible to obtain a licence without undertaking training.

Almost half of the motorcycles were carrying no passengers and almost 70% were carrying no loads. This shows that many of the motorcycles in the study areas were being used for personal transport, simply transporting the driver from one place to another. 41% were carrying one passenger, 10% two passengers, and 1% three passengers.

Helmets were being worn by half of all drivers, but only 4% of passengers.

### *8.1.3 Other vehicles*

Other than motorcycles, the majority of motorised vehicles seen using the study roads were large trucks carrying timber, with also a few private cars in and around the Boma la Ng'ombe to Mwatasi study area. Very few motorised vehicles, other than motorcycles, were seen in the Ihimbo to Itimbo study area.

### *8.1.4 Vehicle ownership*

Vehicle ownership rates were found to be low, with only 1% of households surveyed owning a 4-wheel motor vehicle, 20% of households owned a motorcycle, and 31% a bicycle. 61% owned no vehicle. However, among motorcycle drivers' households, ownership rates were found to be higher at 6% for 4-wheel motor vehicle, 92% for motorcycle, and 37% for bicycle. Only 5% of motorcycle drivers interviewed said that no-one in their household owned a vehicle.

### *8.1.5 Perceptions of safety*

The vast majority of all people interviewed said that they feel unsafe when using the roads: 93% of household heads and 97% of motorcycle drivers. 25% of household heads and 42% of motorcycle drivers said that they had witnessed a crash within the last three months.

## **8.2 Magnitude of crashes**

The magnitude of crashes is judged based on the number of crashes, represented as a percentage of the number of people interviewed, and their severity. The severity of crashes is judged on the following proxies:

- Body part most severely injured
- Type of injury sustained
- Whether anybody else was injured
- Missed days of normal activity
- Treatment sought
- Income lost financial cost incurred

### *8.2.1 Magnitude of crashes identified through motorcycle driver survey*

Of a total of 125 motorcycle drivers interviewed through the motorcycle driver surveys, 30 (24%) said that they had been involved in a crash within the last three months.

Of the 30 motorcycle drivers who had been involved in a crash, 26 (87%) had sustained an injury. The majority (73%) of the 26 injuries were to the lower limbs, 19% were to the upper limbs, and 8% were to the head or face. The majority (65%) of the 26 injuries were bruising and general body pain, 23% were cuts, and 12% were broken bones or dislocations.

The average number of days of normal activity missed by motorcycle drivers who had been injured was six, with three of those injured each missing 14 days. The driver lost income or incurred financial cost as a result of 83% of the crashes.

The driver sought treatment as a result of 75% of the crashes. Another person was injured in 29% of the crashes, with the majority of these being motorcycle passengers and others being pedestrians.

It should also be noted that of the 17 crashes investigated through the household survey, 15 (88%) of the household members had been either driver or passenger of a motorcycle at the time of the crash.

### *8.2.2 Magnitude of crashes identified through household survey*

The magnitude of crashes among the general population living alongside the roads in the study areas was found to be lower than the magnitude among motorcycle drivers. Of a total of 267 household heads interviewed through the household surveys, 14 (5%) said that they had been involved in a crash within the last three months.

The 267 household heads represented a total of 1,252 people living in the households, including themselves. This equates to a total of 985 other household members, excluding the household heads. When asked if other members of their households had been involved in a crash within the last three months, of all 267 household heads, they knew of a total of only five crashes. Five crashes out of a total of 985 people equates to 0.5% of household members – other than the household heads – having been involved in a crash.

There could be a number of reasons for the large difference in the number of household heads being injured (5%) and the number of other household members being injured (0.5%). These include, perhaps:

- Household heads being more active than other household members, using roads more often and so putting themselves at greater risk
- A lack of reporting of crashes by household members to household heads

Two of the five other household members who had been involved in a crash were unavailable to be interviewed as part of this study, so information was collected from three other household members and all 14 household heads who had been involved in a crash: a total of 17 people.

Of the 17 household members who had been involved in a crash, 14 (82%) had sustained an injury. The majority (86%) of the 14 injuries were to the lower limbs, 7% were to the upper limbs, and 7% were to the head or face. The majority (57%) of the 14 injuries were bruising and general body pain, 21% were burns, 14% were cuts, and 7% were broken bones or dislocations.

The average number of days of normal activity lost by household members who had been injured was three, with one of those injured missing seven days. The household members lost income or incurred financial cost as a result of half of the crashes.

The household member sought treatment as a result of 62% of the crashes. Another person was injured in 12% of the crashes.

Table 16 provides a comparison of the proxies used to judge the severity of crashes between those interviewed through the motorcycle survey and those interviewed through the household survey.

**Table 16: Comparison of severity of crashes: motorcycle survey and household survey**

<i>Characteristics</i>	<i>Motorcycle survey</i>	<i>Household survey</i>
<i>Injury / no injury</i>	<i>87% / 13%</i>	<i>82% / 18%</i>
<i>Injury to upper body, inc. face or head</i>	<i>27%</i>	<i>14%</i>
<i>Broken bone or dislocation</i>	<i>12%</i>	<i>7%</i>
<i>Average / maximum days missed</i>	<i>6 days / 14 days</i>	<i>3 days / 7 days</i>
<i>Treatment sought</i>	<i>75%</i>	<i>62%</i>
<i>Other person injured</i>	<i>29%</i>	<i>12%</i>
<i>Cost incurred or income lost</i>	<i>83%</i>	<i>50%</i>

The table shows that in the crashes identified through the motorcycle driver survey, in comparison to those interviewed through the household survey, interviewees were more likely to have:

- Been injured
- Sustained an injury to the upper body, including face or head
- Broken a bone or dislocated a joint
- Spent more days away from normal activity
- Sought treatment
- Incurred cost or lost income

Also, another person was more likely to have been injured in the crashes identified through the motorcycle driver surveys.

### **8.3 Characteristics of crashes**

The characteristics of crashes include:

- The demographics of those involved
- The mode of travel of those involved
- The location and time of the crash
- The factors that contributed to the crash

The characteristics of those crashes identified through the motorcycle driver survey and those identified through the household survey were found to be largely similar, involving young men and motorcycles, and occurring in the proximity of the study area during daylight hours. The contributory

factors were similar, being related to road user behaviour, road design and condition and environmental conditions, although with road user behaviour being less of a factor in the crashes identified through the household survey. Very few of the crashes were reported to the police.

### *8.3.1 Characteristics of crashes identified through motorcycle driver survey*

The 30 drivers identified to have crashed through the motorcycle driver survey, more often than not:

- Were males in their mid-to-late 20s
- Were boda-boda drivers who did not own the motorcycle that they used
- Had less than one year of experience
- Had no formal training and no licence
- Had been educated to no greater than primary school level

In 29 (97%) of the crashes identified through the motorcycle driver survey, the interviewee had been driving a motorcycle at the time of the crash. In only one (3%) of the crashes, had the interviewee been using a different mode: specifically, a bicycle. Of the 29 interviewees who were driving a motorcycle at the time of the crash, 15 (52%) were driving a boda-boda, and 14 (48%) were driving a piki-piki.

The majority (87%) of crashes had occurred on unsealed roads in Kilolo District. Two-thirds of the crashes were identified through interviews in the Boma la Ng'ombe to Mwatasi study area and one-third in the Ihimbo to Itimbo study area. The majority (83%) of crashes occurred during daylight hours.

Road user behaviour was identified as being the most common contributory factor in crashes identified in the Boma la Ng'ombe to Mwatasi study area, while road design and condition and environmental conditions were identified as the most common factor in the Ihimbo to Itimbo study area.

Common examples of road user behaviour contributing to crashes include the use of excessive speed for the surrounding environment and a lack of ability to negotiate wet and slippery road conditions. Examples of road design and condition contributing to crashes include the narrowness of the carriageway creating difficulty for a motorcycle to pass another vehicle, and the presence of large stones in the road. A very common example of environmental conditions contributing to crashes is a wet and slippery road surface due to falling rain or recent rain.

The police were informed in less than 10% of crashes.

### *8.3.2 Characteristics of crashes identified through household survey*

The 17 household members identified to have crashed through the household survey, more often than not:

- Were males in their late 20s
- Used motorcycles as their main means of transport for daily activities
- Had been educated to no greater than primary school level
- Were farmers

In 15 (88%) of the crashes identified through the household survey, the household member had been on a motorcycle at the time of the crash – either as driver (80%) or passenger (20%). In only two (12%) of the crashes, had the household member been using a different mode: specifically, one was riding a bicycle and the other was a pedestrian.

The majority (94%) of crashes had occurred on unsealed roads in Kilolo District. 53% of the crashes were identified through interviews in the Boma la Ng'ombe to Mwatasi study area and 47% in the Ihimbo to Itimbo study area. The majority (88%) of crashes occurred during daylight hours.

Road design and condition and environmental conditions were identified as being common contributory factors, with road user behaviour less commonly being identified.

None of the crashes were reported to the police.

## 9 Implications and recommendations

This section discusses the implications of the study's findings and provides a set of recommendations for decision-makers and other stakeholders.

### 9.1 Implications

While this study provides only a snapshot of the situation in Kilolo District in late 2014 and early 2015, and cannot be considered representative of a wider population, many of the findings are consistent with previous studies by Amend (2013 and 2014). These findings, and their implications, include the following:

- Even in an area of Tanzania which, based on observations by other transport professionals in 2013, was thought to have few motorcycles, motorcycles are now the most common form of vehicle in the study areas. The finding that motorcycles made up around 90% of all motorised vehicles is comparable to findings from previous Amend studies. Further anecdotal information suggests that motorcycles are now present and common across Tanzania, including in the most remote rural areas. Whereas in the past there were very few motorised vehicles using rural roads, and so very little safety risk, there are now many motorcycles and a significant safety risk. ***The specific implication of this is that all those involved in the planning, design, construction, maintenance and management (including policing) of rural roads need to consider motorcycles and motorcycle safety in their work***
- Motorcycle drivers were seen to be by far the most at-risk group of road users using the study roads, with a far greater number and severity of crashes and injuries. This is consistent with findings from previous Amend studies in other areas. Further anecdotal information suggests that this situation is common across Tanzania. ***The specific implication of this is that those with responsibility for road safety need to target motorcycle drivers***
- There was seen to be very little interaction between the study areas' motorcycle drivers and any type of authority, regulation or enforcement. The majority of motorcycle drivers had received no formal training and had no driving licence. A lack of training results in low driving ability. With no driving licence, drivers are reluctant to report crashes to the police, which in turn means they are ineligible for hospital treatment. ***The specific implication of this is that efforts are needed to ensure that motorcycle drivers in rural areas comply with regulations and have access to services such as training, testing and licensing***
- Reporting of crashes to the police was found to be very rare. Low levels of reporting crashes to the police have been identified through a previous Amend study. This is also consistent with the World Health Organization's rating of Tanzania as a 'country without eligible [RTI] death registration data' (WHO, 2013a). ***The specific implication of this is that efforts are needed to improve the reporting of crashes in rural areas***

- The people found to be involved in crashes and sustaining injuries tend to be young men. Again this is consistent with findings from a previous Amend study. ***The specific implication of this is that those with responsibility for road safety need to target young men***
- Road user behaviour was found to be the most common contributory factor. Again this is consistent with findings from a previous Amend study. ***The specific implication of this is that those with responsibility for road safety need to target the behaviour of road users***
- Road design and condition was found to be a common contributory factor. Again this is consistent with findings from a previous Amend study. ***The specific implication of this is that those responsible for the planning, design, construction and maintenance of roads need to consider traffic composition, and in particular the prevalence of motorcycles in the road design***

## **9.2 Recommendations**

The recommendations detailed below are divided into two sub-sections: the first related to the implications of the findings of the study, and the second related to the specific methodology used to undertake the study.

### *9.2.1 Recommendations related to implications*

#### ***Recommendation 1: Strengthen understanding of motorcycle operations and all safety-related issues in rural areas***

Implementing this recommendation will involve further research in a wider range of rural areas across Tanzania, including research to address specific issues such as barriers to accessing training, testing and licensing services, the development of motorcycle taxi associations and the structure of ownership and use of boda-bodas.

#### ***Recommendation 2: Mainstream recognition of motorcycles as a key user of rural roads***

Implementing this recommendation will include the following activities:

- Considering motorcycles and motorcycle-related safety in the development of all rural road-related policies and guidance, including, for example, the Low Volume Road Design Manual which is currently under development
- Considering motorcycles and motorcycle-related safety in all activities related to the planning, design, construction, maintenance and management of rural roads
- Considering enforcement of traffic laws and regulations in rural areas
- Supporting the establishment of rural motorcycle taxi associations

#### ***Recommendation 3: Target motorcycles and young men through road safety activities***

Implementing this recommendation will include the following activities:

- Road safety campaigns, including both education and enforcement (although perhaps at a later date) targeting motorcycle drivers and passengers, with a particular focus on young men
- Considering motorcycles in all elements of road engineering

#### ***Recommendation 4: Improve access to motorcycle training, testing and licensing in rural areas***

Implementing this recommendation will include the following activities:

- The development of an effective motorcycle training programme, perhaps including a national curriculum covering full training and a basic motorcycle safety awareness programme
- The development of an effective testing and licensing system, starting with a thorough review of the current system
- The development of effective mechanisms to ensure that motorcycle drivers from rural areas can access training, testing and licensing services



***Recommendation 5: Improve the reporting of crashes in rural areas***

Implementing this recommendation will involve liaising with the Tanzanian Traffic Police, which is currently responsible for collecting crash data and the Tanzanian Ministry of Works. The Ministry of Works is currently working with the Graz University of Technology and an Austrian consultancy firm to develop the Road Accident Information System (RAIS). This may provide the opportunity to improve the reporting of crashes in rural areas.

***Recommendation 6: Consider lessons from and implications for other African countries***

In many other African countries – including, for example, Uganda, Kenya, Nigeria, Ghana, Liberia, and Chad – motorcycles are common and are used commercially, as in Tanzania, for instance as motorcycle taxis. Lessons may exist in these countries that could be applied to Tanzania to address the motorcycle safety situation.

Also, in other countries – including Zambia, Malawi, Zimbabwe, Botswana and South Africa – the use of motorcycles is relatively rare. If motorcycles become more widespread in these other countries, it is possible that they will face similar issues to those being faced in Tanzania, in which case they may be able to learn from current experience.

Implementing this recommendation will involve carrying out a study to understand how the lessons learned in Tanzania and other countries where motorcycles are already widespread can benefit the countries where motorcycles are currently uncommon but are expected to increase in numbers rapidly and where motorcycle taxis are currently illegal. It may be that measures can be put in place to ensure that in the first few years of increased motorcycle use in a country, the corresponding increase in motorcycle-related deaths and injuries can be avoided.

***Recommendation 7: Consider powered three-wheelers as near-future users of rural roads***

While not a direct finding of this study, it is the belief of the authors that the number of powered three-wheelers using Tanzania's rural roads will increase rapidly in the coming years. Concurrent research by Amend has revealed that the number of registered powered three-wheelers in Tanzania increased from just 59 in 2003 to almost 54,000 in 2014 (Amend, 2015). The vast majority are currently found in urban areas, although they – in particular the model known as 'Toyo', which can be used to carry both people and goods – could be particularly useful in rural areas.

In order to provide for their increased use in rural areas, powered three-wheelers should be considered in road design and management, including the potential safety implications.

*9.2.2 Recommendations related to methodology*

***Recommendation 8: Continue to develop the standard methodology for 'snapshot' studies of rural road traffic injury magnitude and characteristics***

The 'snapshot' approach is useful for developing an understanding of road traffic injury in a specific location at a specific time, including highlighting specific issues.

The methodology used during this study has effectively provided a snapshot of the RTI magnitude and characteristics in the study areas. However, it is recognised that the methodology is not perfect, and a number of alterations could be made to improve it. These alterations, which should be piloted during the next similar study, include:

- Modifying the survey worksheets, in particular considering the information collected through Sections C and D
- Developing a standard way to categorise the severity of crashes and injuries, for example into Low Severity, Moderate Severity and High Severity

- Recording more detailed information on the road design and condition, to understand what elements of design and condition contribute to crash risk
- Obtaining both primary and secondary contributory factors from survey respondents, as well as from RAs, to allow comparison
- Improving the accuracy and efficiency of data collection and entry, for example through the use of 'tablet' devices
- Developing a standard report template for snapshot studies

Further snapshot studies using a modified and improved methodology could be carried out by Amend or by a third party, either to obtain a future snapshot in the same study areas, to compare against the baseline, or to provide a snapshot in other locations.

***Recommendation 9: Develop a methodology for studies to provide a more robust understanding of rural road traffic injury magnitude and characteristics***

While 'snapshot' studies are useful to give a picture of the situation in a specific location at a specific time, their lack of statistical significance means that they cannot be said to be representative of a wider population. Two specific limitations of this are:

- Third parties, including government decision-makers, may not feel comfortable to make decisions based on the findings
- Snapshot studies do not provide a robust baseline, for example of injury rates, against which the impact of any road safety intervention could be evaluated

In order to overcome these limitations, the development of a methodology to provide a more robust understanding of rural road traffic injury should be considered.

***Recommendation 10: Consider timing of future studies***

This study was carried out during the rainy season. As such, the findings may be quite different from those of a study carried out during the dry season. The timing of any future similar studies needs to be carefully considered, especially if an aim is to make a comparison with this study.

In order to develop a more comprehensive understanding of rural road traffic injury in an area, data collection should be carried out in both the dry season and the rainy season.

***Recommendation 11: Undertake 'snapshot' studies in all countries where AFCAP supports rural road improvements***

It is well established that improving rural roads can bring economic and social benefits. However, it is important that the benefits of AFCAP's work are not offset by an increase in road deaths and injuries and the associated negative economic and social consequences.

In all countries where AFCAP supports the development of rural roads, it is recommended that a snapshot study be carried out to develop a basic understanding of road safety issues. The findings of the study should be disseminated to all relevant stakeholders, to ensure that they understand the challenges and opportunities that exist.

## 10 References

- Amend, 2013. Three studies into road traffic injury on rural roads in Tanzania. AFCAP, UK. 24p, 45p, 51p, 21p and Appendices B, C and E. Available at [http://afcap.org/Document%20Library/AFCAP\\_GEN-060-G\\_AmendFinalReport%20v1.2\\_final\\_12%20Jun%202013.pdf](http://afcap.org/Document%20Library/AFCAP_GEN-060-G_AmendFinalReport%20v1.2_final_12%20Jun%202013.pdf)
- Amend, 2014. A study to determine the causes and circumstances of motorcycle crashes on low-volume rural roads. AFCAP, UK. 64p, 27p, 93p and 95p. Available at [http://www.amend.org/docs/AFCAP\\_AMEND\\_Causes%20of%20MC%20Crashes\\_Final%20Rpt\\_25Sep2014.pdf](http://www.amend.org/docs/AFCAP_AMEND_Causes%20of%20MC%20Crashes_Final%20Rpt_25Sep2014.pdf)
- Amend, 2015. Opportunities to improve road safety through 'boda-boda' associations in Tanzania. AFCAP, UK. 15p. Available directly from Amend or AFCAP
- International Energy Agency, 2008, Energy Technology Perspectives, quoted in United Nations Environment Programme, 2010, Share the Road: Investing in Walking and Cycling Road Infrastructure. Nairobi, Kenya. p10. Available at: <http://www.unep.org/transport/sharetheroad/PDF/SharetheRoadReportweb.pdf>
- Kilolo District Council, 2013. Kilolo District Council Socio-Economic Profile, 2013. Dar es Salaam, Tanzania. Available at: [www.nbs.go.tz](http://www.nbs.go.tz)
- National Bureau of Statistics, 2013. 2012 Population and Housing Census. Dar es Salaam, Tanzania. Available at: [www.nbs.go.tz](http://www.nbs.go.tz)
- Prime Minister's Office for Regional Administration and Local Government, 2013. Local Government Transport Programme (LGTP) Phase II (2012/13 to 2016/17). Dodoma, Tanzania. Available from PMORALG
- Tanzania Traffic Police, 2015. Statistics available directly from Traffic Police Headquarters, Sokoine Drive, Dar es Salaam, Tanzania
- WHO, 2013a. Road Safety in the WHO Africa Region, The Facts. Geneva, Switzerland. 3p. Available at: [http://www.who.int/violence\\_injury\\_prevention/road\\_safety\\_status/2013/report/en/](http://www.who.int/violence_injury_prevention/road_safety_status/2013/report/en/)
- WHO, 2013b. Global Status Report on Road Safety: Supporting a Decade of Action. Geneva, Switzerland. 1p and 50p. Available at: [http://www.who.int/violence\\_injury\\_prevention/road\\_safety\\_status/2013/report/en/](http://www.who.int/violence_injury_prevention/road_safety_status/2013/report/en/)
- Willilo and Starkey, 2013. Rural Transport Services Indicators: Report of the Iringa-Kilolo Road, Tanzania. International Forum for Rural Transport and Development (IFRTD), London, UK for Crown Agents, Sutton. Available at: <http://www.ruraltransport.info/RTSi/docs/RTSi-IFRTD-AFCAP-RoadReport-Tanzania-Kilolo-130630.pdf>

## 11 Annexes

*The Annexes are in a separate document.*

END