

**PATTERNS OF UTILISATION OF MOTORCYCLE TAXIS IN RURAL KENYA:
A STUDY OF RONGO SUB-COUNTY, MIGORI COUNTY**

OBUDHO, SAMORA MARCHELE

**A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE OF MASTER OF ARTS IN SOCIOLOGY IN
THE DEPARTMENT OF SOCIAL SCIENCES OF RONGO UNIVERSITY**

© 2020

DECLARATION AND APPROVAL

This thesis is my original work and has not been presented for examination in any other university or any other institution of higher learning.

Signed..... Date.....

SAMORA MARCHELE OBUDHO

Reg. No: MSOC/8027/2014

We confirm that the candidate carried out the work reported in this thesis under our supervision.

Signed..... Date.....

PROF. WILSON A. P. OTENGAH (PhD)

Department of Social Sciences

School of Arts and Social Sciences

Rongo University

Signed..... Date.....

TAJI I. SHIVACHI (PhD)

Department of Social Sciences

School of Arts and Social Sciences

Rongo University

DEDICATION

I dedicate this research thesis to my family, the supportive rock that my life revolves around, for their immense support during my entire studies.

ACKNOWLEDGEMENT

On the journey to attain my master's degree, I was lucky to meet people who helped me directly and indirectly. It is too long to list them all here, but I would like to list some of those without whose guidance and encouragement I would long give up in despair as I faced seemingly insurmountable difficulties in completing my thesis. First, I would like to acknowledge Rongo University's financial support for this study. My deepest gratitude also goes to my supervisors, Prof. Wilson A. P. Otengah and Dr. Taji I. Shivachi, for creating time from their busy schedules to go through my work. Thank you for your significant input that helped shape up this study. Your patience, encouragement, and guidance throughout this thesis made it a success.

I am humbled and most grateful for the collective efforts of all the study participants. I want to acknowledge them for their willingness to share very personal aspects of their lives. Besides, I thank the senior traffic police officers, Rongo sub-county MT SACCO officials, and community leaders who took time from their busy schedules to share their perspectives on the topic. My sincere gratitude goes to the research assistants' commitment to the significant help and support they offered in this study. Thank you to my classmates for being there for me, for the group discussions we conducted as a class, and for being a family all these years. I appreciated so much your contribution to this piece of work and your support. Thank you much to the family, friends, and colleagues for your continuous encouragement and moral support. Last and not least, to the Almighty God, I wish to express my profound gratitude for the gift of life, good health, and the opportunity to accomplish this mission.

ABSTRACT

The utilisation of motorcycle taxis (MTs) as a public transport mode has increased significantly in many countries. Whereas this sharp rise has somewhat eased public transport challenges in rural Kenya, it appears to be fraught with challenges. This complex paradox has brought forth contestations and (re)negotiation of public opinion on Kenya's public policies. Muted in this discourse is the social actors' role as an integral cog. Authorities must adopt a micro perspective by better understanding patterns of utilisation of MTs before formulating or implementing policies to avoid complications and redundancy in the existing public transportation structure. This study analyses patterns of utilisation of MTs in rural Kenya, focusing on the Rongo sub-county in Migori County. Specific objectives of the study were to determine the prevalence of utilisation of MTs; assess the social characteristics of MT users, and examine the drivers of MT use. Rational choice theory, which informed the conceptual framework, guided the study. This study took a mixed-methods approach, whereby both qualitative and quantitative data were used, employing a descriptive cross-sectional survey design complemented by observation and a desk review. The study sample size was 395 household heads drawn from a population of 29,087. The sample was selected through multi-stage and systematic sampling techniques. Data from main respondents were complemented by information from 10 key informants who were purposively selected. Data were collected through a semi-structured questionnaire, focus group discussions, and key informant interviews. Data collection tools were subjected to validity and reliability tests before being applied. Quantitative data were presented in tables and bar charts after being analysed using descriptive statistics such as averages and percentages. Inferential statistics such as regression analysis were applied to measure the relationship between variables. Qualitative data were analysed thematically, presented as narratives. The study found that frequency of utilisation of MTs is high in the study area. Approximately two-thirds (68.8%) of respondents reported using MTs daily. Most MT trips were over short distances, with some respondents using MTs for non-essential travel over short distances that could be travelled on foot. The satisfaction level with MT was slightly above average, with approximately two-thirds (60.9%) of respondents either satisfied or very satisfied. Despite prevalence of use and satisfaction, most respondents raised safety concerns. Respondents aged 41-50 years (55.8%); those with post-secondary education (55.2%); those married (83.1%); those employed in public sector (55.1%); those earning less than Kshs. 10,000 monthly (68.6%) and those without cars (90.9%) were more likely to utilise MTs. However, there was no significant difference in MT utilisation about gender and motorcycles owned. Timesaving was the key driver for MT utilisation. The study concludes that prevalence of utilisation of MTs is high, even for non-essential short distance travel; some population segments utilise MTs more than their counterparts, and timesaving was the most crucial driver in the study area. It recommends strengthening MT sector safety regulations; sensitising MT users on its safety and health issues, focusing on population segments more likely to utilise MTs; and sensitising public and MT riders on time management.

TABLE OF CONTENTS

DECLARATION AND APPROVAL	i
DEDICATION	ii
ACKNOWLEDGEMENT	iii
ABSTRACT	iv
TABLE OF CONTENTS	v
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF ABBREVIATIONS	xi
OPERATIONAL DEFINITION OF TERMS	xii
CHAPTER ONE: INTRODUCTION	1
1.1 Background of the Study	1
1.2 Statement of Problem	5
1.3 Purpose of the Study.....	6
1.4 Specific Objectives of the Study	6
1.5 Research Questions.....	6
1.6 Justification of the Study	7
1.7 Significance of the Study.....	7
1.8 Scope of the Study	8
1.9 Limitations of the Study	8
1.10 Organisation of the Thesis	8
CHAPTER TWO: LITERATURE REVIEW	10
2.1 Introduction	10
2.2 Prevalence of Utilisation of Motorcycle Taxis.....	10
2.3 Social Characteristics of Motorcycle Taxi Users	15
2.4 Drivers of Motorcycle Taxi Use	20

2.5	Theoretical Framework.....	26
2.5.1	Rational Choice Theory	26
2.6	Conceptual Framework.....	27
2.7	Operationalisation of Variables	30
2.8	Summary of Literature Review	32
2.9	Knowledge Gap	33
	CHAPTER THREE: RESEARCH METHODOLOGY	34
3.1	Introduction	34
3.2	Research Design	34
3.3	Study Area	34
3.4	Population and Sampling.....	36
3.4.1	Sample Size Determination.....	36
3.4.2	Sampling Procedure	37
3.4.3	Inclusion and Exclusion Criteria.....	38
3.5	Data Collection Tools.....	38
3.5.1	Survey Questionnaire	39
3.5.2	Key Informant Interview Schedule	39
3.5.3	Focus Group Discussion Guide.....	40
3.5.4	Observation Checklist	40
3.5.5	Validity and Reliability of the Research Instruments	41
3.6	Data Collection Procedure.....	42
3.6.1	Using the Questionnaire.....	42
3.6.2	Conducting Focus Group Discussions (FGDs).....	43
3.6.3	Conducting Interviews	43
3.6.4	Conducting Observation	44
3.7	Data Analysis and Presentation	44

3.8	Ethical Considerations	45
CHAPTER FOUR: PRESENTATION, INTERPRETATION, AND DISCUSSION OF FINDINGS		47
4.1	Introduction	47
4.2	Response Rate.....	47
4.3	Demographic Characteristics of the Respondents	47
4.4	Prevalence of Utilisation of Motorcycle Taxis in the Study Area.....	51
4.4.1	Frequency of Motorcycle Taxi Use.....	51
4.4.2	Motorcycle Taxi Trip Purposes.....	59
4.4.3	Motorcycle Taxi Users' Satisfaction.....	62
4.5	Social Characteristics of Motorcycle Taxi Users	65
4.6	Drivers of Motorcycle Taxi Use	73
4.6.1	Logistic Regression Analysis.....	78
CHAPTER FIVE: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS		84
5.1	Introduction	84
5.2	Summary of the Key Findings.....	84
5.2.1	Prevalence of Utilisation of Motorcycle Taxis in the Study Area	84
5.2.2	Social Characteristics of Motorcycle Taxi Users.....	85
5.2.3	Drivers of Motorcycle Taxi Use	86
5.3	Conclusions	88
5.4	Recommendations	89
5.5	Suggestions for Further Research.....	90
REFERENCES.....		91
APPENDICES		106
	Appendix 1: Questionnaire for Main Respondents	106
	Appendix 2: Key Informant Interview Schedule.....	110

Appendix 3: Focus Group Discussion Guide	112
Appendix 4: Observation Checklist.....	113
Appendix 5: Map Showing Location of Rongo Sub-county in Kenya.....	114
Appendix 6: Introductory Letter to NACOSTI	115
Appendix 7: NACOSTI Research Authorisation Letter	116
Appendix 8: NACOSTI Research Clearance Permit.....	117
Appendix 9: Photolog	118

LIST OF TABLES

Table 2.1: Operationalisation of Variables	31
Table 3.1: Randomly Selected Sub-Location Population and Sample Population.....	38
Table 3.2: Reliability Analysis	42
Table 4.1: Demographic Characteristics of Household Heads	48
Table 4.2: Motorcycle Taxi Trips in Different Periods.....	54
Table 4.3: Respondents' Satisfaction Level with Motorcycle Taxi Transport	62
Table 4.4: Social Characteristics of Motorcycle Taxi Users.....	66
Table 4.5: Mode Characteristics as Perceived by Respondents	77
Table 4.6: Explanatory Variables in the Regression Model	79
Table 4.7: Logistic Regression Results: ASV Model.....	81

LIST OF FIGURES

Figure 2.1: Conceptual Framework for the Analysis of the Patterns of Utilisation of Motorcycle Taxis in Rural Kenya	28
Figure 4.1: Frequency of Motorcycle Taxi Use	52
Figure 4.2: Motorcycle Taxi Trip Distance	57
Figure 4.3: Motorcycle Taxi Trip Purposes	60
Figure 4.4: Drivers of Motorcycle Taxi Use	73

LIST OF ABBREVIATIONS

BRT	Bus Rapid Transit
FGD	Focus Group Discussion
FPE	Free Primary Education
KI	Key Informant
KNBS	Kenya National Bureau of Statistics
KNPS	Kenya National Police Service
MT	Motorcycle Taxi
NACOSTI	National Commission for Science, Technology, and Innovation
NCRC	National Crime Research Centre
NTSA	National Transport Safety Authority
PI	Principal Investigator
RA	Research Assistant

OPERATIONAL DEFINITION OF TERMS

Conventional Mode of Transport: Any form of rural conveyance (public, private, semi-private) that is not a motorcycle taxi service.

Household: In this study, a household is a group of persons living in the same compound, not necessarily in the same house, and might be associated with blood.

Household Head: A household member who makes key day-to-day decisions on behalf of other members and whose authority to decide is recognised by the household and society.

Motorcycle Taxi: A motorcycle used for passengers and goods' carriage at a fee commonly known as *boda boda* in Kenya.

Public Transport: In this study, the phrase has been used to refer to any travel mode whose use is available to all public members at a fee.

Youth: In this document, the term has been used to refer to persons aged between 18 and 35 years.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Transport infrastructure and services are critical components of economic and social development since they enable the smooth flow of people and goods to facilitate trade and social cohesion. Given the vital role of transportation in economic and social development, All the nations worldwide invest in transport infrastructure and undertake interventions to strengthen transport service systems (Afolabi & Gbadamosi, 2017). One such response designed to enhance transport service systems was the zero-rating of motorcycles in the early years of the 21st Century by most countries in Africa, including Kenya. However, public transportation networks in developing nations are still inadequate and poorly designed (Guillen et al., 2013; Jaligot et al., 2017), resulting in the increasing popularity of commercial motorcycles for transport in rural and urban areas (Afukaar et al., 2019; Al-Hasan et al., 2015; Jaligot et al., 2017).

While virtually all countries in the world have challenges meeting their transport needs, Africa has perennially faced myriad transport challenges. At the transport infrastructure level, Africa faces the challenge of bad roads and sparse road networks. This problem is pronounced in rural areas, where many places are unreachable by road, especially in bad weather (Gamberini, 2014). At the transport service level, over 75% of the population in Africa cannot afford to own any private means of transport (Gumel et al., 2017) and are, therefore, compelled to use public transport. However, access to public transportation is still a challenge for many in Africa due to the high cost of the same, and the commensurately high poverty levels (Afukaar et al., 2019). Access to transport is further constrained by availability challenges related to bad roads and sparse road networks, particularly in rural villages.

Therefore, the increased utilisation of motorcycles as commercial transportation vessels provides a much-needed respite from Africa's transportation challenges (Gamberini, 2014). This stems from the fact that because a two-wheeled motorcycle is smaller than motor vehicles, the former

is more easily manoeuvrable than the latter and can operate off-road and access even remote areas with bad or no roads. Motorcycles are also more affordable to the common man and can easily reach the inaccessible parts through narrow and poorly paved roads (SA & MM, 2018). They are cheaper to maintain than motor vehicles because the former have smaller engines and therefore have better fuel economy, and their parts are more affordable (Almeida et al., 2016). Congruently, acquiring motorcycles is easy. Its low maintenance cost, combined with the known flaws of public transport, has created an environment conducive to utilising motorcycles as an instrument of work, mostly informal.

Motorcycle taxis (MTs) also have other qualities that make them an attractive and convenient means of transport. For instance, their services are easily accessible (Pongprasert & Kubota, 2017). They are not restricted to specific routes like is the case with other public transport vehicles, do not have a fixed schedule, and can provide services in a timely and personalised manner (Hariyatno et al., 2018; Jenkins et al., 2020). Operators enjoy significant economic benefits and regulatory autonomy, as this industry is still largely informal. Any person with a motorcycle, regardless of their capacities or skills to manoeuvre and operate the vehicle, could offer taxi services to those in need of it (Cano, 2018).

Given the preceding advantages, there has been a marked increase in the utilisation of MTs, especially in sub-Saharan Africa. Nigeria, South Africa, and Tanzania have the highest number of MTs in Africa, followed by Kenya, Algeria, Uganda, Egypt, Morocco, Angola, and Ethiopia in that order (Research & Markets, 4/25/2017). Nigeria has the highest number of motorcycles, with about eight million MTs operating across Nigeria (L. George, 1/29/2020). In East Africa, rapid motorcycle growth was mainly driven by a lucrative fiscal stimulus that decreased two-wheelers' price. In 2016, Tanzania had the most MTs in the region at around one million. Uganda had the smallest number of about 200,000 MTs (Muchira, 2016).

Kenya's decision to abolish the import tax on motorcycles in 2007 saw significant motorcycle increases in the country (Asafo-Adjei et al., 2018). The total of registered motor vehicles rose by 32.6% in 2009 to 161,813, compared to 121,831 in 2008 (Kenya National Bureau of Statistics [KNBS], 2010). The rise was attributable to the zero-rating of all motorcycles below 250cc. Probably one of the unintended outcomes of increased access to motorcycles was the utilisation of the same for commercial, in ferrying passengers and goods at a fee. These MTs, popularly known as *boda bodas* in Kenya, have become very popular. According to Kiruga (2019), there were an estimated one million motorbikes in operation in 2019. The repair of motorbikes was identified as one of the few employment sources still expanding in the country. The country registered about 16,000 motorcycles every month, a tenfold increase from the figures for 2010.

With the rising number of MTs in Kenya, health and security stakeholders challenged the government's decision to abolish excise tax on motorcycles assembled locally, leading to MT growth. The main contention is that MTs cause more harm than good. For instance, there are allegations that MTs abet crime, with many reports of armed gangs using motorcycles to quickly get away from crime scenes, besides MTs operators being accused of using the MTs as a front to lure and rob their clients and other unsuspecting victims (Opondo & Kiprop, 2018). Besides insecurity, MTs also threaten health budgets, with figures showing that motorcycles contributed to nearly 14% of road accidents in 2018 (Kenya National Police Service [KNPS], 2018) and 24% of total deaths from road traffic accidents (World Health Organization [WHO], 2018). MT drivers are vulnerable to air pollution in their workplace (Arphorn et al., 2018).

The situation mentioned above presents a complex paradox: while MTs appear to have partially addressed the transport problem, especially in sub-Saharan Africa, they are also perceived to be a significant nuisance, if not an absolute menace. There appears to be a consensus that MTs are more harmful than useful (Olvera et al., 2012; Peraphan et al., 2017). Paradoxically, studies reveal that the perception that MTs are more of a problem than a solution is familiar to most users

in urban and rural areas. Therefore, this situation begs the question: why do MTs continue to be a popular means of travel, especially in rural areas, despite their perceived adverse effects? In addressing this question, there appears to be a consensus (Opondo & Kiprop, 2018; Wonga, 2019) on the need to develop a critical understanding of the patterns of utilisation of MTs.

According to WHO (2019), the four components of utilisation patterns include operator characteristics, the prevalence of use, characteristics of users, and drivers of use. This thesis focuses on three of these aspects, considering that the component of operator characteristics has been extensively addressed by various studies such as Pongprasert and Kubota (2017); Opondo and Kiprop (2018); WHO (2018); Mkutu and Mkutu (2019); Kiruga (2019); and Inaba and Kato (2017), among others. Regarding the prevalence of use, there is evidence of increased usage of MTs in Africa, including Kenya (Olvera et al., 2012; Peraphan et al., 2017). This increase is attributable to the worldwide growth of motorisation, the poor and unreliable transport infrastructure systems, and low-cost motorcycles in terms of purchase and maintenance compared to motor vehicles. Motorcycles are considered reliable and more readily available (Starkey, 2016b). However, contradictory findings by Pongprasert and Kubota (2017) suggest that in rural areas, MTs use is more prevalent than in urban areas, while walking remains the most popular means of transportation in rural villages. Similarly, Afukaar et al. (2019) and Ahmed (2016) argue that rural communities restrict their travel times by postponing journeys and combining trips, thus minimising the use of MTs. Therefore, there is an apparent lack of consensus on the prevalence of MTs in rural areas.

Studies on the characteristics of users are similarly not conclusive. For instance, while Herwangi et al. (2015); Ng and Yi (2016), and Olsen et al. (2017) associate the use of MT with lower socio-economic status, Limtanakool et al. (2006), Afukaar et al. (2019), and Hoang and Okamura (2020), found no relationship between socio-economic status and MT use. In the same vein, Bishop et al. (2018) and Márquez et al. (2018) defined gender as an important determinant of

MT utilisation. However, other studies (Afolabi & Gbadamosi, 2017; Afukaar et al., 2019) reported that the relationship between gender and MT use is inconclusive. Finally, while many studies have attempted to determine MT use drivers, the results indicate that these drivers vary from place to place and even occasionally. For instance, Mbabazi (2019), Afukaar et al. (2019), and Muindi and Nyabuta (2018) identified cost as a significant determinant in Uganda, Ghana, and Kakamega, Kenya, respectively. However, Cano (2018), Asafo-Adjei et al. (2018), and Askari et al. (2020) found no association between cost and MT use in Manila, Ghana, and Uganda, respectively. This study sought to analyse the patterns of utilisation of MTs in rural Kenya.

1.2 Statement of Problem

While MTs have partially addressed the transport challenges in Africa and Kenya, they have also come with myriad challenges, including high rates of road traffic accidents, injuries, and deaths; and insecurity. Despite the challenges associated with MTs, their utilisation continues to increase, begging the question: why are MTs popular despite their apparent disadvantages? In this study's background, available evidence suggests that the challenges associated with MTs can only be adequately addressed when the patterns of utilisation are well understood. The government's attempts to regulate the MT market have targeted MT operators and had the opposite effect of aggravating the problem by distorting market structures, possibly because policies designed to regulate the MT market have failed to address the unique utilisation contexts and concerns.

Therefore, authorities must adopt a micro perspective by better understanding the patterns of utilisation of MTs before formulating or implementing policies to avoid complications and redundancy in the existing public transportation structure. Many MT transport studies concentrate on the sub-Saharan and Asian cities, excluding the peculiar situations prevailing in rural areas. The few studies on rural people's MT travel patterns focused only on relatively few travel measures, ignoring the importance of correlating variables. Also, evidence on users' social

characteristics, which is an essential component of utilisation, is fragmentary. At most, each study analysed only a few social variables and a few travel pattern measurements. The relatively significant competing or alternative social variables have not been considered in most studies.

There is a common assumption that MTs exist because the public lacks alternative mobility and that MTs are less costly than other structured public transport modes. However, there seems to be a consensus that users are not pleased with some MT service aspects, yet loyal users still exist. The critical drivers of MT use cannot be simply extrapolated because using the rural mode of travel depends on several factors, including transport type and mode, user tradition and culture, analytical time, geographical context, among others. Therefore, this study focused on the analysis of the patterns of utilisation of MTs in rural Kenya.

1.3 Purpose of the Study

This study analyses the patterns of utilisation of motorcycle taxis in rural Kenya.

1.4 Specific Objectives of the Study

The specific objectives of the study were:

1. To determine the prevalence of utilisation of motorcycle taxis in the study area;
2. To assess the social characteristics of motorcycle taxi users in the study area;
3. To examine the drivers of motorcycle taxi use in the study area.

1.5 Research Questions

The following research questions guided this study:

1. What is the prevalence of utilisation of motorcycle taxis in the study area?
2. What are the social characteristics of motorcycle taxi users in the study area?
3. What drives motorcycle taxi use in the study area?

1.6 Justification of the Study

No sector has captured the public imagination and everyday discourses in Kenya as MTs commonly known as *boda bodas* and credited for revolutionising mobility, especially in rural Kenya where transport infrastructure is not well developed. MT transport has, therefore, not only transformed everyday lives at individual levels but also brought forth the contestations and (re)negotiation of public opinion on the country's public policies, revived the structure and agency debate about morality both at local and national levels and brought the convergence and mediation of international, national and local political, economic and social happenings on the everyday life of individuals, societies, communities and the state. Whereas all these focuses on MTs from a macro perspective, muted in this discourse is the social actors' role as an integral cog.

Inadequate understanding of MT's role in the rural transportation context could render it a risk than a commuting public service. Authorities must adopt a micro perspective by better understanding the patterns of utilisation of MTs before formulating or implementing policies to avoid complications and redundancy in the existing public transportation structure. In this context, conducting a study on patterns of utilisation of MTs in rural Kenya is ideal.

1.7 Significance of the Study

This research and its findings are significant as it enhances the fundamental understanding of patterns of utilisation of MTs needed for policy formulation or emendation. Such an understanding will help analyse the justifications for and against a government's move to abolish the excise tax on locally assembled motorcycles. The overall benefit would be an enhanced transport service delivery, enabling rural dwellers to access needs, services, and resources to enhance life quality. Last, this study may add to a body of knowledge and reference MT utilisation patterns in rural Kenya. It also identifies areas for further research.

1.8 Scope of the Study

This study was confined to the patterns of utilisation of MTs and did not venture into other aspects of MTs as a public transport mode. This study limited itself to 395 household heads as the main respondents and targeted 10 KIs. The scope confined in terms of methodology whereby the study used a sample and not a census. The geographical scope was the Rongo sub-county, which is part of Migori County in Kenya.

1.9 Limitations of the Study

Some limitations were noticed in this study. First, this study was conducted in a rural setting focusing on respondents' views about the patterns of utilisation of MTs. Therefore, this research results may not be generalisable to urban settings. Second, because this is a cross-sectional study, some detailed spatial and temporal information on the individual's rural travel may not have been covered in this study. When activities are monitored over some extended time (say every day for a month), there is an opportunity to observe these aspects of the individual's behaviour. Given the limitations, this study will give the direction for more comprehensive research into MT utilisation.

1.10 Organisation of the Thesis

This thesis is organised into five chapters. Chapter One is introductory and provides the background to the study, a statement of the problem, the purpose of the study, specific objectives, research questions, justification of the study, the significance of the study, scope, limitations of the study, and organisation of the thesis. Chapter Two reviews the literature on the utilisation patterns of MTs that present the global, regional, and Kenyan experiences. The chapter also addresses theoretical and conceptual frameworks. Chapter Three describes the methodology employed by this study. It presents the research design, description of the study area, target population, sample size determination, sampling procedures, and inclusion and exclusion

procedure. The chapter also describes research instruments, data collection procedures, data analysis and presentation, and ethical considerations.

Chapter Four comprises the data analysis, presentation, and interpretation of the findings. First, it identifies the demographic characteristics. Next, results on patterns of utilisation of MTs are presented. The chapter also presents the frequencies, along with a logistic regression analysis. More qualitative data results are integrated into themes and categories. Chapter Five summarises the major findings of the analysis. This section includes the study's conclusions, recommendations, and areas for further research.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents a critical review of the literature and the knowledge of the patterns of utilisation of MTs. The review was guided by the objectives of the study, thus the thematic approach. Sources of information gathered included textbooks, dictionaries, journals, periodicals, reports, and official documents. This review took a funnelled approach, narrowed down from a global perspective, to Africa, Kenya, and the study area. This chapter also presents the theory behind the study and a structured conceptual framework that reveals the relationship between the variables. The chapter analysed the gaps that the study aimed to fill.

2.2 Prevalence of Utilisation of Motorcycle Taxis

MT utilisation is increasing in many nations worldwide (Olvera et al., 2012; Peraphan et al., 2017). This rise is attributable to the worldwide growth of motorisation and disorganised and unreliable transport networks in several developing countries (Mbegu & Mjema, 2019; Muchira, 2016). In most developing countries, the business attracts small and medium-sized investors; youths and politicians also count MTs as alternative employment (Olvera et al., 2012). Using motorcycles is growing fastest in Asia, though significant growth occurs on most continents, including in highly motorised countries such as those in North America and Western Europe. The four largest motorcycle markets globally are all in Asia: China, India, Indonesia, and Vietnam. The motorcycle is also popular in Brazil's frontier towns.

Bicycle taxis were used for the transportation of people and goods throughout the colonial period in sub-Saharan Africa. With a growing need for cheap public transport, MTs slowly modified bicycles. According to Michael et al. (2012), The use of motorcycles for transport gained acceptance by as many retrenched employees after the economic recession by the Late General Murtala Mahomet administration of 1975/1976, and Nigeria's jobless youth took motorcycles as livelihood means. This use of motorbikes benefits the riders and their community, who get

reliable and accessible transport services. MT transport then spread to other West African nations such as Niger and Cameroon in the 1980s.

Starkey (2016b) argues that MTs are popular in the developing world because of their availability. Other inherent benefits, such as door-to-door operation and the capacity to enter narrow footpaths inaccessible by other driven modes, are fast speeds and cost-effectiveness compared with others. Door-to-door services by MTs could be a starting point for harnessing social capital among MT riders and their communities regarding developing trust, networks, and even a sense of belonging from the interactions. These networks can be utilised for the advancement of all parties involved and the community.

According to Peters et al. (2018), the spread of MT's in Sierra Leone and Liberia began as civil wars ended in the early 2000s. This MT spread was because many car taxis in the neighbouring countries were destroyed or driven to security during the war. Also, lower motorcycle purchase costs than cars and minibuses and the lack of road construction and maintenance have helped develop and rapidly spread MTs in both countries, first in urban areas, then later in rural areas. While MT is omnipresent in Uganda and Kenya as a *boda boda*, its use in West and Central Africa has grown under various local names: *bendskin* in Cameroon, *zemidjan* in Benin and Togo, *okada* or *alalokin* in Nigeria, *oleyiain* in Togo, and *kabu-kabu* in Niger (Singoro et al., 2016).

The two-wheel transport services in East Africa are an invention from Uganda that had developed since the early 1960s at Uganda–Kenya border Busia District and became popular in the 1970s when the border was temporarily closed by Ugandan president, Idi Amin Dada. These two-wheelers were used to smuggle goods across the border of Kenya and Uganda in Busia. Hence, *boda boda* was a phrase made from an English word “border border” in line with the MT's cross border utilisation. Commercial two-wheelers initially appeared in bicycle taxis, which operated across the border of Kenya and Uganda. Later these services were supplemented by motorcycles–

both transport modes are called *boda boda* (Howe, 2003; A. Kumar, 2011). Today, the industry has spread to the different Uganda regions, and the term *boda boda* has spread across the Ugandan borders to the nearby borderland communities.

In Kenya, like Uganda, motorcycles were introduced in the 1960s in Busia town. They spread in both countries to other rural and urban areas, with a rapid spread in Uganda. Using motorcycles flourished significantly in 2008 after the Kenyan government abolished the import duty for motorcycles below 250cc to boost rural and urban transportation and job creation for the youth. The number of newly registered motorcycles went up by 55.1%, from 16,293 units in 2007 to 51,412 units in 2008 and 91,151 units in 2009 in 2008 (KNBS, 2010). The increase in using motorcycles coincided with the utilisation of MTs for transport.

The frequency of MTs is also much higher, although walking remains a popular means of access to routes to the market and other rural areas. This popularity is because the MT services are easily accessible because of their relatively low-cost and availability (Pongprasert & Kubota, 2017). According to Hansen (2015), motorcycles are probably the primary reason Hanoi's streets are not perpetually gridlock. With absent transport alternatives, people need to understand motorcycles because of their different uses and value. The situation would only get worse if emerging competitors replaced millions of motorbikes.

There is increasing evidence that active journeys (cycling or non-leisure walking, such as business travel, shopping) can play a significant role in the overall physical activity levels (Mackett & Brown, 2011; Sahlqvist et al., 2012), with associated benefits for health. Also, brief periods of exercise have been shown to lead to physical and mental health (Warburton et al., 2006). Reduced physical activity is the primary cause of many lifestyle diseases (Bouchard et al., 2015). Rural residents of developing countries move to access a range of services and facilities not available at the beginning of their trips (Starkey, 2016b). Trips required to access basic needs

and services dominate travel patterns in these rural areas (Paramita et al., 2018). The activities are organised for various purposes, including work, educational activities, shopping, and leisure.

Individuals create intricate travel patterns when they participate in day-to-day events in various places and periods (Hoang & Okamura, 2020; Irawan et al., 2019; Parsa et al., 2020). A daily schedule of rural inhabitants in the villages comprises a set of decision-making. These decision-making activities include regular trip patterns, primary trip time, main trip mode choices, and secondary trip mode choices (Vaziri et al., 2014). The emphasis on rural public transport has not decreased, especially as public transport services are restricted to rural villages (Johnston, 2007).

Rural communities have implemented many coping mechanisms to mitigate the negative consequences of inadequate infrastructure in public transport. The most critical one, for instance, is to restrict the times of travel by postponing the journey (Afukaar et al., 2019) or combining trips (Ahmed, 2016). The weekly market visit also involves the use of other facilities. Such an outrageous demand can mask suppressed overall demand on market days.

Ng and Yi (2016) conducted a study on MTs in Kampala, Uganda. They found that MT trips corresponded to prevailing activities, with residential areas being low-income margins and formal business areas peaking. MT begins in urban areas where point-to-point transport is required, spreading to rural villages (Starkey, 2016a). The motorbike is often the first transport choice in Indonesia, and with introducing an online application program, Ojek Online was trendy for taxi services. Ojek Online has a high demand in Depok City, Indonesia. Its customers fill almost the entire square on the streets. Especially at peak times (between 4 pm and 8 pm), they often offer transport services on pavements and sometimes even on the road (Nurhafizhah et al., 2018).

MTs offer services on the footways, particularly during rush hours (Pongprasert & Kubota, 2017). They serve rural villages and provide transport services to people's homes, typically

within a six-kilometre radius (Mbabazi, 2019). Rural MT services are available in nearby small towns usually connected to the national road network and are served by minibuses, buses, and trucks, where people and cargo are collected. These small towns are becoming hubs for those who need to travel further (Al-Hasan et al., 2015; Starkey, 2016b, 2016a). MTs provide point-to-point demand-driven transportation services for travellers and goods. They operate on a relatively small distance (Starkey, 2016a). Motorbike taxis are used mainly for medium distances (5-10 km), similar to private motorcycles, whereas buses are used primarily for long distances, usually over 10 kilometres (Tuan & Mateo-Babiano, 2013).

In most sub-Saharan countries, concerns about MT accidents and safety are rising. MTs can be dangerous, especially for MTs that stop, drive, and service sidewalks and pedestrians (Pongprasert & Kubota, 2017). Motorcycles in Kenya, for instance, accounted for nearly 14% of the fatalities in 2018 (KNPS, 2018), with riders of motorised two- and three-wheelers accounting for 24% of total fatalities from road accidents (WHO, 2018). The law permits only one driver and one passenger in specific countries; in others, only two or three (Bishop & Amos, 2015). MTs, despite strict adherence in the urban area, avoid only the nearby towns (Starkey, 2016a). Four or five passengers can be seen on one MT in rural areas, exceeding legal limits for motorcyclists (Starkey, 2016b).

Rural people also use MT to transport their fundamental needs, such as food, water, clothes, and medicines. These range from everyday items, including foodstuffs and boxes, to unusual items, such as furniture (Ng & Yi, 2016), coffins, and human corpses (Ayanwuyi, 2013). Sometimes the MTs transport quantities of goods strapped on MT are more massive than their capacity (Jenkins et al., 2020). They are loading passengers, livestock, and food bags (sometimes all of them at once) on the back of their motorcycle (Carayannis & Pangburn, 2020).

2.3 Social Characteristics of Motorcycle Taxi Users

Many studies were conducted to examine the effect of people's social characteristics on their travel behaviour. Such studies found crucial links between travel behaviour and variables such as gender, marital status, occupation, age, educational attainment, household car ownership, and families' activities (Hoang & Okamura, 2020; Limtanakool et al., 2006). This relationship is because transport is structured by social inequality regarding transport access and preferences (Herwangi et al., 2015). Social and economic status can impose travel restrictions (Ng & Yi, 2016). According to Olsen et al. (2017), people with the least benefit and those with the most mobility drawbacks are also economically disadvantaged in many other ways. Vulnerable persons suffer because rural transport systems are limited and inconvenient (Afukaar et al., 2019).

In many studies, the difference in MT behaviour due to gender was an important factor (Meyer & Miller, 2010; Rosenbloom & Burns, 1993). Motorcycle ownership is much higher for males than females in Africa for personal or commercial use, mainly due to the standard pattern in vehicle ownership and other assets, which disadvantaged rural women (Bishop et al., 2018). However, some exceptions exist. Porter (2011) found that while they prefer to employ men in their vehicles, many rural women own MTs. The service of private motorcycles by women in French-speaking countries such as Burkina Faso seems to be the highest on the African continent. Women's motorbikes in these countries are more common in urban regions than in rural regions.

Rural MT usage is constrained primarily by cost. MT is a costly means of transportation in rural places. Accessibility and other restrictions based on gender and culture imply that rural women typically have less access to MTs than rural men. The more affluent rural people had become more likely to use MTs on the Jos Plateau, Nigeria, since the 1990s. This likelihood of use by the wealthier people was because of the fares that could be double that of local shorter distances, rural bus fares, and three times the long-distance bus fares. By comparison, the working poor

(men and women) mostly use MTs for short trips in some urban contexts such as Cameroon and Douala, particularly when other public transport systems are not available (Olvera et al., 2012).

Howe and Davis (2002) observed that MT travel gives women a protection level (against exhaustion, wet weather, and undulating landscape) compared to walking. Some significant advantages of MT usage by women are market access and transport access in health emergencies (Porter et al., 2013; Sacks et al., 2016). MT savings can also be valuable for women who struggle to live up to other household and community obligations, such as marginalised women widows of rural Uganda (Naybor et al., 2016). Besides, motorcycles can increase carriage loads (mainly perishable products) compared to head loads commonly allocated to women and children but are potentially physically harmful (ibid). According to Kaumbutho et al. (2013), moving from head carriage to motorcycle usage will reduce farmers' overall cost by about a third in the Meru district. In this context, load carrying is a paid service where girls and women involved in the head carriage can experience a drop in household income by transitioning to motorised transport.

The heavy domestic workload and a wide range of cultural restrictions often limit women's and girls' mobility. According to Tuffour and Appiagyei (2014), the patronage of MT services in Accra Metropolis, Ghana, is gender-based and age-based. Most riders are male and young, rendering most females as passengers. The study found that women in the urban transport sector of Accra Metropolis, Ghana, are less likely to find employment because of the unequal gender-specific power relationships (i.e., "patriarchy").

The freedom that MTs give women can transform their position in society. While MT is almost only a male activity in Africa, Howe and Davis (2002) argue that women have untapped possibilities to move into this field. Women have not stopped their use in certain regions. For example, in Douala, women account for 54% of MT passengers. In the same study, 69% of passengers were young adults between 18 and 34 years (Olvera et al., 2012). Sierra Leone attempts to encourage skills training, security awareness, certification, and registration of

motorcycle transportation businesses involving women operators as part of a ReCAP programme (Peters et al., 2018). In Tanzania, Pikilily trains young women to be motorcycle mechanics (Bishop et al., 2018). These are optimistic examples of shifts in what is still an occupational field dominated by men.

Some men can resist the freedom that MTs give women can transform their position in society (Calvo, 1994). They may equate promiscuity with regular and distant women's travel and thus discourage such trips. In some parts of Uganda, it may not be acceptable to use motorcycle taxis in some communities to monitor movement because of how the passengers are supposed to travel on MT and their proximity to the MT operator (Porter, 2011). Therefore, women frequently ride side-saddle with safety consequences amid shifting attitudes. Also, the intimacy of MT travel is a concern for many users in other countries. The proximity between women travellers and men riders, particularly when women have to hold on to men riders when travelling fast, is often regarded as culturally unacceptable (Gillen, 2016).

Age is another variable relating to preferences for transport mode (Polat, 2012). The patterns of travel have been observed in terms of age, from youth to adulthood. There is evidence that persons 25 to 50 years of age are likely to travel more often than their younger and older peers. Therefore, people over 60 years would prefer more reliable, relaxed, and convenient transportations modes to reduce travel-related stress (Nutsugbodo et al., 2018). A key factor is the perception of safety that differs according to gender, age, and income. Márquez et al. (2018) note that, in Bucaramanga City, Colombia, the number that selected the alternatives were balanced: 48% of the respondents decided on the BRT feeder service, while 52% chose MTs, although users felt the BRT feeder service was safer than MTs. Al-Hasan et al. (2015) conclude that the population's demographic structure has a noticeable impact on public transport demand. The changing population age structure changes the population's transport habits (Konečný et al.,

2019). The changes in demographic structure in terms of population ageing often affect MT's journeys.

MT operators often cannot consider the needs of mobility-restricted passengers, including expectant mothers, older people, and those with long-term impairments and short-term diseases limit the use of the MT in these groups (Porter, 2016; Sacks et al., 2016). However, there are also opportunities for poor and hard to reach communities to access transportation. In Uganda, MT riders developed an emergency transportation system providing expectant mothers access to medical care (Bishop & Amos, 2015). MT riders' participation in the emergency transport scheme was a deliberate decision that allowed them to advertise their services to the broader community and raise demand for services. Bishop and Amos (2015) show that distributing telephone numbers and focusing on cost-effectiveness improved drivers' social status in the communities, improving their businesses.

Guillen et al. (2013), in a study in Davao City, Philippines, indicate that people with low incomes typically rely on informal public transportation systems. The study confirmed the role of social and financial factors in modal decisions. It showed impressive results. The service quality played a significant role in the perceived reliance on conventional (four-wheel) taxis or buses and informal methods (for example, MTs), but a direct part in actual mode use. This study shows the connection of perceived dependence on trip recalls by local modes and supports the theory that shows the role of habit and the impact of "mere exposure." As shown by many linked studies, changing habits is difficult. The real usage of public transportation modes supports this indication, particularly MTs, for short journeys.

In many studies, household composition and income have had a major effect on travel behaviour. Childbearing and retirement are the main phases in the household life cycle, affecting travel behaviour. Therefore, the non-motorised transport types are most often used by families made up of students, the unemployed, and part-time people without children. Older people and high-

income families are less likely to use unmotorised transport modes. Ryley (2006) surveyed the composition of 2910 households in Edinburgh. His study has shown the distinctive travel characteristics of families with children. These households rely heavily on cars as the primary transportation mode, but most do not use cycles and favour bike journeys for recreation and not work trips.

Besides, there has been considerable recent interest in and speculation about the importance of social roles for travel patterns. An individual's role in a household and the broader community is defined not only through workforce participation but also by gender, age, marital status, and the life cycle. For example, McCarthy et al. (2017) show that life activities, such as children's births interrupt routine travel and offer a precious opportunity to affect sustainable transport practices. Studies show that individuals with higher incomes are making more journeys, taking social vacations, driving more distances, and visiting shopping centres more on the weekend (Hanson & Hanson, 1981; Márquez et al., 2018). The motorcycle is more commonly used by low-income people in Latin America (Hagen et al., 2016).

The educational level is an aspect of the usage of MTs. An extra school year has a significant effect on the possibility of many MT trips per month (Gamberini, 2014). In terms of occupation, public transit networks are more likely for students than others, as they are less costly. According to Afolabi and Gbadamosi (2017), the MT users are mainly adults aged between 31 and 40 are MT users; about half of them (53.8%) were married and relatively educated. As transport means, the motorcycles are highly patronised amongst youth and older people with low and middle-income, and higher educational qualifications.

Vehicle ownership increases the chance of travel, particularly on discretionary trips (Inaba & Kato, 2017; Owolabi, 2010). Car and motorcycle owners drive in their vehicles. For most developing countries, motorised travel is not accessible for the household and usually relies on informal private sector public transportation services (Afukaar et al., 2019). According to KNBS

(2019c), approximately 9% of households in Kenya owned a motorcycle. A larger share of rural households (10.8%) than urban (6.7%) owned a bike.

Ownership of motorcycles for personal and commercial use in Africa is much higher for men than for women. It follows a pattern of owning motorcycles and taxis due to gender and cultural constraints. Porter (2011) found that women in the countryside were more than twice as likely as men to own MTs, even though men were employed to operate their vehicles. Women, especially rural women, are at a disadvantage in many parts of Africa and the Middle East regarding public transport access. In rural areas, this limited MT ownership prevents women from using most motorcycles and tricycles in urban areas of many African countries, while men are more likely to use them.

Tuan and Mateo-Babiano (2013) conducted a study on Vietnam's MT service—its socio-economic implications and political dimensions. They found that middle and low-income staff and students are the key consumers. They are between 20 and 50 years of age. Observing their major trips over a week has shown that they mostly use MTs for shopping (31%), followed by work trips (18%). Most do not use MTs daily. For example, only 12% of respondents use it daily, 4% use it twice a week, 13% use it once a week, and most use it once a month or less. This reduced MT usage level was attributable to the fact that most have access to vehicles owned by their families, particularly private motorcycles. The survey found that almost 100% of these households owned at least one motorcycle, and over 60% had two or more motorcycles.

2.4 Drivers of Motorcycle Taxi Use

According to Mbabazi (2019), there is a strong correlation between the characteristics of the trip service and trip patterns. Better public transport is linked to high usage (Imam, 2014). Rural people need timely, predictable, affordable, comfortable, safe, and secure transportation. They also need transport services that convey people with their belongings and (when necessary) their supporters such as parents or helpers (Afukaar et al., 2019; Starkey, 2016b). Public transport

service users link the services offered with their needs, expectations, and service satisfaction (Imam, 2014; Paramita et al., 2018).

User surveys assess the quality of public transport. They are used to gathering information on the service and its users' satisfaction. According to Paramita et al. (2018), policymakers need to consider the current level of user satisfaction of existing modes of public transport. This understanding encourages successful journeys or public transport networks (Olsen et al., 2017). Askari et al. (2020) observed that driver behaviour and practice criteria, vehicle features, comfort, and waiting times could affect taxi users' satisfaction. The essential qualities of satisfaction were vehicle cleanliness, the waiting area conditions, service frequency, and transfer distance (Paramita et al., 2018).

Total travel time in transport is a significant impact on travel patterns. Travel time attributes typically comprise waiting time, ride time, time off the ride, and time to walk. MTs show a surprising level of flexibility in Guangzhou, China (Qian, 2015), and have become essential in ordinary urban residents' daily mobile activities. Peters et al. (2018) state that rural inhabitants in Sierra Leone and Liberia appreciated MTs for offering timely conveyance of people and their belongings. This timely MT transport contrasts with conventional (four-wheel) taxis that only leave when they are full, making travel unreliable and contributes to lengthy waiting times (Afukaar et al., 2019). Paramita et al. (2018) noted a low satisfaction in public transport for passengers with limited options and a long waiting time.

The less time is required, the more likely transportation modes to satisfy travellers (Cohen, 2019). MTs have two principal competitive advantages-speed and agility (Goodfellow, 2015). MT speed continues to be constant (almost 10 kilometres per hour), regardless of road conditions or traffic conditions. (Ng & Yi, 2016). According to Jenkins et al. (2020), MTs may provide a motorised service based on their unique design (narrow and agile, but with substantial loads) for villages linked only by footpaths with the major, secondary, and feeder roads. According to

Márquez et al. (2018), riding on a MT increases the chance of arriving at the destination in the ride's estimated time. The more disruption the journey takes, the more travellers see the journey took longer. If the journey were continuous, the real-time would, however, be the same. According to Paramita et al. (2018), if people congest the vehicles, they may perceive the time for the ride to be longer, as the time for passengers to get on and off is longer. The crowding onboard positively adds to the perceived time of walk and wait.

The need for time is a personal definition for the understanding of time by the individual. Depending on the journey's intent, the value of time will shift, such as daytime travel and leisure travel. Travel time is less critical for leisure than for functional trips, such as a commute. People travel for a long time when they are comfortable (Cohen, 2019). Other factors that might make passengers feel that travel time is less critical include noise level, air quality, the exposure and using telecommunications signals, social impact, desire for variation, conditions suited for productive or private activities, catering, and toilet access (Goodwin, 2019). People cannot accurately calculate travel costs and time and their interaction with other factors (Cohen, 2019). Such people have a delay element in their estimation (Gardner & Abraham, 2007).

Another essential aspect that influences public transport patterns is the frequency of their services. Frequent connections ensure that continuous commuter traffic is regularly available (Afukaar et al., 2019). Daily, weekend, public holiday, and late-night MT services are available (Ng & Yi, 2016) and are convenient and faster, especially at peak times. MT services are conveniently accessible from MT services can be easily reached from 'stalls' in the towns and shopping areas and stops along major roads for passenger services (Starkey, 2016a), offering the only alternative along its routes (Hansen, 2015). Rural MT users frequently complained about the general cost of fares in rural MTs per kilometre. They argued that conventional (four-wheel) taxi or buses are preferable when available (Peters et al., 2018). However, the lack of timeliness

(or lack of punctuality) of such options generates the “demand” for MTs (Bishop & Amos, 2015; Starkey, 2016a).

The efficiency and benefits that rural populations derive from accessing MT via mobile phones are impressive (Starkey, 2016b). A mobile telephone enables rural people to call transport when they need it (Mbabazi, 2019). The access of MTs by mobile phone can be crucial in medical emergencies; for instance, a mobile phone can call a MT to pick up a vulnerable person from home and take them to the nearest hospital, providing convenient door-to-door service (Afukaar et al., 2019). Mobile phones will transform travel within remote rural areas in the coming years, and Porter (2016) praises the expansion of MTs to ensure modern connectivity.

The affordability of transport services also affects public transport patterns. Access to the facilities varies, with poor people in rural areas at a disadvantage. Despite some road connectivity in Africa, the rural poor remain in high transportation costs and limited service availability (Mbabazi, 2019). This high transport cost substantially decreases demand for services, as most rural people consider fares for passengers and goods more than they can afford. The low population density and low-income drive a decline in transportation services in rural villages in sub-Saharan Africa. Afukaar et al. (2019) also argue that the absence of affordable rural transportation has a significant influence on rural people’s quality of life in Ghana. The unaffordability of transport leads to substantial economic and social problems. Since most rural people can afford a small fraction of the cost only of essential services such as healthcare, housing, and education, sufficient demand for these services will be reduced.

Studies have confirmed that higher fares lead to a steep fall in passenger numbers, and when fares are increased without justification, passengers who cannot afford public transport fares get off (Starkey, 2016b). Transportation affordability refers to people’s financial capacity to access vital goods and activities such as employment, school, medical care, daily shopping, and socialisation. Favourable transport will boost disadvantaged commuters’ prospects and attract them,

contributing to economic development and growing social equity. In remote areas, the identification of transport affordability is significant in transport policies and strategies (Panou & Proios, 2013). When a passenger earns more, they look for quality rather than how much they will pay for the distance they will cover. Moneyed people can pay higher fares for quicker trips or more comfort (Starkey, 2016b). Passengers expect value for their money if it costs them high fares.

The MT tariff in Kenya is unregulated. According to Ng and Yi (2016), the fares vary, for example, in the distance, time, place, weather, day, or perhaps even an MT rider's location, e.g., on the roadway or at a stage. The reasons fare increases could be that it is raining (Muindi & Nyabuta, 2018); there is a traffic police operation, so MT riders are expected to part with some money. MT travel fares will also increase during a festive season, so there is a high demand against a constant supply, or the fuel prices are expected to increase. The fares increase at peak times when schools are closed, or the semester has started, or during graduation ceremonies. Users can negotiate and find drivers at lower prices (Ng & Yi, 2016). The fares can fall by about 60% on a two-passenger fare (Starkey, 2016b). According to Jenkins et al. (2020), in rural Liberia and Sierra Leone, sharing a MT with two or three more passengers could lower the client's price. However, traders sometimes prefer to ride alone and depart immediately to reach the market more quickly. They can carry merchandise such that MT riders cannot pick additional passengers along the trip.

Another significant aspect that is influencing public transport patterns is the travel comfort of their services. Commuters want to sit in a comfortable seat with clean seats and a decent driver. The transport service providers achieve this by adapting the vehicle conditions to commuters' expectations (Idris et al., 2019). Other elements that affect comfort in a transport mode include space sharing, crowding (Cohen, 2019), and noise (Goodwin, 2019). For rural residents, freight carriage is essential. For example, rural people wish to travel with their products when they visit

a market to sell agricultural produce. However, they do not want to be inconvenienced by other people's goods (Afukaar et al., 2019). However, MTs with limited passenger and freight capacity is the most popular way to travel by road, but they are uncomfortable. It also exposes passengers to dust, rain, and sun, but their travel time is relatively short, and they travel fast. Individuals want to travel with their belongings and not be bothered by other people's belongings, so they ride motorcycles. Overcrowding in MTs is preferable to waiting for the next vehicle for another hour or two (Afukaar et al., 2019).

Maslow's hierarchy of needs describes safety and security as fundamental human needs (Maslow, 1943). Thus, the public transport service's perception of safety and risk influences travel patterns (Cohen, 2019). Road users are dissatisfied with motorcycles' road safety situation (Afukaar et al., 2019). The safety concerns range from attacks on riders to other occupants. Injuries and deaths from motorised vehicles such as motorcycles are on the rise, and even the local press has classified the work as particularly dangerous. MT travel can be hazardous, with little to no protection (Nurhafizhah et al., 2018). Injuries on motorcycles and tricycles are more frequent and severe than those on a four-wheeled vehicle, including lower limb injuries, including pelvic injuries. Motorists do not benefit from wearing protective clothing, as the number of injured or killed in accidents increases with every kilometre driven, even with protective clothing.

MTs cannot transport persons with disabilities on their own because holding onto a motorcycle can be a challenge, especially for people with special needs such as cerebral palsy, autism, and other handicaps. To transport them more safely, it often requires additional passengers to ride on a motorcycle with those vulnerable individuals sandwiched between the driver and a second pillion traveller (Afukaar et al., 2019). Increased MTs have been linked to increasing pedestrian accidents on the pavement (Pongprasert & Kubota, 2017). Motorbikes were also called "street killers," that failed to manage well-being in an increasingly complicated system. Such depictions

pose motorcycle travel as a significant challenge for physical health. The accounts have established the ‘fact’ that we take for granted: that motorcycles are far more likely than cars to be involved in road accidents. MTs can often stop, drive, and serve on sidewalks, even though they are stopped, driven, and operated from the sidewalk (Qian, 2015).

2.5 Theoretical Framework

This study was guided by the rational choice theory, a framework for understanding social and economic behaviour such as patterns of utilisation of MTs.

2.5.1 Rational Choice Theory

The fundamental premise of rational choice theory is that social phenomena can be explained in terms of individual actions of which they comprise. This theory’s basic concept is that societies’ behavioural patterns represent individual actors’ choices to maximise their benefits and minimise costs (Scott, 1999). People determine how to behave by contrasting the costs and benefits of different acts. They act under explicit constraints, based on knowledge about the circumstances under which they act. Behaviour patterns will develop within society from those choices. The theory emphasises individual social actors, their interests, as the starting point. Social institutions and social change can be understood only through individual actions and interactions. Actors are purposeful or have intentions for a particular goal (Oppenheimer, 2008). Values and preferences form the goal. In this theory, individual actors must expect the outcome of the alternative course of action and decide the course of action to take.

The rational choice theory helped clarify the attitudes, perceptions, and reactions of MT passengers to MTs. For example, given rural communities’ distribution in small village settlements, many rural residents must walk long distances to access public bus services. This point makes it easier to understand why MTs have become a key feature of Kenya’s rural transportation system. It also explains why they appear to expand dramatically, mainly as they provide a first substantial improvement in the transportation conditions of settlements previously

dependent on human power walking and moving goods. MTs supplement public transport system focused primarily on private minibuses. Although MTs partially tackled transport issues in Africa and Kenya, they also faced many challenges, including high road traffic accidents, injuries and deaths, and insecurity. However, despite the challenges associated with MTs, their use in rural Kenya continues to increase, asking: why are MTs common despite their apparent disadvantages? Rural people's interests cannot be realistically overlooked.

The rational choice theory helped enhance understanding of why rural transportation users of different gender, ages, professions, and abilities) prefer MTs and use MTs in different ways. They may prefer the option that maximises benefits in rural people's choice between MT and traditional transport. Similarly, Sen (2009) demonstrated the maximisation of utility as the product of "conscious choice." It means an individual chooses a choice to maximise their usefulness. Here, the rational choice theory is used to understand how rural people make deliberate decisions between MT and traditional transportation to optimise their usefulness, based on their knowledge, even though this comes with myriad obstacles, including high road traffic accidents, injuries, and deaths. Study questions were formulated from the adopted theoretical perspectives and literature review.

2.6 Conceptual Framework

Figure 2.1 presents the conceptual framework used to analyse the patterns of MT utilisation in rural Kenya. The framework shows inter-linkages between the study variables critical to understanding MT utilisation patterns in rural Kenya.

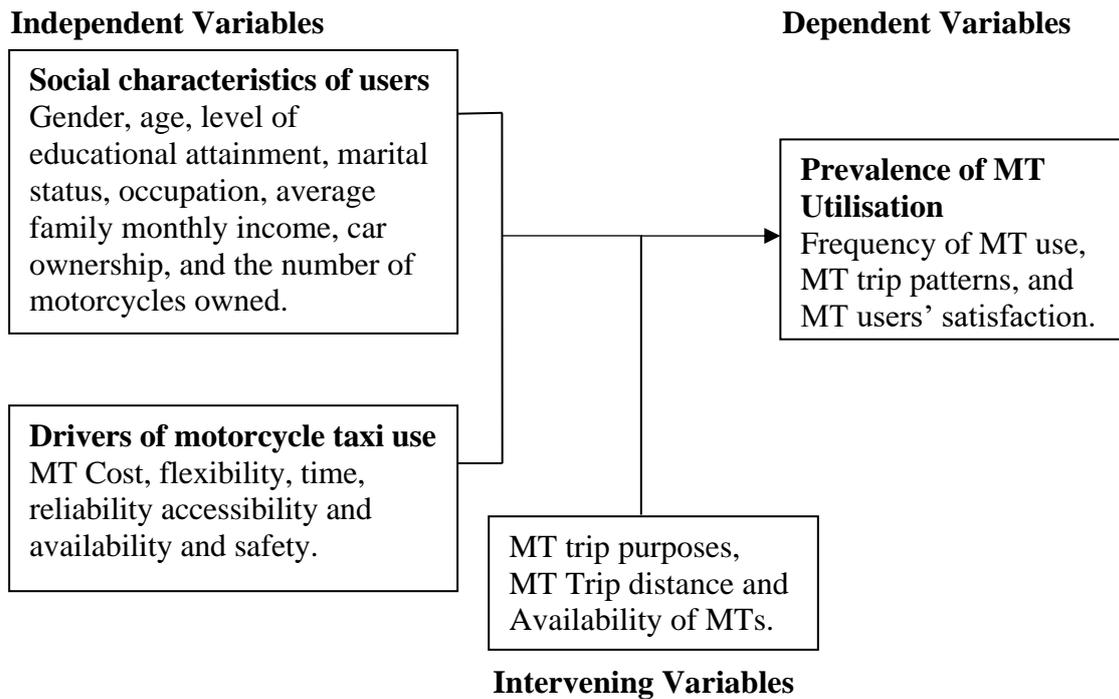


Figure 2.1: Conceptual Framework for the Analysis of the Patterns of Utilisation of Motorcycle Taxis in Rural Kenya

The framework shows the social characteristics of rural people and the drivers of MT use that could influence a rural passenger's actions and behaviour, leading to differences in patterns of utilisation of MTs. This study conceptualises that the social characteristics of MT users and drivers of MT use influenced the prevalence of MT utilisation in terms of frequency of MT use, MT trip patterns, and MT users' satisfaction. The social characteristics of MT users examined in this study were gender, age, educational attainment, marital status, occupation, average family monthly income, car ownership, and the number of motorcycles owned. Some user social characteristics may affect MT use in the study area. For example, age may be linked with MT utilisation. As the literature shows, age-groups in public transport have different views and experiences. MT usage steadily declines as an individual gets old since the old are not physically healthy and may not withstand long journeys' stress. They would, therefore, want to choose ways of ensuring their safety, comfort, and convenience. MT utilisation is more likely to reduce if one

owns a motorcycle. There are increased chances of MT utilisation for none owners, especially with the pressure to meet daily targets.

Regarding drivers of MT use, the conceptual framework shows that MT's service characteristics were the drivers of MT use. The drivers examined in this study included cost, flexibility, time, reliability, accessibility and availability, and safety. Affordability is vital since it represents individuals' or households' financial capacity to compromise their access. The utilisation of MTs offers many advantages such as better accessibility to different areas, ease of maintenance, the relative cheapness of its use, curbing the loss of business working hours, lateness to work, and other challenges associated with traffic jams (Gbagir et al., 2018). Besides offering public transportation along rural roads, two features of MTs enable them to have an even more significant impact. Motorcycles may normally be called by cell phone to provide point-to-point services in good time. They can also cross footpaths and tracks and small bridges (Starkey, 2016a). MTs effectively provide road transportation services to villages and households living off the road. This use of MTs will alter rural access. However, passengers may not choose a mode of transport if it is likely to endanger safety.

In addition, MT travel time is shorter than its counterpart, mainly conventional (four-wheel) taxis or buses. Similarly, there is a significant difference between the travel costs of these two modes; some passengers may prefer MT, whereas others may favour larger vehicles like conventional (four-wheel) taxis or buses. Under this case, the critical advantage of MT is basically for its flexible door-to-door services. Passengers who wish to save their travel time would prefer MT. Those who use the MTs enjoy a shorter travel time, while passengers using the counterparts pay a cheaper total cost. However, safety issues may be a concern for MTs, which is another reason, besides a lower travel cost, for those who opt to patronise conventional (four-wheel) taxis or buses instead of MT. Therefore, the conceptual framework shows the interplay between users'

social characteristics, drivers of motorcycle taxi use, and the prevalence of MT utilisation, especially when there are varied MT trip purposes, distance, and availability.

2.7 Operationalisation of Variables

This study conceptualises that MT service attributes and people's social characteristics play a role in patterns of utilisation of MTs. Many of the role-related factors apply at the individual instead of the household level. Therefore, the focus of this study is on the household head. The operationalisation of the study variables is summarised in Table 2.1.

Table 2.1: Operationalisation of Variables

Objectives	Type of Data Collected			Data Collection Tools	Data Analysis
	Dependent Variable	Intervening Variable	Independent Variable		
To determine the prevalence of utilisation of motorcycle taxis in the study area	Frequency of motorcycle taxi use, MT trip patterns, and MT users' satisfaction.	MT trip purposes, MT Trip distance and Availability of MTs.	Access to motorcycle taxis.	A questionnaire, KI interview Schedule, FGDs Guide, and Observation checklist.	Descriptive statistics; Percentages, mean, standard deviations, and frequencies.
To assess the social characteristics of motorcycle taxi users	Frequency of motorcycle taxi use, MT trip patterns, and MT users' satisfaction.		Gender, age, educational attainment, marital status, occupation, average family monthly income, car ownership, and the number of motorcycles owned.	A questionnaire, KI interview Schedule, and FGDs Guide.	Descriptive statistics; Percentages, Frequencies, and
To examine the drivers of motorcycle taxi use in the study area	Frequency of motorcycle taxi use, MT trip patterns, and MT users' satisfaction.		Cost, flexibility, time, reliability accessibility and availability, and safety.	A questionnaire, KI interview Schedule, and FGDs Guide.	Descriptive statistics; Percentages, Frequencies, and logistic regression model.

2.8 Summary of Literature Review

The review has looked at the global, regional, and local patterns of utilisation of MTs in rural Kenya. It gives an overview based on existing reports and articles of the current state of knowledge on the patterns of utilisation of MTs in rural Kenya. The literature review scrutinises the critical issues about the prevalence of utilisation of MTs, the social characteristics of MT users, and the drivers of MT use. In recent years, the emerging scenario shows that many MT studies concentrate on sub-Saharan and Asian cities, but seldom in rural areas. Only a few reviews have examined the prevalence of utilisation of MTs empirically. One or two simple travel indicators (for instance, the number of trips) in such studies do not highlight the overall travel pattern. The studies combined provide many operational variables for consideration here.

Collectively, past studies have accumulated considerable evidence that people's social characteristics customarily relate to travel behaviour. However, the evidence is fragmentary since the individual study has examined only a few demographic variables and several travel patterns measures. Most of the studies did not consider the relative value of competitive or alternative social characteristic variables. With the exceptions noted in the above review, one of the significant shortcomings of previous work is the inclusion of only a few social characteristic variables in each study.

The literature review also shows that the characteristics of MTs influence the utilisation of MTs in most of the studies. They include cost, flexibility, time, reliability, accessibility and availability, and safety. However, one cannot generalise the variables that have the most influence on MT utilisation. This difficulty in generalisation is because those variables depend not only on each transport system but on many factors, including the type and mode of transport, user traditions and cultures, the time of analysis, and the geographical context. This chapter also discussed the theory that guided this study.

2.9 Knowledge Gap

Many MT transportation studies concentrate on cities in sub-Saharan Africa and Asia, but seldom in rural areas. Only a few studies have empirically examined MT travel patterns. These few studies often use one or two simple travel indicators (for example, the number of trips). Also, there is no way of assessing the relative frequency with which various activities are undertaken without longitudinal data. There can be no assessment of the variety of different activities an individual undertakes. However, this study did not seek to fill this gap but tried to fill the gap in the existing research on MT utilisation in rural Kenya. Also, there is no clear view of how each of several social characteristics relates to unique aspects of complex MT utilisation in rural Kenya. The existing evidence is fragmentary since only a few social variables and few use measures have, at most, been examined in each study.

Although the characteristics of MTs influence the utilisation of MTs in most of the studies, one cannot generalise how MT's cost, flexibility, time, reliability, accessibility and availability, and safety influence on MT utilisation in rural Kenya. These variables are not unique to any transportation system. The variables depend on many factors such as transport type and mode, practice and culture of the customers, time of the study, and geographical context. This study sought to fill these gaps.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research design, study area, target population, sample size and sampling procedure, data collection tools, validity and reliability of research instruments, and data collection procedure. The chapter also discusses data analysis, techniques, and how the study dealt with ethical issues.

3.2 Research Design

This study adopted a mixed-method approach, in which a variety of designs were used to collect both qualitative and quantitative data. The first design, descriptive cross-sectional survey design, was selected because it sought to explore a phenomenon: the patterns of utilisation of MTs in rural Kenya. In the survey design, qualitative data sought to describe respondents' experiences by obtaining answers to the "what, where, how, and when" of the phenomenon. This aspect enabled the main respondents and key informants (KIs) to express their opinions on utilising MTs for transport within and outside their villages. The cross-section aspect enabled data collection on the relationships between variables in time across all ages of eligible respondents. Quantitative data allowed for an analysis of numerical information such as percentages and averages, besides comparing the relationship between variables. Data from the survey was complemented by data collected in a desk review of documents and through observation.

3.3 Study Area

Rongo sub-county, the study area, is one of the eight sub-counties of Migori County, Kenya, in the South-Western part of Kenya. The sub-county is predominantly occupied by the Luo, one of the 42 ethnic groups in Kenya, and covers 213.4 km² (KNBS, 2019b). It is divided into two administrative divisions (Rongo and Chamgiwadu divisions), seven locations, and 22 sub-locations (County Government of Migori, 2018). A map in Appendix 5 shows the location of the Rongo sub-county in Kenya.

Subsistence agriculture is the main socio-economic activity of the Rongo sub-county. Cereals (maize, sorghum, millet), pulses (beans, cowpeas, green grams, soya beans), roots, and tubers (sweet potatoes, cassava) are the major food crops produced in the sub-county. Rongo sub-county has a tropical climate with considerable rainfall for most months and a limited dry season. The driest month is January, and the most prolonged rainfall occurs between March/April and May/June, while the shortest rainfall is between October and December. However, the flat and sumptuous soil in some areas periodically floods and waterlog the area (County Government of Migori, 2019). Due to rainfall availability and favourable climatic conditions, the sub-county can produce enough for its population and transport the excess to the surrounding markets.

Because of its peaceful business environment, a better standard of living, and a rich pool of qualified employees, the sub-county has kept its competitive advantage. The good agricultural soils, coupled with Rongo University's existence, attract people from other areas searching for jobs and educational opportunities. Given the above conditions, the population increased from 100,547 in 2009 (County Government of Migori, 2018) to 124,587, with 29,087 households in 2019 (KNBS, 2019a). In terms of infrastructure development, the sub-county has many buildings. Although it has no rail, port, airport, or jetty, the sub-county is served externally by three major roads. Three major roads radiate from it outside: Kisii-Rongo-Migori Highway, Rongo-Homabay Road, and Rongo-Riosir Road. Most roads are directly connected to nearby towns. The people in the Rongo sub-county have only road-based public transport service modes on which to rely. The above and other factors have contributed to the rapid growth of road transportation in the sub-county.

Rongo sub-county was purposively selected for the study because, as an emerging metropolitan sub-county, urban and rural populations encounter transport service provision problems. There is an uneven distribution of the Rongo sub-county road network with a central part concentration. The sub-county has a well-maintained road network internally in the central town but weak

peripheral roads. In both dry and wet seasons, the urban areas in the Rongo sub-county are accessible. In urban areas, the transport problem is attributed to the concentrated population. While in rural areas, the transport problem is due to poor road conditions and road availability. Therefore, it was projected that the MTs are the chief means of transportation for farmers, workers, and business people to different sub-county parts. The MTs in this sub-county was thus appropriate for generalisation.

3.4 Population and Sampling

The target population for this study was all the household heads in the Rongo sub-county. There are 29,087 households in the Rongo sub-county (KNBS, 2019a). KIs for this study included two senior traffic police officers, two officials of the Rongo sub-county MT SACCO (one from each division), and six community leaders. The six community leaders comprised one ward administrators, one chief, and four village elders - one from each of the data collection sites described in the sampling procedures section.

3.4.1 Sample Size Determination

The sample size for this study was 395 household heads, which was arrived at using Taro Yamane's formula (Yamane, 1967). The formula states:

$$n = \frac{N}{1 + N(e)^2}$$

Where;

n = Required sample size,

N = Size of the target population and given as 29,087 household heads (KNBS, 2019a),

e = Acceptable error and given as 0.05.

The study used the above formula to calculate the required sample size:

$$\begin{aligned}n &= N / (1 + N * e^2) \\&= 29,087 / (1 + 29,087 * 0.0025) \\&= 29,087 / (1 + 72.72) \\&= 29,087 / 73.72 \\&= 394.57 \\&\approx 395 \text{ household heads}\end{aligned}$$

3.4.2 Sampling Procedure

This study employed a two-step sampling procedure. The first step involved a three-stage cluster sampling in identifying the data collection sites. In the first stage, the study area was divided into the two administrative divisions that make up the Rongo sub-county, namely Rongo and Chamgiwadu Divisions. Both divisions were purposively selected because the former is predominantly peri-urban, while the latter is predominantly rural. In the second stage, two locations were purposively selected from each division. Care was taken to ensure that the selected divisions' population reflected the characteristics of the entire division. East Kamagambo and Central Kamagambo were selected from Rongo Division, while South Kamagambo and West Kamagambo were selected from Chamgiwadu Division. The third stage of clustering involved the random selection of two sub-locations from each of the selected four locations. The eight selected sub-locations made up the data collection sites for this study.

Step two of the sampling procedure involved the selection of the actual respondents. In selecting respondents, each of the data collection sites was first allocated a quota, proportionate to the study sample size of 395, as stated in Table 3.1. The study applied the formula: $n_v = (N_v / N) \times n$.

Where:

n_v is the quota allocated to each data collection site;

N_v is the total population (number of household heads) in each data collection site;

N is the total population size of the study area; and
n is the study sample size.

Table 3.1: Randomly Selected Sub-Location Population and Sample Population

Divisions	Selected Locations	Selected Sub-Locations	Total No. of Households	Allocated Quota
Rongo	East Kamagambo	Kyadieto	1,294	58
		Kong'udi	379	17
Chamgiwadu	Central Kamagambo	Koderobara	1,335	60
		Kabuoro	2,222	99
	South Kamagambo	South Kanyajuok	1,027	46
		Kamreri	699	31
	West Kamagambo	East Kanyamamba	1,018	46
		Kangeso	851	38
		Total	8,825	395

Source: KNBS (2019b)

After allocating quotas, a sampling frame was drawn for each data collection site, helped by respective assistant chiefs and their village elders. From each sampling frame, study participants were selected using the simple random sampling method.

3.4.3 Inclusion and Exclusion Criteria

Household heads who stay within the Rongo sub-county, aged 18 years and above, who agreed to participate voluntarily by signing the consent form, were eligible for the study without considering whether they own or operate MT. However, the study excluded households headed by minors aged below 18 years as they were not old enough to provide legal consent. The study also excluded household heads who do not stay in the study area, foreigners, mobile, and deceased.

3.5 Data Collection Tools

The study sourced data from both primary and secondary sources, using a questionnaire, KI interview schedule, FGD guide, and an observation checklist. Besides the primary data, this study got secondary data from relevant online and printed documentation, publications, reports, and

sessional papers relative to MT activities in rural communities in the Rongo sub-county, Kenya, and beyond.

3.5.1 Survey Questionnaire

The primary data collection tool for the study was a semi-structured questionnaire (see Appendix 1). The questionnaire was selected because even when the universe is wide-ranging, it has low costs and is free of the interviewer's distortions: the answer is in the words of the respondents themselves, the respondents have enough time to answer carefully, and large samples can be used, and findings can be accurate and more reliable (Kothari, 2004).

In developing the questionnaire, the study was guided by the research questions and informed by the theoretical and conceptual frameworks. It comprised both closed and open-ended questions. The questionnaire tool was divided into sections A, B, and C. Section A was quantitative and collected information about the respondent's demographic profile, such as gender, age, educational attainment, marital status, occupation, average family monthly income, ownership of a car, and the number of motorcycles owned. Section B, which had both open and closed-ended questions, obtained information about the prevalence of utilisation of MTs. It included questions on the frequency of MT use, types of MT use, and MT users' satisfaction. Section C sought information about drivers of MT use.

3.5.2 Key Informant Interview Schedule

An interview schedule was developed to collect data from KIs (see Appendix 2). This tool was selected because it allows the investigator to reach known people quickly; it is the only way to reach people whose contact details are unknown; it entails talking to people in homes, offices, on-street, or shopping centres. Tuckman (1999) and R. Kumar (2012) recognised that KIs were flexible because the questions could be repeated, and the interviewee's meaning clarified.

The interview schedule comprised a set of questions covering MT use frequency, types of MT use, and MT users' satisfaction. It also included MT users' social characteristics in terms of gender, age, educational attainment level, marital status, occupation, average family monthly income, car ownership, and motorcycles owned. The interview schedule also sought information about drivers of MT use.

3.5.3 Focus Group Discussion Guide

A focus group discussion (FGD) guide (Appendix 3) was developed for this study. The FGD guide was used because it helps understand people's thoughts and feelings (Acocella, 2012). This tool collected information about the frequency of MT use, types of MT use, and MT users' satisfaction. The discussions also included MT users' social characteristics in terms of gender, age, educational attainment level, marital status, occupation, average family monthly income, car ownership, and the number of motorcycles owned. It also sought information about drivers of MT use.

3.5.4 Observation Checklist

An observation checklist (Appendix 4) was used to observe the number of MTs parked at a particular point, the number of MTs moving around in the study area, the number of MT riders, the passenger riding styles, the number of passengers carried on MTs and the items carried on MTs. This information complemented data on the patterns of utilisation of MTs in rural Kenya in the Rongo sub-county. The checklist includes gathering data through observation of the study without interviewing the participants. The data gathered applies to what is taking place and will not be complicated by respondents' past or future behaviour or attitudes (Kothari, 2004).

3.5.5 Validity and Reliability of the Research Instruments

This study assessed the face and content validity of the preliminary research instruments through two expert study supervisors. It tested the questionnaire's reliability for data collection by evaluating how much they measure the common construct (the scale's internal consistency).

a) Validity

Two study supervisors tested the validity of the instruments by validating the study tools. The principal investigator received their views on the relevance, representativeness, clarity, structure and wording, the content, and other relevant parts of the research instruments. Based on the study supervisors' feedback, the study changed, revised, and improved preliminary research instruments for enhancing clarity and face validity. The study was validated by training research assistants (RAs) to understand the study's context, the data collection tool's content, and be competent in administering the tool. This controlled prejudice that could emerge from random errors: incorrect code, incorrect instructions, the fatigue of the interviewee/interviewer, interests, desires, or viewpoints of the interviewer.

b) Reliability

This study ensured reliability by calculating the Cronbach alpha, the most popular numerical reliability coefficient (demonstrating how closely a group of items is linked). The rule of thumb, as suggested by D. George and Mallery (2003), classified Cronbach's alpha coefficient values as >0.8 =Excellent; >0.7 =Good; >0.6 =Acceptable; >0.5 =fair; >0.4 =Poor and <0.3 =Unacceptable. The study showed that the closer the alpha coefficient to Cronbach is to 1.0, the higher the internal consistency of the objects. Cronbach's alpha coefficient was measured and reported for the subscales' internal accuracy in the study. To test the research instrument's reliability, the PI selected a pilot group of 15 people from its target population. This pilot study was done by first stratifying individuals. It also considered gender equity and individuals' geographical background. Table 3.2 presents a reliability analysis.

Table 3.2: Reliability Analysis

	Cronbach's Alpha
Prevalence of utilisation of motorcycle taxis	.842
Social characteristics of motorcycle taxi users	.721
Drivers of motorcycle taxi use	.742

The findings revealed that the prevalence of utilisation of MTs had a coefficient of 0.842. The social characteristics of MT users had a coefficient of 0.721, and drivers of MT use had a coefficient of 0.742. All constructs show that the Cronbach's alpha value is higher than the proposed 0.7 value. The study kept all the items in the subscale since none were inflated. Some also observed that all items correlate to a reasonable degree with a total scale. A correlation with the total scale of above 0.90 would have meant redundancy and duplication of items. Therefore, the study was reliable for capturing the constructs.

3.6 Data Collection Procedure

Before commencing data collection, the principal investigator (PI) notified the County Commissioner, Migori County, and the County Director of Education, Migori County, through a copy of the research authorisation letter (Appendix 7) from the National Commission for Science, Technology, and Innovation (NACOSTI).

3.6.1 Using the Questionnaire

Five RAs were recruited to collect data using the questionnaire. Each of the RAs was a graduate of social sciences, with a good command of the Luo language commonly spoken in the study area. The RAs were then taken through two-day training by the PI before commencing data collection. During the training, the RAs were informed about the study's purpose and then taken through the questionnaire. They were also trained on basic communication skills such as clarity, audibility, interpersonal skills, and the importance of observing etiquette while interacting with

respondents and other public members. RAs were also trained on the ethical principles in social research.

After the training, RAs distributed the questionnaire under the close supervision of the PI. Upon arriving at each selected household, each RA enquired about the household head, then approached the potential respondent and requested him or her to participate, after explaining the purpose of the study. Whenever such a household head consented to participate, the RA issued out one questionnaire, then stayed and waited for the respondent to complete filling it in. RAs were asked to try much not to leave the questionnaire behind. This approach ensured a fairly good response rate.

3.6.2 Conducting Focus Group Discussions (FGDs)

Four FGDs were conducted, one in each of the data collection sites. Each FGD had between eight and twelve participants of the same gender, who had filled up and returned the questionnaire. The dates and venues of each FGD were identified in consultation with participants. All FGDs were conducted in a conducive environment and lasted for approximately one hour.

All FGDs were conducted by the PI, helped by one RA who recorded the proceedings. In this study, participants' consent was required before the FGDs. The PI then guided participants to make ground rules, through which they all were assured of their freedom of expression and confidentiality. The PI moderated the discussions and ensured that each participant got an equal chance to air their views.

3.6.3 Conducting Interviews

Ten interviews were conducted. The PI conducted all interviews while a RA noted down the responses. Each interview took approximately one hour. The dates and venues of each interview were set in consultation with the interviewee. Care was taken to ensure that the venue was conducive and that the interviewee was at ease.

The PI introduced himself and their RA at the beginning of the interview and offered the interviewees opportunity to present themselves. While the interview schedule guided the interviews, the order of questions was not followed religiously and varied depending on the interaction flow. The PI used questioning skills such as probing, reflection, paraphrasing, focusing, and point challenging to guide the discussion. The data gathered was used to complement and validate responses from the questionnaire survey.

3.6.4 Conducting Observation

This study conducted observations at the main termini and along the major roads. The PI and the RAs closely observed and noted the number of MT riders, passenger riding styles, the number of passengers on MTs, the items on MTs, and the riders' general observable behaviour. The observations lasted one week and were conducted from 18th to 24th November 2019. Observations focused on informing complement the survey findings on patterns of utilisation of MTs in the study area.

3.7 Data Analysis and Presentation

The study generated both qualitative and quantitative data from the mixed-methods approach. Qualitative data was generated from FGDs, KI interviews, observations, and open-ended questions in the questionnaire. In contrast, quantitative data came from study observations and the closed-ended questions in the questionnaire. Thematic analysis was used to analyse the survey's qualitative results. The study used NVIVO 11 to come up with themes and patterns found during the data collection process. The software provides an organised and structured approach to analysis, allows easy access to all information when needed as data is imported or created in one database. NVIVO 11 also enabled the investigator to work effectively with different qualitative data types. It made sub-group analysis easier than marking up themes with highlighter pens on paper copies of transcripts.

In NVIVO 11, data were imported from the source: recorded interviews, FGDs, and observation images. Data from open-ended questions in the study questionnaire and observation notes were also created in the software. Nodes were then created based on the questions. The case nodes were set up by gathering all the information given by a respondent. Themes were then coded, and any emerging theme was included. Queries were then used to compare themes, and finally, memos recorded the new findings and ideas. The study then used the themes that emerged from the categories to explain the variables.

Quantitative data were coded, cleaned, and entered in IBM SPSS Statistics V25.0 software. This study used the software because it offers extensive data processing and many statistical analysis procedures that analyse small to detailed statistics. IBM SPSS Statistics V25.0 software was used to generate descriptive statistics from quantitative data. Descriptive statistics simply summarise the sample and the measures (Mishra et al., 2019). Glewwe and Levin (2005) note that simple descriptive statistics like percentages show a considerable advantage over more complex statistics by informing a range of readers of the results because they are easy to understand. Therefore, descriptive statistics were necessary for this study because it helped visualize and summarise large amounts of data to make them more manageable.

Inferential statistics are also used to draw conclusions from different study participants (Kothari, 2004; Thompson, 2009). In this study, inferential statistics included a logistic regression model run in IBM SPSS Statistics V25.0 to examine the drivers of MT utilisation. The study presented qualitative data in narratives, while quantitative data was presented in tables, bar charts, and pie charts.

3.8 Ethical Considerations

Permission to conduct this study (Appendix 8) was obtained from NACOSTI through the Rongo University School of Graduate Studies (Appendix 6). Before commencing data collection, the

study notified authorities by a copy of the research authorisation letter (Appendix 7). The Rongo University Ethical Review Board and NACOSTI reviewed and approved the study proposal, its informed consent document, and the research instruments. The study also acknowledged the respondents' confidentiality, anonymity, and privacy and ensured that the study did not hurt the study area communities. Assurance to keep the information gathered confidential in the consent form was also included in the study.

CHAPTER FOUR: PRESENTATION, INTERPRETATION, AND DISCUSSION OF FINDINGS

4.1 Introduction

This chapter presents the study findings. The findings are presented as per the study objectives. The chapter begins with a presentation of the questionnaire returns, followed by a description of respondents' characteristics. This is followed by a presentation of the results, their interpretation, and a discussion of the same for each research question.

4.2 Response Rate

Out of 395 copies of the distributed questionnaire, 289 were filled and returned, which amounts to a return rate of 73.2%. According to R. Kumar (2012), a response rate of 50% and above is adequate for descriptive surveys. This, therefore, implies that this study's return rate of 73.2% is adequate. The high return rate could be attributed to the PI, ensuring that each of the selected respondents understood the purpose of the study and was persuaded to participate. However, despite the best efforts, some household heads were engaged in their daily routines and could not participate in the study because it could interfere with their earnings.

4.3 Demographic Characteristics of the Respondents

The study sought to explore the demographic characteristics of the respondents who participated in the survey. This information was deemed appropriate to decide if the respondents were a representative sample of the target population to generalise study findings. The specific demographic information investigated included gender, age, educational attainment, marital status, occupation, average family monthly income, car ownership, and the number of motorcycles owned, as presented in Table 4.1.

Table 4.1: Demographic Characteristics of Household Heads

Total N=289			
Socio-demographic Characteristic		Frequency (n)	Percentage (%)
Gender	Male	230	79.6
	Female	59	20.4
Age-Group	30 and below	37	12.8
	31-40	81	28
	41-50	96	33.2
	51-60	56	19.4
	Above 61	19	6.6
Educational attainment	No formal schooling	5	1.7
	Primary	72	24.9
	Secondary	126	43.6
	Post-secondary	86	29.8
Marital Status	Single	13	4.5
	Married	206	71.3
	Separated/Divorced	31	10.7
	Widowed	39	13.5
The Main Occupation of Household Head	Unemployed	24	8.3
	Retired	63	21.8
	Farmer	154	53.3
	Civil servant	17	5.9
	Employed in private sector	31	10.7
Average Family Monthly Income in Kenya Shillings (Kshs.)	5,000 and below	89	30.8
	5,001-10,000	114	39.2
	10,001-20,000	50	17.3
	20,001-30,000	17	6
	Above 30,000	19	6.7
Car Ownership	Yes	28	9.6
	No	261	90.4
Number of Motorcycles Owned	1	33	11.3
	2	7	2.4
	3	5	1.6
	Above 4	2	0.6
	None	243	84.1

As shown in Table 4.1, slightly more than three-quarters (79.6%) of respondents were male. This finding indicates that most households in the study area are male-headed, typical in Kenya's most rural areas. More than two-thirds of rural households in Kenya are male-headed (KNBS, 2018a). The finding that most households are male-headed could have implications on rural MT transport, considering that women's participation in decision-making on transport matters could be diminished, resulting in skewed transport solutions favouring men.

The study also found that approximately two-thirds (61.2%) of all respondents were aged between 31 and 50 years, as stated in Table 4.1. Table 4.1 further shows that slightly more than one-tenth (12.8%) of the respondents were below 30 years, while 6.6% were above 60. This finding conforms to the population structure in Kenya (KNBS, 2018b). The results in Table 4.1 have ramifications on rural transport since they imply that a considerable proportion of the respondents, over 90%, are still in their active years and are likely to be frequent users of various modes of transport.

Data in Table 4.1 also reveals that the study area's literacy level is relatively high, with almost three-quarters (73.4%) of the respondents having attained at least secondary school education. Among those who had completed secondary school, close to one-third (29.8%) also had post-secondary qualifications. Only a very minute proportion (1.7%) of the respondents had no formal schooling. Some studies (Muyanga et al., 2010; Ogola, 2010; Owuor et al., 2018) have attributed the high literacy rates in the study area to Kenya's free primary education (FPE) programme in January 2003. However, this argument does not account for the older generation who completed school before introducing FPE. Until recently, the FPE program did not extend to secondary school. Therefore, the argument mentioned above cannot explain the overall high literacy rate in the study area, which is higher than the national average. This study, thus, posits that the high literacy rate could be related to the local community placing a high value on formal education and formal employment, with individuals with both high education and white-collar jobs being regarded highly in terms of social status.

Close to three-quarters (71.3%) of the respondents were married, and only 4.5% were single, as shown in Table 4.1. The rest of the respondents were separated/divorced or widowed at 24.2%. The findings indicate that a higher percentage of household heads in the study area are married. This finding is mirrored by KNBS (2018a) that found that in Migori County, 64.4% of the adult population was married, 28.2% were never married, and 16.4% were divorced/separated or

widowed. In the study, the marital status is relatively higher, while the proportion of single household heads is low. This finding could be attributed to the fact that people get and stay married for cultural reasons in rural areas. Married life is a respected social institution in this study area and is a peaceful co-existence that translates to supportive co-existence, fostering family stability. Household heads who are single, divorced, separated, or widowed are more disadvantaged in human and financial resource availability than their married counterparts; hence, they can influence transport services utilisation.

Slightly more than half (53.3%) of the respondents were engaged in peasant farming, and approximately one-fifth (21.8%) were petty traders, as stated in Table 4.1. It is essential to point out that, as revealed in Table 4.1, only 16% of the respondents were formally employed. This finding indicates that the mainstay of the study area is peasant farming. This indication was confirmed by secondary data (KNBS, 2015) and qualitative data from FGDs and KI interviews. Respondents disclosed that even those in formal employment, or petty trading, complement their activities with some peasant farming. This finding has implications for rural transport since peasants need to access markets to sell farm produce and purchase inputs. However, considering that they are peasant farmers, the implication is that the farm inputs and produce to be transported are in small quantities. This social status could act as an impetus for the utilisation of MTs. Another implication of the data in Table 4.1 is related to latent unemployment. Viewed against educational attainment data, data on respondents' occupation shows that the two are not commensurate. While literacy level is relatively high, this is not accompanied by a corresponding level of formal employment. The implication of this could be reflected in the high number of MTs riders in the study area, as revealed by casual observation and qualitative data from FGDs and KI interviews.

Regarding levels of income data in Table 4.1 reveals that approximately two-thirds (70%) of the respondents earn less than Kenya shillings 10,000 per month. This finding on income levels could

be connected to the predominant occupation, peasant farming, as shown in Table 4.1 and is in line with the KNBS (2015). Agriculture in Kenya remains a primary driver of rural growth and improved livelihoods, but it is mostly semi-subsistence (Olwande & Mathenge, 2012). Any way to raise many rural poor people out of poverty will require some transformation of small farming into a more commercialised production system. The utilisation of MT transport would improve poor farmers' access to markets, thus providing hope for them to increase production viability to earn cash incomes.

Information regarding car ownership was also recorded, and as Table 4.1 shows, only 9.6% of the respondents own at least one car. Therefore, data on car ownership shows that the study area's motorisation level is low, affecting the utilisation of MTs. Not surprisingly, about 16% of the respondents owned at least one motorcycle in the study area, as shown in Table 4.1, which also mirrors the 2019 population census results that 10.8% of the rural households owned a motorcycle (KNBS, 2019c).

4.4 Prevalence of Utilisation of Motorcycle Taxis in the Study Area

The first objective of the study was to establish the prevalence of utilisation of MTs in the study area. Under this objective, the study investigated the frequency of MT use and average MT trip distance, besides assessing the level of satisfaction with MTs. The findings of that investigation are presented in this section.

4.4.1 Frequency of Motorcycle Taxi Use

This study sought to establish the frequency of MT use. It asked respondents about how frequently they used MTs. The findings reveal that the frequency of utilisation of MTs is high in the study area, as shown in Figure 4.1.

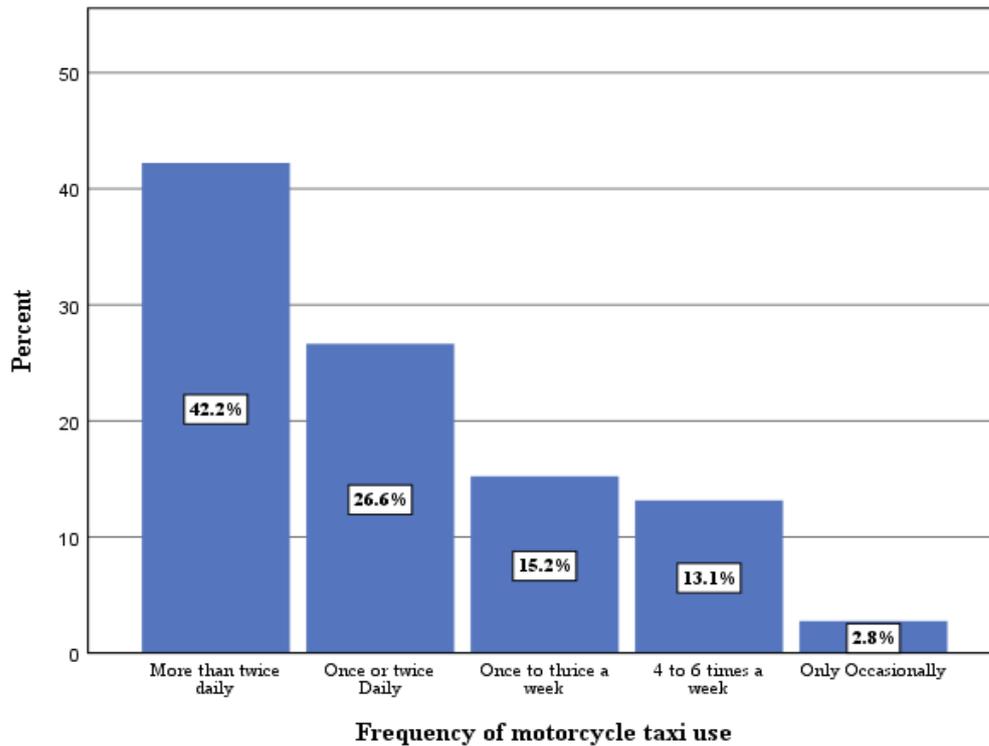


Figure 4.1: Frequency of Motorcycle Taxi Use

As shown in Figure 4.1, approximately two-thirds (68.8%) of respondents used MTs every day, with more than one-third (42.2%) being more frequent users because they use MTs more than twice daily. Only about 2.8% of respondents use it only occasionally. Data in Figure 4.1 was verified by qualitative data, which revealed that the frequency of utilisation of MTs is relatively high. As confirmed by a key informant in the study:

“In Rongo sub-county, so many people rely on MTs for transport. Without them, many people cannot get around quickly at all” (Ward administrator, North Kamagambo, December 2019).

Therefore, this study revealed that most respondents in the study area are very reliant on MT for mobility. This reliance on MT could be attributed to the fact that very few have access to vehicles owned by their families, as the survey results in Table 4.1 showed that only 9.6% of the households that the respondents belonged to owned a car and less than 16% of the households that the respondents belonged to had one or more motorcycles. The variation in the frequency of MT use lies in the purpose of the MT users’ trips. For example, a user who employs MT services

only once a week is more likely to go to a market than an office; the opposite might be true for a user who uses MT services 4 to 6 times a week to reach their workplace.

This finding of this study on the frequency of MT use is in line with other studies on MT transport. For example, Gamberini (2014) indicates that many rural mobility forms are central to rural communities' way of life. Starkey (2016a) also indicates that traffic mainly includes pedestrians and motorcycles on the narrow, low-capacity rural roads that connect the village to main roads (or towns). The researcher notes that the absence of adequate transport infrastructure forces many rural people to use public transport under rural geographical features. MT transport enables access to sites within the Rongo sub-county and even outside it.

To corroborate the information obtained on the frequency of MT use, the study observed MTs in the study area. The observation results, which documented the MTs availability, trip patterns, and average MT trip distance, are presented in the section below.

a) Availability of Motorcycle Taxis in the Study Area

Data from observation and corroborated by qualitative data from FGDs shows that finding a MT in the study area is relatively easy, considering the sheer numbers and presence. Data from observation revealed that MTs are available in abundance at very many points within the study area. Throughout the study area, MTs were observed parked at sheds constructed for that purpose, dotted all over. They were also observed waiting for customers at main rural road junctions or under trees. Other MT riders could also be seen riding around the study area without passengers scouting for clients. A key informant further revealed that most of the frequent users have contacts of several riders in their phones, further reinforcing convenience since the riders are available at the client's convenience:

“Almost everyone I know... even the people who drive cars has several boda boda guys [motorcycle taxi riders] who transport them” (MT SACCO official, South Kamagambo)

This study's findings on the availability of MTs are in line with related studies conducted on MTs. For example, according to Starkey (2016a), although rural dwellers often complain about the services of MTs, and prefer using motor vehicles, they are compelled to use the former due to availability. Afukaar et al. (2019) also noted that many riders in rural Ghana were already using cell telephones so customers can call them. The researcher posits that passengers choose MTs because no suitable alternatives exist.

b) Patterns of Motorcycle Taxi Trips

This study investigated MT trips during different periods and at various locations in the study area and observed that the trips peak at different times and days. The study also noted that most trips appear to converge on Rongo town as the most common destination. The results of MT trip at different times of the day are presented in Table 4.2.

Table 4.2: Motorcycle Taxi Trips in Different Periods

Category	Point of Interest	Percentage of Points of Origin (O) and Points of Destination (D) Based Trips at Different Times of the Day									
		05:00-10:00		10:01-13:00		13:01-16:00		16:01-20:00		20:01-05:00	
		O	D	O	D	O	D	O	D	O	D
Formal commercial and business areas	Regional centre	7	9	13	15	15	15	17	11	14	9
	Main markets	9	12	14	15	15	15	17	12	12	7
	Public institutions	8	9	12	11	14	14	11	10	8	6
	Places of leisure	4	2	4	2	2	2	5	3	20	18
Hospitals and health facilities		4	4	4	5	4	11	5	9	3	3
Education centres	Universities	3	11	7	11	12	9	8	7	4	4
	Schools	0	16	0	3	2	1	12	0	0	0
Small-scale and informal places of business		9	9	9	10	10	12	11	10	11	12
Agricultural areas		5	5	5	4	4	2	3	2	3	1
Centres of worship		3	3	3	4	2	2	4	3	1	3
Residences based on respondents' level of income (Kshs.)	Less than 10,000	16	6	14	6	7	7	5	14	8	11
	10,001- 25,000	14	5	9	4	4	5	4	10	6	10
	25,001-40,000	12	4	4	4	3	4	2	9	4	8
	Over 40,000	6	3	3	2	3	4	1	5	3	7
Total		100	100	100	100	100	100	100	100	100	100

Table 4.2 also shows that MT trips to commercial areas peak from mid-morning to mid-afternoon. The heavy flow of MT traffic at these hours shows that the study area is essentially a daytime economy. Interestingly, these peak hours also apply to health facilities. Even more

impressive is the revelation that although both the questionnaire and FGDs pointed to using MTs to commute to work, Table 4.2 does not show a marked intensity in traffic during early mornings and late evenings, which are the typical times for reporting to, and leaving work respectively. This apparent contradiction could be related to the small proportion of persons engaged in formal employment, as stated in Table 4.1.

Table 4.2 also reveals an interesting phenomenon: MTs in the study area operate throughout the day, suggesting a high utilisation rate. This observation contradicts previous studies, which suggest that MTs in rural areas operate only during the daytime (Jaligot et al., 2017). Table 4.2 shows that even though MT traffic intensity reduces from late afternoon, it does not die off completely. Quantitative data from observation, which was confirmed by qualitative data from FGDs and KI interviews, showed that certain specific MTs waiting points operate throughout the day and night. Qualitative data from FGDs and KI interviews further revealed that the main clients for night travel in the study area include revellers moving to and from places of entertainment, worshipers travelling to churches for overnight prayers, mourners attending overnight vigils at funerals, and the occasional passengers. The passengers alight at Rongo town from long-distance travel. The data mentioned above indicate that although the study area is mainly a daytime economy, activities continue, albeit slower, even through the night. However, night activities are mainly inclined towards social rather than economic purposes.

Therefore, data in Table 4.2 implies that MTs are used for commercial and social purposes, and contradict Gamberini (2014) findings that rural people use the MT service mainly to sustain or establish social connections. As shown in this study, the people in the study area, predominantly rural, use MTs for commercial and social purposes. Therefore, this study concurs with Starkey (2016a), who found that MTs are used to transport agricultural produce to markets and transport rural dwellers to shops, government facilities, health facilities, and educational institutions.

Table 4.2 also shows that the origin and destination points in the mornings and after working hours were mostly residential areas, particularly among the respondents with low-income levels. This finding reflects MTs' dependence among respondents with low levels of income. The activities of MTs in medical and educational centres were consistent, with increased demand at a specific time interval. Rongo University, for example, was the most common destination.

This study also reveals that Rongo town in the study area is mostly an economic hub and not necessarily a residential place. This can be deduced from Table 4.2, which shows that traffic flow to the town is heavy between 10:00 and 13:00 hours, with the traffic outflow from the town peaking in the evenings. Table 4.2 further shows a shift in activities from Rongo town to smaller centres in the late afternoons. This finding shows that the day population of Rongo town is higher than its night population and that many people live away from the town. This finding has implications on the utilisation of MTs since it could contribute to the high prevalence of utilisation. The revelation that Rongo town has a higher day population, viewed with the data in Table 4.1, in which a tiny proportion of the study area's people owns motorised transport, implies that the study area has a high commuter population, necessitating the availability of public transport solutions. This finding concurs with Afukaar et al. (2019), who found that MTs utilisation is higher in rural areas with high proportions of commuters who do not own private motorised transport.

c) Average Motorcycle Taxi Trip Distance

The study established MT trip distance by looking at frequency distribution for all MT trips' distances in kilometres. The findings are as presented in Figure 4.2.

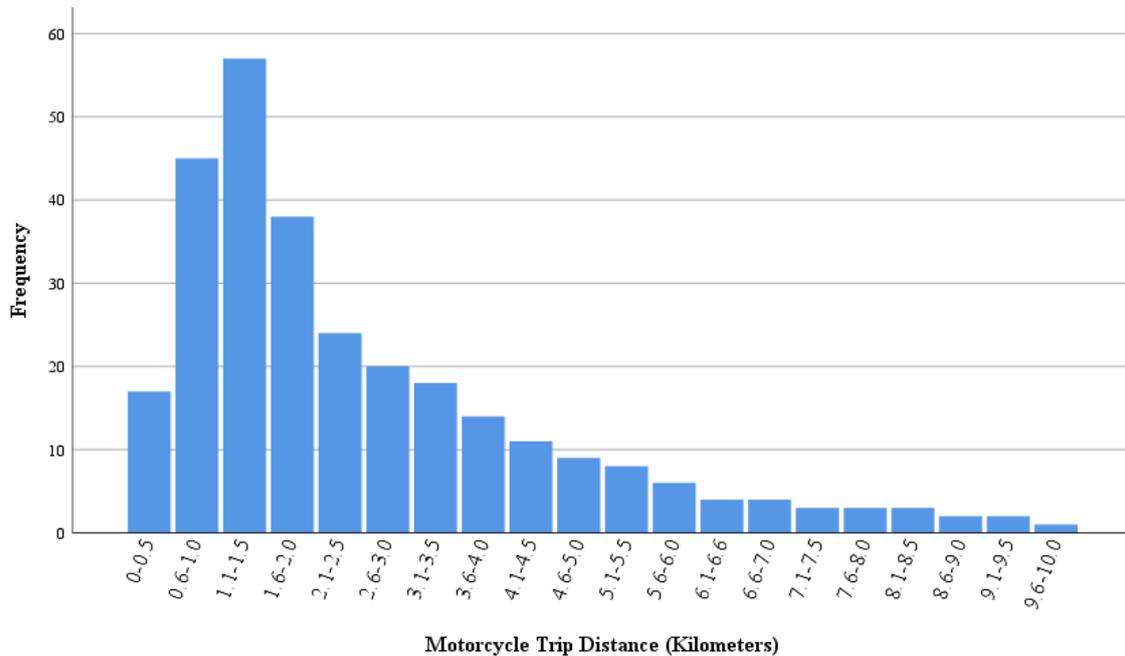


Figure 4.2: Motorcycle Taxi Trip Distance

Figure 4.2 illustrates that most of the MT trips were between 600 metres and two kilometres, with very few long-distance trips of over five kilometres. Average MT trip distances are considerably shorter at 2.98 kilometres. The data in Figure 4.2 were corroborated by qualitative information from FGDs, which indicated that the average time taken in each trip ranged between three and 30 minutes.

“Walking is today abnormal in the view of many people in Rongo sub-county who have embraced boda boda [MTs] for public transport” (FGD01, Male, Age 30, December 2019).

These findings might infer a delimiting role for MT services. In the rural public transportation scene, MT services might be suitable to provide mobility for short- to mid-range trips only. A lengthy trip on MT would make it a less desirable option as safety, convenience, and cost would highly influence a commuter’s trip-making decision. Data in Figure 4.2 also point towards an emerging trend in rural mobility: overreliance on motorised transport for routine travel. This study suggests that increasingly, the rural population is walking less and utilising motorised transport more frequently. This is evidenced by the revelation that MTs are utilised for short

trips, which would previously be covered on foot. Qualitative data further revealed that some of these trips are for non-essential travel that could not be urgent. As expressed by one key informant:

“Most people in this area are used to motorcycle taxi travel...even for short distances and in travels that are not emergency... they prefer a motorcycle taxi to walk” (MT SACCO official, South Kamagambo).

This trend has health implications since overreliance on MTs, especially for non-essential travel between short distances, may contribute to reduced physical activity, which is the primary cause of many lifestyle diseases (Bouchard et al., 2015). There is rising evidence that active travel (walking or cycling for non-recreational activities, including trips for commute, business, and shopping) can substantially contribute to physical activity levels (Mackett & Brown, 2011; Sahlqvist et al., 2012), with related health benefits. Brief workouts have proved to lead to physical and mental well-being. (Warburton et al., 2006). The researcher notes that policy initiatives to promote active travel (primarily walking and cycling) have become a strategy to address lifestyle disorders associated with high levels of obesity, diabetes, heart disease, and other diseases compared to motorised transport such as MTs.

In extending the significance of trip distance as an indicator of MT usage among commuters, the location of operational MT stations should come to mind. Data in Figure 4.2 was compared with quantitative data from observation on the general state of roads in the study area, which showed that while most of the major roads were in motorable condition, the feeder roads were not perfect. Qualitative data revealed that MTs drop their passengers right at the passengers' doorstep when transporting them to their homes. FGDs revealed that MTs use short-cuts to reach their destinations.

This finding implies that MTs may not always use the major roads and often use roads that may not be in motorable condition. The probability of using MT coarsely depends on the distance of the individual's destination inside the rural villages. Given this, the results in Figure 4.2 are inconclusive with previous findings by Bishop et al. (2018), who aver that MTs thrive in areas where rugged terrain makes other types of vehicles challenging to operate. Similarly, Starkey (2016a) also suggests that MTs use is prevalent in rural areas with bad roads. MTs provide feeder services connecting off-road to various and more accessible motorised transportation types, bringing passengers from rural areas to urban areas with paved roads.

This study indicates that MTs are prevalent in the study area even for short distances, even though the major roads are fairly good. However, the revelation that MTs also use roads not in motorable condition implies this assertion is inconclusive.

4.4.2 Motorcycle Taxi Trip Purposes

This study sought to establish the motorcycle taxi trip purposes. The respondents were asked their most common MT trip purposes. The findings revealed that people utilise MTs primarily to access workplaces in the study area, as shown in Figure 4.3.

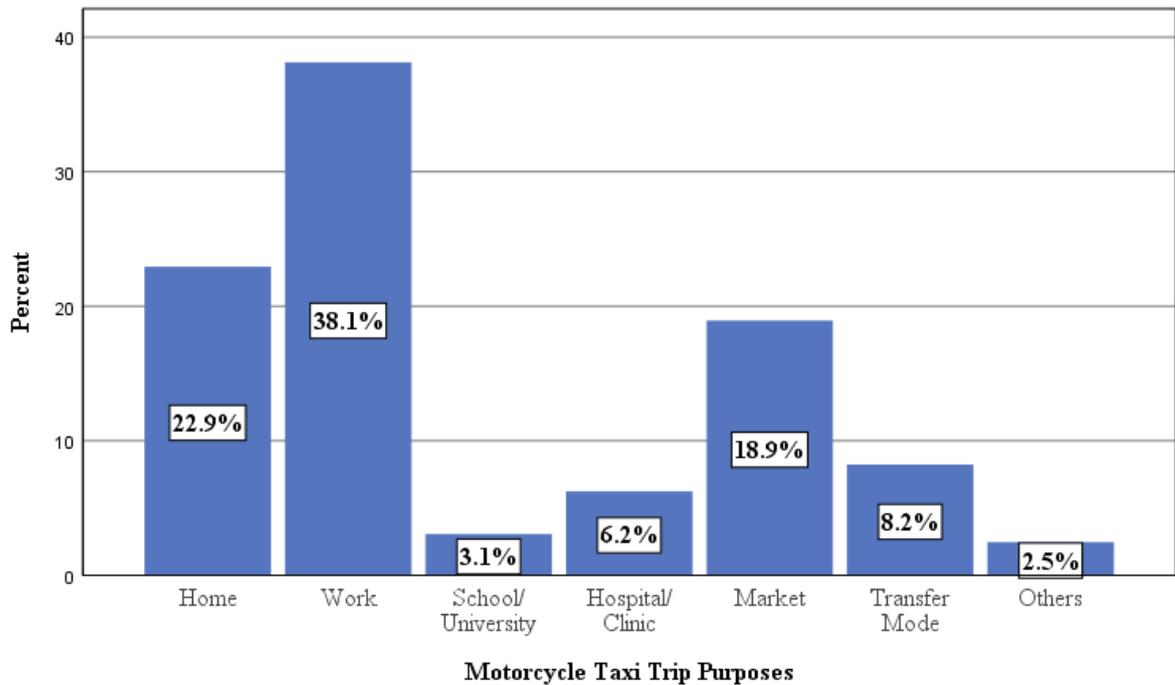


Figure 4.3: Motorcycle Taxi Trip Purposes

As illustrated in Figure 4.3, 38.1% of the respondents' MT trips are for work; about 30% are trips for going home from various places in the study area. About 19% are market-bound trips, and the remaining 20% is divided into MT trips for transfer to other modes of transport (8.2%), Hospital/clinic trips (6.2%), school/university trips (3.1%), and other trips (2.5%), most of which were identified as 'personal' trips. Qualitative data from FGDs confirmed the use of MTs for these purposes. For example, a participant from an FGD who was a primary school teacher and a cooking gas dealer reported that:

“If the customers need them urgently, I just call a motorcycle taxi rider to deliver, and I do not have to waste too much time saying I am going to be late and all of that” (FGD07, Male, Age 29, December 2019).

Besides, MTs in the study area is often used for medical emergencies, as KI echoes: *“If I have to travel urgently to hospital, I just use the motorcycle taxi and travel”* (Village elder 04, December 2019). A focus group participant also indicated that: *“I normally use motorcycle taxi for emergency only because the risk is there.”* (FGD02, Female, Age 31, December 2019).

The study findings reveal the different motorcycle trip purposes with varying types of users as passengers, cargo-users, or both. There is a correlation between the two entities; specific trip purposes are more travelled using MTs than others. For example, work trips have the highest proportion of MT trips (38.1%). It shows there are social and other factors linked with a MT trip purpose. For example, children's need to travel comfortably, and perceived safety influences the school transport mode selection. These factors are subjective but seem to receive a higher weighting than objective factors, such as trip time and trip distance. The perceived safety and convenience are perhaps prioritised here as parents take their children to school on their way to work.

These findings align with related studies showing that motorcycle trip purposes vary from one user to the other. For example, a survey conducted by Kolawole and Afolabi (2017) found that over half of the MTs are used to travel for professional reasons. Also, Dahunsi and Owoeye (2016) noted that Sociability is another consideration in MT use. According to Gamberini (2014), workers and employees use MTs to travel to work, and MTs promote transportation to village medical facilities and markets. Pregnant mothers, sick people, and the elderly and disabled find them useful, as they are usually the only motorised transport available for their travel to medical centres (Starkey, 2016a).

MT's use to get to work as the most popular reason for using MTs could be attributed to poor road conditions in rural villages in Kenya. Workers living in these rural villages also need mobility to work. The readily available, convenient, and affordable means of transport is the more affordable MTs that match their purchasing power.

4.4.3 Motorcycle Taxi Users' Satisfaction

In establishing the prevalence of utilisation of MTs in the study area, this study sought to assess users' satisfaction with MTs. Towards this end, respondents were asked to rate their level of satisfaction with the MT transport service. Table 4.3 presents the findings.

Table 4.3: Respondents' Satisfaction Level with Motorcycle Taxi Transport

Strongly Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied	Total	Min.	Max.	Mean	Std. Dev.
24	33	56	143	33	289	1	5	3.44	1.098
8.3%	11.4%	19.4%	49.5%	11.4%	100%				

Table 4.3 indicated that the level of satisfaction with MT services is slightly above average, with a mean of 3.44 on a scale of 0-5. Approximately two-thirds of the respondents (60.9%) were satisfied or very satisfied with MT. Only one-fifth of the respondents (19.7%) were neutral with MT. This finding is exciting when seen with qualitative data from FGDs. Whereas only one-fifth of the respondents expressed dissatisfaction with MT, qualitative data revealed that an overwhelming majority of the respondents perceive MTs as recklessly ridden by riders of questionable character. There was a consensus in all the FGDs that MTs are unsafe modes of transport, with a high likelihood of accidents.

This study reveals that rural people's satisfaction with MT is slightly above average despite the challenges. The apparent contradiction could be attributed to the possibility that most respondents were more concerned about time. The desire to save time and arrive at the destination quickly emerged as one of most respondents' most significant concerns. Simultaneously, negative reasons could be attributed to MT riders' mannerisms, unprofessional driving, and poor safety. This study's results are similar to the other studies on MTs, which found that the generally reported negative externalities and outcomes linked with MTs, such as the rise in road traffic accidents, seem not to have played a role in their uptake. Zuure and Yiboe (2017) found that although the business put young drivers at great risk, most were not willing to abandon the business due to their perceived socio-economic advantages gained. The same sentiment is also echoed by Gumel

et al. (2017) that the main driving force of MT growth is socio-economic considerations, including the reliability of MTs relative to cars, their relatively low maintenance costs, and perhaps the main employment opportunities for unemployed youth in Kenya.

Safety concerns

Despite the high level of satisfaction, data from observation revealed several safety concerns. The first was the practice of carrying two or more passengers, which appeared to be the norm rather than the exception. This finding was corroborated by qualitative data from FGDs, which showed that it is normal for MTs to carry two or more passengers in the study area. An FGD participant indicated:

“Sometimes, it forces us to share the only available boda boda [MT]... there are other times when children, people with disabilities and older persons are required to travel with their supporting persons (parents/helpers)” (FGD08, Male, Age 71, December 2019).

Another FGD participant indicated that:

“I feel more secure when we are two or three people on one MT, especially at night. The riders, however, do not reduce the fares paid when they carry more than one passenger. They charge us per person” (FGD06, Female, Age 26, December 2019).

A key informant stated:

“We only do what is fair... not what is impossible to execute. We stop motorcycle taxi drivers who do not wear helmets because this is for their safety, and they can still ride wearing helmets. However, it would be extremely unfair to avoid overloading motorcycle taxis as people have to drive along the rural road, and they have no alternative. We know that the motorcycle taxis normally carry a single passenger at the beginning of the journey but gather passengers along the way to overwhelm them. The community would

protest and make our jobs and lives incredibly difficult if we were to stop and charge the drivers for this.” (Senior traffic officer 02, Kamagambo police station.)

Data from FGDs further revealed that rural people even considered it necessary for MTs to carry two or more passengers in certain circumstances. One such situation arises when only one MT is available, and there are two or more passengers. It also occurs when an adult needs to travel with an infirm person such as a child, a sick person, or an older adult who requires support or prop up on the MT. Some female passengers feel more secure when they outnumber the rider, especially at night than when they ride alone. These findings also reveal the many difficulties enforcement officials often face in applying the ‘one passenger’ limit in rural areas in African, Asian, and Latin American countries.

Contrary to the indication of Jenkins et al. (2020) and Starkey (2016a), fares may decrease if a MT carries two passengers; this study’s qualitative data revealed that even though the price is negotiable, the cost rarely reduces when there is more than one passenger. The analysis is in line with Bishop and Amos (2015) that MT travel gives women protection relative to walking (trying to overcome exhaustion, rainy weather, and undulated terrain). This has a positive effect on the utilisation of MTs.

Another safety observation was that passengers rarely used safety helmets. FGDs revealed that many female pillions refused to use helmets, citing that it could interfere with their hairstyle. This occasional use of a safety helmet made them more vulnerable to head injury in an accident. However, this study observed that the residents, including well-dressed ladies, were sitting astride on the MT. Sitting astride reduced the risk of passenger dislodgement from the MT. In accidents, passengers suffer severe injuries on their bodies. KI interviews also showed that many passengers refused to use reflectors as required by law. They argued that the reflectors were dirty and susceptible to skin disease transmission. This refusal to use reflectors threatened the lives of

both the rider and the passengers on board as they were not visible from afar, especially in the obscurity.

The study also found that drunk male pillion passengers posed many challenges to the riders. The research could attribute this to the fact that some drunk pillion passengers even fall asleep while on the MT, and they fall off the bike. It forced the riders to look for another rider to sit behind a drunk passenger. During the FGD for the male, it was reported that some intoxicated passengers turned out to be annoying, especially when they said they had paid while they had not. Sometimes, they asked riders to fight so they could avoid paying for travel. The study also observed that MT transported common goods such as foodstuffs, water, and unusual items such as furniture, construction materials (such as cement, roofing sheets, and steel reinforcements rods), farming tools, and coffins. Sometimes the goods carried were more massive than the capacity of MTs hence causing accidents.

Despite the law in most countries that only allows for one driver and one passenger (Bishop & Amos, 2015), these findings indicate that four or five people can be seen on a single MT, dangerously overloading the recommended limits for motorcycle passengers. The study findings follow other studies that the items transported on MT included foodstuffs and boxes and unusual items such as furniture (Ng & Yi, 2016), coffins, and human corpses (Ayanwuyi, 2013). Sometimes the MTs transport quantities of goods strapped on MT, which is more massive than their capacity (Jenkins et al., 2020). They carry passengers, animals, and food (sometimes all three at once) on their MTs' back (Carayannis & Pangburn, 2020).

4.5 Social Characteristics of Motorcycle Taxi Users

The second objective of this study was to determine the social characteristics of MT users. Social characteristics were operationalised as gender, age, educational attainment, marital status, occupation, average family monthly income, car ownership, and the number of motorcycles

owned (see Table 2.1). The study compared these attributes of social characteristics against the frequency of utilisation. Table 4.4 presents the results.

Table 4.4: Social Characteristics of Motorcycle Taxi Users

Total N=289							
Social Characteristic		Frequency of Motorcycle Taxi Use in Percentages					Total
		More than twice daily	Once or twice Daily	4 to 6 times a week	Once to thrice a week	Only Occasionally	
Gender	Male	6.6	28.1	26.6	34.5	4.2	64.1
	Female	5.8	31.9	24.6	32.3	5.4	33.9
Age-group	30 and below	7.8	50.6	19.2	18.1	4.3	9.9
	31-40	8.5	47.6	16.4	25.5	2	11.5
	41-50	6.7	36.7	23.1	31.4	2.1	55.8
	51-60	4.9	39.6	24.9	28.4	2.2	20.7
	Above 61	1.2	2.8	17.7	29.1	49.2	2.1
Educational attainment	No formal schooling	1.2	47.1	21.3	29.4	1	12.9
	Primary	2.2	47.6	12.5	31.9	5.8	10.6
	Secondary	7.2	41.4	18.9	31.4	1.1	21.3
	Post-secondary	5.1	38.7	23.4	30.7	2.1	55.2
Marital Status	Single	7.6	38.6	22.3	29.7	1.8	12.1
	Married	4.7	38.7	22.1	29.4	5.1	83.1
	Separated	4.7	26.3	20	46.9	2.1	2.7
	Widowed	6.2	19.6	16	55.4	2.8	2.1
The Main Occupation of Household Head	Unemployed	2.4	21.6	18.3	51.4	6.3	1.6
	Retired	3.6	19.4	6.2	23.5	47.3	2.6
	Farmer	6.8	44.2	18.2	25.7	5.1	18.5
	Civil servant	7.1	56.4	24.4	9.2	2.9	55.1
	Employed in private sector	8.2	54.2	26.4	8.6	2.6	22.2
Average Family Monthly Income in Kenya Shillings (Kshs.)	5,000 and below	1.1	30.2	9.3	58.2	1.2	38.5
	5,001-10,000	5.3	41.6	22.1	28.7	2.3	30.1
	10,001-20,000	8.3	40.3	18.3	30.4	2.7	19.7
	20,001-30,000	4.4	46.2	33.1	14.5	1.8	15.8
	Above 30,000	1.3	24.1	33.6	38.2	2.8	4.9
Car Ownership	Yes	6.3	39.1	22.2	30.1	2.3	9.1
	No	6.1	38.1	23.8	29.7	2.3	90.9
Number of Motorcycles Owned	1	5.1	36.6	24.3	31.7	2.3	16.5
	2	7.1	47.5	16.2	26.1	3.1	14.1
	3	4.2	52.4	12.2	31.2	0	21.6
	More than 4	4.1	49.6	13.2	33.1	0	47.8

Table 4.4 shows that although the proportion of male respondents in this study is slightly higher (79.6%) than that of females (20.4%) as shown in Table 4.1, the number of trips made by males is also slightly higher (64.1%) than that of females (33.9%) but by a lesser ratio. Table 4.1 also shows that 28.1% of the male respondents travelled once or twice daily, while 37.9% of the female respondents travelled once or twice daily. The analysis also shows that 6.6%, 37.5%,

26.6%, and 1.2% of male respondents travelled using MT more than twice daily, once to thrice a week, 4 to 6 times a week, and only occasionally. On the other side, MT trips made by female respondents show that 5.6%, 30.3%, 20.6%, and 5.6% of the trips were made more than twice daily, once to thrice a week, 4 to 6 times a week, and only occasionally, respectively.

Data in Table 4.4 suggest that MT services equitably provide access and mobility for both genders. The study further shows no substantial percentage gap between male and female respondents about MT use, for those who utilise MTs in the once or twice daily; more than twice daily; once to thrice a week; and 4 to 6 times a week category. This study's finding that both genders fairly utilise MT is contrary to Afolabi and Gbadamosi (2017) and Peters et al. (2018) that more than half of MT passengers are usually male.

Table 4.4 also shows the respondents' age-group and the frequency of their utilisation of MTs. The ages are relevant, as age-groups in public transport have different views and experiences. Table 4.4 shows that 9.9% of MT utilisation frequency in the study area was reflected among respondents under 30 years. Those between 31-40 years of age accounted for 55.8%. In comparison, 20.7% of MT utilisation's overall frequency was for people aged between 51 and 60. Respondents over 60 took up just 2.1% of the frequency of MT utilisation. This study shows that adults under 60 years accounted for a significant proportion of persons who utilise MTs once or twice daily. The study further indicates MT trips made only occasionally made up slightly less than half (49.2%) of all the trips made by respondents above 60 years.

The results reveal that the frequency of MT usage steadily declines as an individual gets old. The majority of respondents make MT trips once or twice daily within the official working age in Kenya than those of the elderly and youth. This study's finding on the age-group of MT users is in line with Afolabi and Gbadamosi (2017), who indicate that most MT users are adults in their active age. These findings are agreeable since the old are not physically healthy and may

not withstand long journeys' stress. They would, therefore, want to choose ways of ensuring their safety, comfort, and convenience.

This study shows that respondents with no formal education took up 12.9% of MT utilisation, while those who had attained primary school level of education accounted for 10.6% MT utilisation, with 21.3% of utilisation going to respondents with secondary school education. The respondents with post-secondary education undertook more than half (55.2%) of the trips. This study finding could be attributed to individuals with higher education levels who are more ready to travel to the market since the market is a place for exchanging goods and is a main social centre. Living in a remote area can be experienced as a restriction, and MT is regarded as a tool to extend the personal socialisation network. In addition, since education is connected to disposable income in rural areas, the significance of the finding can also be regarded as a proxy for the ability and willingness to pay.

Data in Table 4.4 appears to contradict Gamberini (2014) that most MT use in rural is dedicated to social reasons instead of commercial purposes. This contradiction is shown in Table 4.4, in which respondents within the economically active age-groups utilise MTs more than those above the age of 60, who are believed to be less active (KNBS, 2018b). However, this may not be the case as the higher rate of utilisation by persons within the economically active age-group could also be attributed to cost considerations since persons within this age-group are more likely to afford MT charges. As shown in Table 4.2 and the subsequent discussions, part of the travel, especially night travel, is for social.

Regarding marital status, data in Table 4.4 shows that married respondents had the highest prevalence of utilisation of MTs, at 83.1%. The single respondents who took 12.1% of the MT trips trailed well behind. The separated and widowed respondents made 2.7% and 2.1% of journeys, respectively. The findings reveal that married respondents made the most trips. The

marital orientation of an individual, to a great deal, is a determinant of engagement in certain occupations. Unlike the unmarried people, marital responsibilities often compel married people to travel using MT to take up any commitment, provided it promises gains. Table 4.4 shows strong percentage correlations in the number of trips taken by single and married rural people once or twice daily, once to three times a week, and 4 to 6 times a week.

This research suggests that household MT travel is constrained or encouraged by family roles and responsibilities. Similarly, McCarthy et al. (2017) indicate that life occurrences, such as a child's conception disrupt daily travel and are a valuable opportunity to affect sustainable transport practices such as MT travel. The absence of a husband delays MT travel for single mothers, and they are not as well off as their married counterparts. For example, the difference in income between single parents and married parents probably influences the frequency of MT travel.

This study also examined the relationship between the occupation and utilisation of MTs. In Table 4.4, respondents formally employed in the public sector accounted for more than half (55.1%) of the MT trips. Their counterparts followed this group in the private sector at 22.2%, and peasant farmers at 18.5%, with retired and unemployed people contributing only 2.6% and 1.6% of utilisation, respectively. This phenomenon is fascinating considering the data in Table 4.2, which shows that MT trips do not peak in the early mornings or late afternoons as expected in an area with high utilisation of public transport by people in formal employment. Qualitative data from FGDs and KI interviews revealed two explanations for this apparent contradiction. First, focus group discussants and KIs disclosed that many civil servants in the study area own motor vehicles. The study participants further divulged that these people who own motor vehicles typically use their private means of transport to commute to and from work in the early mornings and late afternoons. However, during the day, they send MT riders to run their private

errands since they usually cannot do this by themselves due to engagements at work. In the words of one key informant:

“The workers use them to run their private errands while at work” (Chief, Central Kamagambo Location, December 2019).

Similarly, a focus group participant reported:

“If I need to buy something urgently while I am at work, I just call a boda boda [motorcycle taxi] guy to run, pick them from the store and just deliver to me.” (FGD04, female, Age 54, December 2019).

Qualitative data further revealed that people engaged in formal employment own many private enterprises in the study area. These people are also engaged in peasant farming, as explained in the discussion preceding Table 4.1. People engaged in formal employment find it convenient to utilise MT riders to run errands to sustain their private income-generating ventures. One of the focus group participants had this to say:

“Motorcycle taxi transport is always vital for the operation of my cooking gas business. They help me transport business goods.” (FGD08, male, teacher, December 2019).

The second explanation for the discrepancy in the data in Tables 4.2 and 4.4 is that some carry out their farming activities in the early morning hours until 10 am when they leave the farms to go to their private businesses. This group of people use MTs to travel to their private businesses; hence the high MT trip density from 10 am.

The study also looked at respondents' monthly income as another social characteristic that could influence the utilisation of MTs. In Table 4.4, respondents with less than Kshs. 5,000 monthly income accounted for 38.5% of MT utilisation, those who earn between Kshs. 5,001 and 10,000 made 30.1% of the total MT trips and respondents between the income levels of Kshs. 10001-20000 made 19.7% of the total MT trips. Respondents with between Kshs. 20,001-30,000 income

levels took about 15.8% of the trips, while the respondents with income levels above Kshs. 30,000 took just 4.9% of the total MT trips.

Studies indicate that the poorest cannot afford public transport unless heavily subsidised (Lucas et al., 2016). Therefore, this study expected the levels of income to influence the frequency of MT usage. However, as portrayed in Table 4.4, perhaps the very poor are the most dependent on MTs. This dependence is also projected in the residential, small, and informal commercial areas in high MT travel density (see Table 4.2). MT, therefore, has socially identifiable characteristics. The finding of this study that the low-income groups are the most dependent on MT could be attributed to the respondent's appreciation of lifestyle changes and the improved income derived from MTs, rather than on income levels.

Similarly, Ng and Yi (2016) found that although some very poor people were struggling to afford the luxury of speed in Kampala, Uganda, they still use MTs to supply goods. In addition, Guillen et al. (2013), in a study in Davao City, Philippines, indicates that low-income people depend on informal public transportation systems. The study findings have dispelled the held illusion that levels of income influence MT usage frequency.

Another social characteristic of the respondents in this analysis is car ownership. Table 4.4 shows that car-owning households took 9.1% of the MT trips, while households without cars undertook the remaining 90.9% of the trips. In comparison, this study shows that 39.1% of respondents that owned vehicles made MT trips once or twice daily, 30.1% Once to three times a week, and 22.2% 4 to 6 times a week. Similarly, 38.1% made MT trips once or twice daily, while 29.7% made MT trips once to thrice a week and 23.8% MT trips 4 to 6 times a week among respondents who do not own vehicles. Below is what a key informant had to say:

“If you don't have a car, a boda boda [motorcycle taxi] will enable you to reach many places in this sub-county... even if you have a car, there are locations that can't be

reached by motor cars, so obviously you can just lock your car, go on a boda boda so finish the trip. Plus, boda boda riders can either wait for you or come and pick you up.”
(FGD01, Male, December 2019).

The survey findings in Table 4.4 indicate those who do not own cars heavily rely on MTs as an alternative public transportation mode in the study area, supported by qualitative data. These study findings are in line with other studies on MTs. For example, Starkey et al. (2019) show that MTs in many rural and urban parts of sub-Saharan Africa have become the most used motorised transport means. This study finding can be explained by the few cars owned by rural elites, as discussed in Table 4.1. In the study area, car ownership is low, and most rural people require personal or public transportation service to carry themselves and their goods on rural roads. The researcher suggests that MTs are the only motorised means of travel for most rural people accessing essential services and livelihoods.

Table 4.4 shows that households with four motorcycles and above made the most MT trips made by motorcycle owners at 47.8%. Households with three motorcycles accompany this at 21.6%, but behind are households with one motorcycle, with 16.5% of MT trips, and the least are households with two motorcycles, with 14.1% of trips. Regardless of the number of motorcycles owned, the respondents made most of the MT trips once or twice daily. MT trips once to thrice a week and 4 to 6 times a week follows this. Households with 3 and 4 motorcycles did not make MT trips only occasionally.

Table 4.4 also reveals that the number of motorcycles owned probably does not influence the frequency of MT trips made. This study expected the frequency of MT use to decline as the number of motorcycles owned by the study respondent increases. However, this was not the case, as households with four motorcycles even generated slightly less than half (47.8%) of the motorcycle owners' total trips. This study's findings on the frequency of MT trips relative to the

number of motorcycles owned by the study respondents contradict other studies, such as Inaba and Kato (2017). They indicate those vehicle owners use their vehicles to travel. The apparent contradiction may be attributed to the trips undertaken for business. For business trips, individuals are more willing to pay for MT travel than a trip travelling from the villages. For a non-business trip, the individuals are more willing to use their motorcycle to travel. The generalised cost of using a MT is reasonable for a business trip.

4.6 Drivers of Motorcycle Taxi Use

The third objective was to examine the drivers of MT use in the study area. The study asked user respondents to identify their primary reason for using or choosing MT services. The findings are as presented in Figure 4.4.

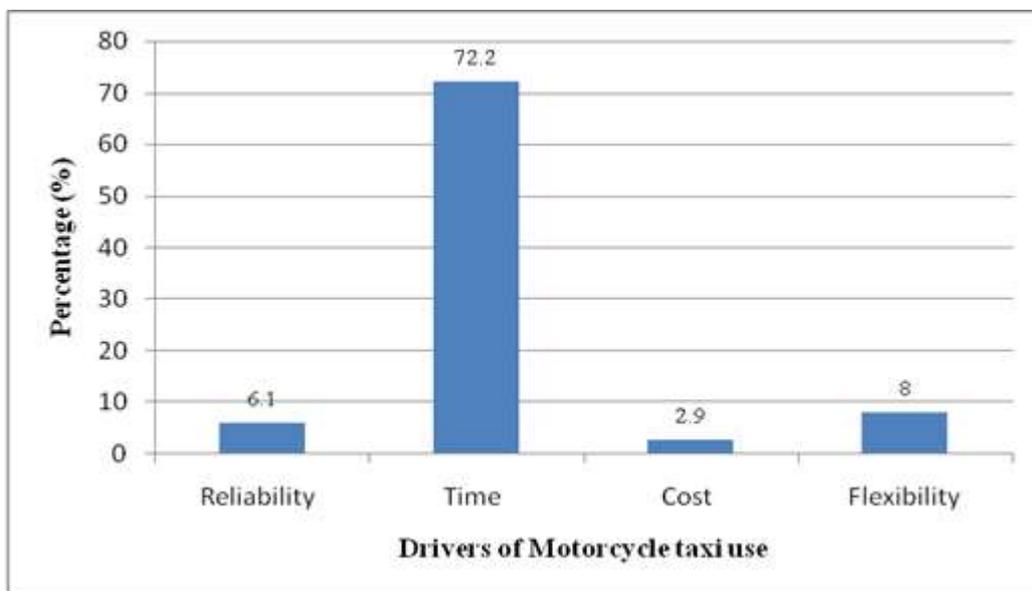


Figure 4.4: Drivers of Motorcycle Taxi Use

Figure 4.4 illustrates that about 72% of respondents chose ‘Time’ as their primary reason for choosing MT services. In the FGD for females, it was generally agreed that the MT is “*faster than conventional four-wheel taxis or buses*” (FGD05, female, Age 23, December 2019), and that was valuable, as many such women tried to combine trading and family life.

This finding points out the importance of travel time in choosing an appropriate transport mode for a trip. Although conventional (four-wheel) public buses or taxis maintains the competitive edge of cost, as shown in Table 4.8, passengers choose MT transport for its timesaving. This finding is in line with other studies indicating that total travel time affects travel patterns (Paramita et al., 2018). Similarly, according to Márquez et al. (2018), there are higher chances of reaching the destination in planned travel time when one rides on a MT. The MTs possesses two main competitive advantages – their speed and agility (Goodfellow, 2015). Cohen (2019) also notes that the urgency of time is a personal concept about an individual’s perception of time. People are more likely to travel for a long time if they are comfortable. However, the desire to save time could be associated with safety issues. While this study did not analyse the relationship between time and MT accidents, it is logical to assume that MT operators who hurry to save time are more vulnerable to road accidents. Problems of safety can be a problem for MTs, which besides a lower travel cost, explains why some people opt to patronise conventional (four-wheel) taxis or buses instead of MT.

The study respondents also listed the MT accessibility and availability as one of the primary reasons for using them at 10.8%. Data from observation discussed earlier and corroborated by qualitative data from FGDs show that finding a MT in the study area is relatively easy. The FGDs further revealed that most frequent users have several riders’ contacts in their phones, further reinforcing accessibility since they are available at the client’s convenience. An FGD participant well summarises MT transport characteristics:

“Boda boda [motorcycle taxi] can help you reach places if you do not have a car...there are some places the motor vehicles cannot reach, and obviously one can always lock his/her motor vehicle, take on a boda boda and complete the journey and come back later, enter the vehicle and continue driving. They can come and pick you. They are also quick...! So, when I need to go home early, they are convenient and are always

available....., one can always use his/her phone to call the riders” (FGD01, Male, Age 36, December 2019).

This study's findings show that MTs fill the demand and supply gap in rural public transportation; by providing reliable and continuous rural public transportation services to the locals. These findings are in line with other studies on MT transport. For instance, although rural MT users often complain that the fares per kilometre for rural MTs are typically more costly and claim they prefer using conventional (four-wheeled) taxis or buses when these are available (Peters et al., 2018), the lack of timeliness (or lack of punctuality) of these alternatives creates the “demand” for MTs (Bishop & Amos, 2015; Starkey, 2016a). MT service is readily available from ‘stands’ in towns and business centres and stops along major roads for passenger service (Starkey, 2016a), providing the only alternative along their routes (Hansen, 2015). The efficiency and benefits that rural populations derive from accessing MT via mobile phones are impressive (Afukaar et al., 2019; Mbabazi, 2019; Starkey, 2016b). Even though rural people cannot afford to travel regularly, more individuals can now access MTs. This access to MT can be crucial in medical emergencies; for example, a mobile phone can call a MT to pick up a vulnerable person from home and take them to the nearest hospital, providing convenient door-to-door service.

The respondents also listed reliability (6%) as one of the primary reasons for using MTs. FGDs revealed that rural people believe that MT riders are very well-versed with alternative routes and know most places, reducing the likelihood of getting lost or wasting time asking for directions. The respondents saw the riders as friendly and trustworthy and reported using MTs to commute and run personal errands. Most respondents were calling specific MT riders ‘*my boda boda [MT] guy.*’

These findings reveal that rural people perceive MT as a reliable mode of transportation. This finding is in line with Starkey (2016a) that several advantages make them suitable for rural and urban setups than other motorised road transport forms. Similarly, according to Jenkins et al.

(2020), for villages linked by footpath to the main, secondary, or feeder road network, MTs may provide a mobile service because of their unique nature (narrow and agile with substantial loads). Others, such as Qian (2015), further indicate that MTs show a surprising flexibility level in Guangzhou, China.

Respondents also listed cost (2.9%) as a principal reason for MT transport use. The study findings also reveal that the price paid for MT trips is negotiable. A key informant reported:

“The price depends on how you are dressed up or how you bargain... The riders charge you accordingly so long as you are dressed presentably. For instance, a four-kilometre could cost between Kshs. 20 and Kshs.30, but a two-kilometre trip could cost Kshs. 40. The riders charge between Kshs. 50 to Kshs.100 for trips ranging between five to seven kilometres.” (Village elder 02, Male, Age 62).

Besides, a FGD participant indicated:

“While going to Rongo town, a matatu [conventional (four-wheeled) taxi] or bus charges me a fare of Kshs.50 compared with a motorcycle taxi, which charges a minimum of Kshs. 100. It is significantly more expensive to travel on a motorcycle taxi, but if you think about the time you save, it gets cheaper. Time is money! It even becomes cheaper if you consider all other factors.” (FGD05, Male, Age 41, December 2019).

The above finding on MT fare reveals that MT fares vary mainly according to the will of the transport drivers who may dictate their prices to the population that became a hostage in a situation of monopoly. As discussed in Table 4.5, the study findings revealed that travelling using conventional (four-wheel) taxis or buses is cheaper than MT travel; the people in the study area considered the fare charged for MT travel reasonable. This finding could be attributed to travel time's importance in choosing an appropriate transport mode for a trip. Those with money will pay more for a faster trip and more comfort (Jenkins et al., 2020; Starkey, 2016b). In this

study, the fares vary depending on distance, time, locations, weather, day, or even location of approaching a MT rider, for example, on the road or at a stage. However, the user could bargain or search for another rider at a more reasonable price, as echoed by secondary data (Ng & Yi, 2016). Recognition of affordability in transport policy and policy growth is critical, particularly in rural areas. Transport affordability equals increasing income because the unemployed commuters can reach their potential work stations and are not discriminated against or marginalised in terms of social and economic inclusion.

The study survey further asked respondents to give a comparison between the conventional mode of transportation and MTs. Conventional modes of transport in this study are defined as any form of public transportation, the study area that is not a MT. Mode characteristics, as perceived by respondents, are presented in Table 4.5. The factors considered in this study are: waiting time—the time spent before making a trip with the desired mode, trip time –trip duration with the preferred mode, and trip cost- the total amount paid for the trip with the desired mode. Perceived mode characteristics from conventional mode users are also presented in Table 4.5.

Table 4.5: Mode Characteristics as Perceived by Respondents

Mode Characteristics	Unit	Mean	SD	Min.	Max.	Count
Motorcycle Taxi Perception						
Waiting Time	mins.	4.2	5.58	0	30	289
Trip Time	mins.	14.95	14.04	2	125	289
Trip Cost	Kshs.	202.35	116.8	20	3300	289
Conventional Modes Perception						
Waiting Time	mins.	12.07	11.64	0	90	289
Trip Time	mins.	46.69	32.31	2	180	289
Trip Cost	Kshs.	56.69	54.11	50	1700	289

Table 4.5 shows that making a MT trip is 3.57 times more expensive than making a trip with conventional transport modes in terms of trip cost. From the respondent’s perspective, a typical MT trip could cost Kshs. 202.35 as compared to Kshs. 56.69 for a trip using conventional modes of transport. Despite this drawback, MT services outdo conventional modes in trip completion

time and waiting time. For example, a typical trip would take 47 minutes to complete at the cost of only Kshs. 56.69 if conventional modes are used. However, if MT is used, the trip time would be reduced to only 15 minutes, but the price would be costlier at Kshs. 202.35. From either user perspective, the mean trip time and mean waiting time for MT are considerably lesser than conventional modes, but the opposite is true in terms of the mean trip cost.

Several implications can be made from this finding. One of which is the inherent necessity to save time on their travel. Any trip-making individual would choose an alternative that would get them to their destination in a shorter period. However, for those that perceive time as an invaluable commodity, especially if something critical is at stake, the alternative that guarantees quicker mobility would be the most viable option.

The researcher suggests that the expensive cost of a MT trip is somewhat reasonable since the nature of its service is demand-responsive; meaning it exists to serve a niche market (e.g., time-sensitive workers or transit-captive commuters), unlike conventional modes of transport that regularly provide transport services to the commuting public. Given the rough analysis regarding MT services' marginal trip cost, one wonders: what makes MTs an attractive alternative to conventional transport modes? The subsequent analysis will help in answering this question by delving further into the decision-making process of commuters.

4.6.1 Logistic Regression Analysis

To test the premise that modal characteristics, notably travel time savings, are the primary drivers for MT utilisation, logistic regression was used to model respondents' choice probabilities between two alternatives. Table 4.6 provides a list of variables used for the regression model.

Table 4.6: Explanatory Variables in the Regression Model

Variables	Variable Description	Unit
Independent (Quantitative) Variables		
WTM	Waiting time for MT	Minutes
WTC	Waiting time for conventional modes	Minutes
TTM	Travel time for MT	Minutes
TTC	Travel time for conventional modes	Minutes
TCM	Travel cost for MT	Kshs.
TCC	Travel cost for conventional modes	Kshs.
WT	WTM – WTC	Minutes
TT	TTM – TTC	Minutes
TC	TCM– TCC	Kshs.
Distance	Distance perceived by the commuter	Kilometres
Age	Respondent’s age	Years
Independent (Qualitative) Variables		
Gender	Gender dummy variable	= 1 if Male = 0 if Female
MaritStat	Marital status dummy variable	= 1 if Married = 0 if Unmarried
Education	Educational background dummy variable	=1 with higher educational Degree = 0 without a higher educational degree
Employed	Employment status dummy variable	= 1 if employed = 0 if unemployed
Income	Low-income cluster	=1 if income \leq Kshs. 20, 000 = 0 otherwise
	High-income cluster	=1 if Income \geq Kshs. 20, 001 = 0 otherwise
Purpose	Work-induced trip	= 1 for work trips = 0 otherwise
	Others-induced trip	= 1 for other trips = 0 otherwise
Time	Time period dummy variable	= 1 for daytime = 0 for night time

Three modal attributes were primarily considered: waiting time, travel time, and trip cost. The differences between the mode attributes of MT and conventional modes (i.e., WT, TT, and TC) were also used in the regression analysis. Intuitively, ‘WT’ and ‘TT’ should be negative as MT is presumed to provide quicker mobility than conventional modes of transport. ‘TC’ (difference

in trip costs) should be positive as MT fares are more expensive than conventional modes of transport.

Besides mode attributes, six social characteristic variables were also included in the regression model. Most of these variables can be dummy variables or those with binary responses only. The 'Education' variable corresponds to respondents who could attain at least a secondary education. The 'Income' variable was grouped into low-income (\leq Kshs. 20, 000) and high-income (\geq Kshs. 20, 001). There were initially seven MT trip purposes (variable labelled as 'Purpose') that can be chosen by the respondents. However, for the sake of simplicity in the regression model, it was reduced to only two. Last, the 'Time' variable describes the period wherein the trip is made; it was simply classified into two 12-hour periods (daytime and night time).

Analysis of commuter data by logistic regression was done with a model that considers alternative-specific variables (ASV). In this regression model, mode attributes, specifically waiting time, travel time, and trip cost variables, are specified individually and independently for each mode alternative. The results of the logistic regression model are presented in Table 4.7.

Table 4.7: Logistic Regression Results: ASV Model

Variable	Coefficient	Std. Error	t-Statistic	p-Value
Intercept	0.055325	0.856452	0.065	0.948494
WTM	0.060475	0.047136	1.283	0.199494
WTC	0.013584	0.023764	0.572	0.567583
TTM	0.024607	0.015950	1.543	0.122899
TTC	-0.004426	0.006095	-0.726	0.467741
TCM	0.002442	0.002401	1.017	0.309133
TCC	0.001425	0.004923	0.290	0.772177
Distance	-0.175647	0.045441	-3.865	0.000111
Time: Daytime	-0.017779	0.455315	-0.039	0.968853
Age	-0.014249	0.018048	-0.790	0.429809
Gender: Male	-0.022358	0.278565	-0.080	0.936031
MaritStat: Married	-0.106588	0.311851	-0.342	0.732508
Education: \geq Secondary	0.579732	0.334239	1.734	0.082833
Employed: Yes	0.807070	0.566390	1.425	0.154175
Income: Low \leq Kshs. 20, 000	0.346333	0.336444	1.029	0.303295
Income: High \geq Kshs. 20, 001	0.254612	0.595626	0.427	0.669038
Purpose: Work	0.743767	0.361104	2.060	0.039427
Purpose: Others	-0.087953	0.430039	-0.205	0.837945

N = 289; Null Deviance: 414.46; Residual Deviance: 349.02; AIC: 358.02; ρ^2 : 0.157892; ρ^2 : 0.075858.

Based on the estimated results of its coefficients, mode characteristics do not affect an individual's probability of choosing MT; the reasons because its estimated coefficients are not statistically significant, and some yielded unrealistic signs. Take, for example, the estimated coefficients for MT mode attributes (i.e., 0.060475, 0.024607, and 0.002442 for WTM, TTM, and TCM, respectively). A unit increase in either variable should decrease the probability of choosing MT. However, the regression results are counterintuitive and have yielded a positive estimate. These results could imply an unexplainable bias towards MT among the interviewed respondents. The same irregularity can also be observed for the estimated coefficient of TTC (-0.004426). A unit increase in travel time for conventional modes should increase the MT's probability. Therefore, the estimate should be positive. However, the regression model yielded a negative estimate. This result is peculiar and could only be justified if a trip with considerable length causes the travel time, and the corresponding cost for this trip would make MT the least desirable alternative.

The estimated coefficient for trip distance is -0.175647 , which is negative and statistically significant; this result indicates that distance affects MT's probability to be chosen. In terms of elasticity, a unit increase in the trip distance would decrease the MT's probability by as much as 4.54%. This result may help explain the irregularity of the estimated coefficient for TTC. A long-distance trip on MT would take less time to complete than taking it with conventional modes of transport. However, the cost for this trip on MT would make it a less desirable alternative.

Safety and convenience might be an underlying factor that commuters consider when travelling for long distances. The 'Time' variable yielded a coefficient not statistically significant. This result could imply that the period wherein a trip is conducted does not directly affect a commuter's choice probability on MT.

The social characteristic variables in the regression model also provide influence on MT's probability. The estimated coefficient for 'Age' (-0.014249) indicates that an older individual is less likely to take MT than a younger person. The same behaviour is portrayed based on an individual's marital status. A married person is less likely to take MT, perhaps due to safety and health concerns. Despite aptness on these estimated coefficients, they are not statistically significant, which implies these variables weakly influence an individual's trip-making decision.

The coefficient estimates for the 'Education' variable (0.579732) indicate that an individual with higher education is likely to choose MT more than conventional modes. The same conduct is exuded for the estimated coefficients for the 'Employed' and 'Income' variables. The resulting sign of these estimates is reasonable, especially for the income variable. Individuals that earn more income would likely choose MT since they can spend more on it. A typical MT trip costs more than a typical conventional trip. However, these two social characteristic variables (i.e., employed and income variables) are not statistically significant, which indicates that it does not strongly affect an individual's trip-making decision. Last, for the 'Purpose' variable, MT is more

likely to be chosen if an individual is on a work-induced trip. The estimated coefficient for this variable is 0.7438, which is positive and statistically significant. From this result, it is indicative that individuals whose trip agenda is to go to work value the importance of getting to their workplace on time. It can also be implied that an individual is likely to choose MT to save substantial time in his/her work-induced trip.

CHAPTER FIVE: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the key findings. It also summarises conclusions and makes recommendations for policy, practice, and future research. The key findings are briefly highlighted in the sections that follow.

5.2 Summary of the Key Findings

The study sought to analyse the patterns of utilisation of MTs in rural Kenya. Upon determining the prevalence of utilisation of MTs, the study assessed the social characteristics of MT users; and examined the drivers of MT use. This section summarises the findings.

5.2.1 Prevalence of Utilisation of Motorcycle Taxis in the Study Area

The study findings revealed that the frequency of utilisation of MTs is high in the study area, with approximately two-thirds (68.8%) of respondents being daily users. The high frequency of MT utilisation could be attributed to very few people's owning private vehicles. Most frequent users have contacts of several riders in their phones, further reinforcing convenience. The study also noted that most MT trips appear to converge on Rongo town as the most common destination. MT travel patterns also reveal how MT transport services interact with rural people's daily lives and the Rongo sub-county. This is clear in the high MT trips from the people's residences in the morning, in the formal business and commercial centres during hours of working, in leisure places during the night, and in the respective retail centres out of the working hours.

Most of the MT trips were between 600 metres and two kilometres, with very few long-distance trips of over five kilometres. The study data point towards an emerging trend in rural mobility: overreliance on motorised transport for routine travel. This trend has health implications since it may reduce physical activity, which is the primary cause of many lifestyle diseases.

Work trips have the highest proportion of MT trips (38.1%), showing that social and other factors are linked with the purpose of MT trips. The level of satisfaction with MT is slightly above average, with approximately two-thirds of the respondents (60.9%) satisfied or very satisfied with MT. However, qualitative data revealed that an overwhelming majority of the respondents perceive MTs as recklessly ridden by riders of questionable characters. Despite high satisfaction, data from observation showed several safety concerns. Rural people even consider it necessary for MTs to carry two or more passengers. The passengers rarely used safety helmets, making them more vulnerable to head injury in an accident. KI interviews also showed that many passengers refused to use reflectors as required by law. Besides, FGDs revealed that many female pillion passengers refused to use safety helmets, citing that it could interfere with their hairstyle. Some intoxicated passengers turned out to be annoying, especially when they said they had paid while they had not. Besides, the study observed that sometimes the goods carried on MT were more massive than the capacity of MTs, hence causing accidents.

5.2.2 Social Characteristics of Motorcycle Taxi Users

Male respondents made 64.1% of the total MT trips, while female respondents made 33.9% of the total trips showing that both genders fairly utilise MT services in the Rongo sub-county. The frequency of MT usage steadily declines as an individual gets old. Respondents between the ages of 41-50 years accounted for 55.8% of the MT trips. The respondents with post-secondary education undertook more than half (55.2%) of the trips. Married respondents had the highest prevalence of utilisation of MTs, at 83.1%. Respondents formally employed in the public sector accounted for more than half (55.1%) of the MT trips. Respondents with less than Kshs. 5,000 monthly income accounted for 38.5% of utilisation, those who earn between Kshs. 5,001 and 10,000 made 30.1% of the total MT trips. Perhaps low and low-income groups rely most on MTs. This reliance is also expected in the high density of their residential areas. Car-owning households took 9.1% of the MT trips.

In comparison, households without cars undertook the remaining 90.9% of the trips, indicating those who do not own cars heavily rely on MTs as an alternative public transport in the study area, which is also supported by qualitative data. This study expected the frequency MT use to decline with an increase in MTs owned by the respondent. However, this was not the case, as households with four motorcycles even generated slightly less than half (47.8%) of the motorcycle owners' total trips.

5.2.3 Drivers of Motorcycle Taxi Use

This study revealed that a typical MT trip is 3.57 times more expensive than a trip made on conventional modes of transport such as *matatu* taxis, buses, hired four-wheeled taxis, personal cars, and personal motorcycles. Previous findings from the descriptive analysis regarding the prevalence of MT use in which 38.1% of interviewees indicated that their intention to start an MT trip was work-induced, were further supported by the logistic regression model. The model consistently identified work-related trips as a significant factor in the individual's choice of probabilities. Individuals whose trip is work-induced do not mind the inflated costs associated with MT if they get to their workplaces on time. However, this study's results reaffirm the commuter's value of time as an essential factor in the trip-making decision. Perhaps commuters would rather spend their time in more productive means than on vehicle travel.

The inflated cost of a MT trip indicates the nature of its service. Like other demand-responsive modes of transport, it provides on-demand mobility among time-sensitive commuters, unlike conventional modes of transportation that regularly offer transit services to the commuting public. Unique design (narrow and agile, but with substantial loads) provides MTs with a competitive edge against other existing modes of transportation. The researcher initially expected that mode attributes, specifically travel time savings, are the individual's primary motivator to choose MT. However, empirical results from the resulting logistic regression model suggested differently.

Based on estimated results of its coefficients, mode characteristics do not affect an individual's probability of choosing MT. The estimated coefficients are not statistically significant, and some yielded unrealistic signs. A unit increase in conventional travel time should increase the MT's probability. However, the regression model yielded a negative estimate. A unit increase in the trip distance would decrease the MT's probability by as much as 4.52%. A long-distance trip on MT would take less time to complete than taking it with conventional modes of transport. However, the cost for this trip on MT would make it a less desirable alternative.

Safety and convenience might be an underlying factor that commuters consider when travelling for long distances. The 'Time' variable yielded a coefficient not statistically significant. This could imply that the period wherein a trip is conducted does not directly affect a commuter's choice probability.

The social characteristic variables in the regression model also provide influence on MT's probability. The estimated coefficient for 'Age' (- 0.014249) indicates that an older individual is less likely to take MT. The same behaviour is portrayed based on an individual's marital status. Despite aptness on these estimated coefficients, they are not statistically significant. The coefficient estimates for the 'Education' variable (0.579732) indicate that an individual with higher education is likely to choose MT more than conventional modes. Individuals that earn more income would likely choose MT since they can spend more. Two social characteristic variables (i.e., Employed and Income variables) are not statistically significant, which indicates that it does not strongly affect an individual's trip-making decision. Last, MT is more likely to be chosen if an individual is on a work-induced trip. The estimated coefficient for this variable is 0.7438, which is positive and statistically significant. It is indicative that individuals whose trip agenda is to go to work value the importance of getting to their workplace on time.

5.3 Conclusions

This study set out to analyse the patterns of utilisation of MTs in rural Kenya. The general conclusion of this study is that the prevalence of utilisation of MTs in the study area is high, even for non-essential travel over short distances with some segments of the population utilising MTs more than their counterparts. The study also concludes that timesaving was the most crucial driver of MT use. Based on the findings, the specific conclusions for each objective are presented below.

1. The prevalence of utilisation of MTs in the study area is high, bordering on overreliance, with evidence that people in the study area utilised MTs even when unnecessary. While the level of satisfaction with MT services is fairly high, there are safety concerns amplified by overreliance. This overreliance has both positive and negative impacts. While it is good for the economy as it facilitates the faster movement of goods, it may have health implications since it may contribute to lifestyle diseases.
2. Some social characteristics of users influence the utilisation of MTs in the study area. While there was no significant difference in MT utilisation in relation to gender and number of motorcycles owned, age emerged as an important characteristic, with persons aged between 41-50 years reporting higher use. Marriage, educational attainment, occupation, and income level also emerged as important social characteristics associated with MT utilisation.
3. The desire to save time emerged as the most crucial driver of MT use in the study area. This drive was even more significant for work-related trips. This could be a significant contributor to road traffic accidents since MTs are always rushing to beat time. Other drivers included availability and accessibility. However, the cost was not an important driver in this study.

5.4 Recommendations

The study makes recommendations as follows:

1. Through the National Transport Safety Authority (NTSA), the national government should strengthen the MT sector regulation to enhance safety, considering that a significant majority of rural dwellers rely on MTs for transport. Through their ministries of health, the national and county governments should implement awareness campaigns to sensitise public members on the health benefits of regularly walking.
2. Through the NTSA and ministry of health, the national governments should implement targeted interventions, focusing on the population segments that utilise MTs more frequently than others, to sensitise MT users on safety and health issues. The MT users should be sensitised to insist that riders comply with safety requirements besides being educated on the health benefits of regularly walking.
3. Through the NTSA, the national governments should sensitise the public and MT riders on time management; so they are not in a big hurry while using MTs or any other road transport form. This initiative can reduce the need for speed in motorised transport, thus reducing road traffic accidents.

5.5 Suggestions for Further Research

The study suggests that:

1. Further studies should be conducted into the usage of MTs in other parts of rural Kenya to determine whether the finding of this study could be extended to the entire country.
2. There is a need for more research on the needs of certain vulnerable groups (the young, the old, women, and infirm) who are much more sensitive to inadequate transportation services. Such research would identify ways to meet their MT transport needs.
3. The survey in this study focused primarily on the perspective of MT users. However, for the government to provide an impartial and comprehensive regulation on MT services, a detailed investigation should also be conducted from its operators' perspective.

REFERENCES

- Acocella, I. (2012). The focus groups in social research: advantages and disadvantages. *Quality & Quantity*, 46(4), 1125–1136. <https://doi.org/10.1007/s11135-011-9600-4>
- Afolabi, O. J., & Gbadamosi, K. T. (2017). Impact of Commercial Motorcycle Operation on Urban Mobility in Ogun State, Nigeria. *Logistics & Sustainable Transport*, 8(1), 62–71. <https://doi.org/10.1515/jlst-2017-0006>
- Afukaar, F., Damsere-Derry, J., Peters, K., & Starkey, P. (2019). Rural Transport Services Indicators: Using a new mixed-methods methodology to inform policy in Ghana. *Transportation Research Interdisciplinary Perspectives*, 3, 100074. <https://doi.org/10.1016/j.trip.2019.100074>
- Ahmed, T. (2016). *Exploring Trip Chain Behaviour of the Working Population in Dhaka* [Unpublished Master's Thesis]. Bangladesh University of Engineering and Technology, Dhaka, Bangladesh. <http://lib.buet.ac.bd:8080/xmlui/handle/123456789/4295>
- Al-Hasan, A. Z., Momoh, S., & Eboreime, L. (2015). Urban poverty and informal motorcycle transport services in a Nigerian intermediate settlement: A synthesis of operative motives and satisfaction. *Urban, Planning and Transport Research*, 3(1), 1–18. <https://doi.org/10.1080/21650020.2014.978950>
- Almeida, G. C. M. d., Medeiros, F. d. C. D. d., Pinto, L. O., Moura, J. M. B. d. O., & Lima, K. C. (2016). *Prevalência e fatores associados a acidentes de trânsito com mototaxistas* [Prevalence and factors associated with traffic accidents involving motorcycle taxis] (Vol. 69). <https://doi.org/10.1590/0034-7167.2016690223i>
- Arphorn, S., Ishimaru, T., Hara, K., & Mahasandana, S. (2018). Considering the effects of ambient particulate matter on the lung function of motorcycle taxi drivers in Bangkok, Thailand. *Journal of the Air & Waste Management Association (1995)*, 68(2), 139–145. <https://doi.org/10.1080/10962247.2017.1359217>
- Asafo-Adjei, C., Iyer-Raniga, U., & Aranda-Mena, G. (2018). Transport and Accessibility Challenges Facing the Rural People Living Along Feeder Roads in Ghana. *Civil Engineering and Architecture*, 6(5), 257–267. <https://doi.org/10.13189/cea.2018.060505>

- Askari, S., Peiravian, F., Tilahun, N., & Yousefi Baseri, M. (2020). Determinants of users' perceived taxi service quality in the context of a developing country. *Transportation Letters*, 7(4), 1–13. <https://doi.org/10.1080/19427867.2020.1714844>
- Ayanwuyi, E. (2013). Rural Dweller's Perception of Impacts of Motorcycle (Okada) Services in Community Development in Ogbomoso Agricultural Zone of Oyo State, Nigeria. <https://www.iiste.org/Journals/index.php/RHSS/article/download/7953/7959>
- Bishop, T., & Amos, P. (2015). *Opportunities to improve road safety through 'boda-boda' associations in Tanzania: Final Report*. <https://pdfs.semanticscholar.org/a9e2/e9a20b9ffe61561f1ff1b3d86840f863ca06.pdf>
- Bishop, T., Barber, C., Charman, S., & Porter, G. (2018). *Enhancing understanding on safe motorcycle and three-wheeler use for rural transport: Literature Review*. <https://pdfs.semanticscholar.org/ef95/ae470937d92e61fd16ee5aa834c23ffc091f.pdf>
- Bouchard, C., Blair, S. N., & Katzmarzyk, P. T. (2015). Less Sitting, More Physical Activity, or Higher Fitness? *Mayo Clinic Proceedings*, 90(11), 1533–1540. <https://doi.org/10.1016/j.mayocp.2015.08.005>
- Calvo, C. M. (1994). *Case Study on Intermediate Means of Transport Bicycles and Rural Women in Uganda*. Environmentally Sustainable Development Division, Technical Department, Africa Region, World Bank. <https://www.ssatp.org/sites/ssatp/files/publications/SSATP-WorkingPapers/WP12/part1.pdf>
- Cano, S. M. (2018). *Habal-Habal: Characteristics of Motorcycle Taxi Users in Metropolitan Manila* [Unpublished Master's Thesis]. Chulalongkorn University. <https://cuir.car.chula.ac.th/xmlui/handle/123456789/63648>
- Carayannis, T., & Pangburn, A. (2020). Home Is Where the Heart Is: Identity, Return and the Toleka Bicycle Taxi Union in Congo's Equateur. *Journal of Refugee Studies*, 16(2), Article fez105, 176. <https://doi.org/10.1093/jrs/fez105>
- Cohen, K. (2019). *Human Behavior and New Mobility Trends in the United States, Europe, and China* (Working Paper No. 024.2019). Milano. Fondazione Eni Enrico Mattei (FEEM). <https://doi.org/10.2139/ssrn.3475381>

- County Government of Migori. (2018). *Migori County Integrated Development Plan 2018-2022*. Nairobi. Republic of Kenya. <https://www.cog.go.ke/media-multimedia/speeches/category/106-county-integrated-development-plans-2018-2022?download=330:migori-county-integrated-development-plan-2018-2022>
- County Government of Migori. (2019). *Rongo Municipal Integrated Development Plan (RMIDeP) 2019-2023*. Nairobi. Republic of Kenya. https://migori.go.ke/downloadmigori/rongo_municipality/RONGO-IDeP-2019-2023.pdf
- Dahunsi, F. T., & Owoeye, P. O. (2016). The use of road signs, traffic control devices and other road safety information toward accident reduction among Okada riders (commercial motorcyclists) in Ado-Ekiti, Nigeria. *Scholarly Journal of Science Research and Essay*, 5(2), 16–24. <https://www.scholarly-journals.com/sjsre/publications/2016/June/pdf/Dahunsi%20and%20Owoeye.pdf>
- Gamberini, G. L. (2014). *boda boda*: The Impact of A Motorbike Taxi Service in Rural South Uganda. *Columbia University Journal of Politics & Society*, 25(2), 138–153. <https://doi.org/10.7916/d8gt5mft>
- Gardner, B., & Abraham, C. (2007). What drives car use? A grounded theory analysis of commuters' reasons for driving. *Transportation Research Part F: Traffic Psychology and Behaviour*, 10(3), 187–200. <https://doi.org/10.1016/j.trf.2006.09.004>
- Gbagir, K., Etu, J. E., & Oyedepo, O. J. (2018). Motorcycle Ownership Assessment and Estimation in Makurdi, North Central, Nigeria: A Multinomial Logit Model Approach. *Journal of Civil Engineering, Science and Technology*, 9(2), 3. <https://doi.org/10.33736/jcest.989.2018>
- George, D., & Mallery, P. (2003). *Using SPSS for Windows step by step: A simple guide and reference (11.0 update) (4th Ed.)*. Allyn & Bacon. <https://wps.ablongman.com/wps/media/objects/385/394732/george4answers.pdf>
- George, L. (1/29/2020). Crowded Lagos to ban motorbikes from most of Nigerian metropolis. *Reuters Media*. <https://www.reuters.com/article/us-nigeria-transportation-ban/crowded-lagos-to-ban-motorbikes-from-most-of-nigerian-metropolis-idUSKBN1ZQ2GF>

- Gillen, J. (2016). Streets of fire: motorbike mobilities in Vietnam. *Area*, 48(1), 64–69. <https://doi.org/10.1111/area.12225>
- Glewwe, P., & Levin, M. (2005). Presenting simple descriptive statistics from household survey data. In P. Narain (Ed.), *Studies in methods: Vol. 96. Household surveys in developing and transition countries*. United Nations. https://unstats.un.org/unsd/hhsurveys/pdf/Household_surveys.pdf
- Goodfellow, T. (2015). Taming the “Rogue” Sector: Studying State Effectiveness in Africa through Informal Transport Politics. *Comparative Politics*, 47(2), 127–147. <https://doi.org/10.5129/001041515814224462>
- Goodwin, P. (2019). The Influence of Technologies and Lifestyle on the Value of Time. In *International Transport Forum Discussion Papers* (2019/03). OECD Publishing. <https://doi.org/10.1787/9811ba36-en>
- Guillen, M. D., Ishida, H., & Okamoto, N. (2013). Is the use of informal public transport modes in developing countries habitual? An empirical study in Davao City, Philippines. *Transport Policy*, 26, 31–42. <https://doi.org/10.1016/j.tranpol.2012.03.008>
- Gumel, G. B., Adam, I. M., & Rilwan, I. A.-R. (2017). Impact of Commercial Motorcycle Transport in Raising Income: Evidence from Jigawa State, Nigeria. *CARD International Journal of Social Sciences and Conflict Management*, 2(3), 74–91. <https://casirmediapublishing.com/wp-content/uploads/2019/09/Pages-76-94.pdf>
- Hagen, J. X., Pardo, C., & Valente, J. B. (2016). Motivations for motorcycle use for Urban travel in Latin America: A qualitative study. *Transport Policy*, 49, 93–104. <https://doi.org/10.1016/j.tranpol.2016.04.010>
- Hansen, A. (2015). Motorbike Madness? Development and Two-Wheeled Mobility in Hanoi. *Asia in Focus*, 2, 5–13. <https://niasasiainfocus.files.wordpress.com/2015/03/arve-hansen.pdf>
- Hanson, S., & Hanson, P. (1981). The Travel-Activity Patterns of Urban Residents: Dimensions and Relationships to Sociodemographic Characteristics. *Economic Geography*, 57(4), 332. <https://doi.org/10.2307/144213>

- Hariyatno, H., Wimpertiwi, D., Isanawikrama, I., & Bawono, A. (2018). Ease of Online Ojek Service Grows Consumer Loyalty. *The Winners*, 19(2). <https://doi.org/10.21512/tw.v19i2.4610>
- Herwangi, Y., Pradono, P., Syabri, I., & Kustiwan, I. (2015). Making the connection between transport disadvantage and motorcycle usage of low-income people in Yogyakarta urbanized area, Indonesia. *Journal of the Eastern Asia Society for Transportation Studies*, 11, 90–109. <https://doi.org/10.11175/easts.11.90>
- Hoang, Q., & Okamura, T. (2020). Analyzing behavioral intentions in new residential developments of motorcycle dependent cities: The case of Ho Chi Minh City, Vietnam. *Case Studies on Transport Policy*, 8(1), 163–172. <https://doi.org/10.1016/j.cstp.2018.09.007>
- Howe, J. G. (2003). 'Filling the middle': Uganda's appropriate transport services. *Transport Reviews*, 23(2), 161–176. <https://doi.org/10.1080/01441640309890>
- Howe, J. G., & Davis, A. (2002). *boda boda* - Uganda's Rural and Urban Low-Capacity Transport Services. In *Proceedings of the 10th International CODATU Conference*. <https://trid.trb.org/view/735176>
- Idris, I., Sari, P., Ali, Y., Aisyah, S., & Hadi, A. (2019). The Effect of Taxi Bike Service Quality on Customer Satisfaction Among Students. In R. Hidayat, M. Mesran, T. M. Diansyah, S. Supriyanto, & D. Siregar (Eds.), *the 2nd International Conference on Advance and Scientific Innovation (ICASI)*. EAI. <https://doi.org/10.4108/eai.18-7-2019.2288678>
- Imam, R. (2014). Measuring Public Transport Satisfaction from User Surveys. *International Journal of Business and Management*, 9(6). <https://doi.org/10.5539/ijbm.v9n6p106>
- Inaba, H., & Kato, H. (2017). Impacts of Motorcycle Demand Management in Yangon, Myanmar. *Transportation Research Procedia*, 25, 4852–4868. <https://doi.org/10.1016/j.trpro.2017.05.364>
- Irawan, M. Z., Belgiawan, P. F., Tarigan, A. K. M., & Wijanarko, F. (2019). To compete or not compete: exploring the relationships between motorcycle-based ride-sourcing, motorcycle taxis, and public transport in the Jakarta metropolitan area. *Transportation*, 41(5), 1099. <https://doi.org/10.1007/s11116-019-10019-5>

- Jaligot, R., Kemajou, A., & Chenal, J. (2017). A new approach to spatial analysis of motorcycle taxis activities – the case of Port-au-Prince, Haiti. *Urban, Planning and Transport Research*, 5(1), 78–91. <https://doi.org/10.1080/21650020.2017.1402697>
- Jenkins, J., Mokuwa, E. Y., Peters, K., & Richards, P. (2020). Changing women's lives and livelihoods: motorcycle taxis in rural Liberia and Sierra Leone. *Proceedings of the Institution of Civil Engineers - Transport*, 173(2), 132–143. <https://doi.org/10.1680/jtran.18.00162>
- Johnston, D. C. (2007). These roads were made for walking? The nature and use of rural public transport services in Garut Regency, West Java, Indonesia. *Singapore Journal of Tropical Geography*, 28(2), 171–187. <https://doi.org/10.1111/j.1467-9493.2007.00289.x>
- Kaumbutho, P., Njenga, P., Sieber, N., & Mbathi, M. (2013). *Agricultural value chains: an illustrated booklet* (AFCAP/GEN/060). AFCAP. <https://assets.publishing.service.gov.uk/media/57a08a3640f0b652dd000606/AFCAP-GEN-060-D-agricultural-market-demands-Illustrated-Booklet.pdf>
- Kenya National Bureau of Statistics (KNBS). (2010). *Economic survey 2010*. Nairobi. Government Printers. https://www.knbs.or.ke/?page_id=3142
- Kenya National Bureau of Statistics (KNBS). (2015). *Migori County Statistical Abstract*. Nairobi. Government Printers. https://www.knbs.or.ke/?page_id=3142
- Kenya National Bureau of Statistics (KNBS). (2018a). *2015/16 Kenya Integrated Household Budget Survey (KIHBS): Basic Report*. Nairobi. Government Printers. https://www.knbs.or.ke/?page_id=3142
- Kenya National Bureau of Statistics (KNBS). (2018b). *Economic Survey 2018*. Nairobi. Government Printers. https://www.knbs.or.ke/?page_id=3142
- Kenya National Bureau of Statistics (KNBS). (2019a). *2019 Kenya Population and Housing Census Volume I: Population by County and Sub-County*. Nairobi. Government Printers. https://www.knbs.or.ke/?page_id=3142

- Kenya National Bureau of Statistics (KNBS). (2019b). *2019 Kenya Population and Housing Census Volume II: Distribution of Population by Administrative Units*. Nairobi. Government Printers. https://www.knbs.or.ke/?page_id=3142
- Kenya National Bureau of Statistics (KNBS). (2019c). *2019 Kenya Population and Housing Census Volume IV: Distribution of Population by Socio-Economic Characteristics*. Nairobi. Government Printers. https://www.knbs.or.ke/?page_id=3142
- Kenya National Police Service (KNPS). (2018). *Annual Crime Report*. Nairobi. Government Printers. <http://www.nationalpolice.go.ke/crime-statistics.html?download=59:crime-report>
- Kiruga, M. (2019). *African cities grapple with two-wheeled transport conundrum*. <https://www.theafricareport.com/15049/african-cities-grapple-with-two-wheeled-transport-conundrum/>
- Kolawole, T. G., & Afolabi, O. J. (2017). An Assessment of Motorcycle Operation in Ado-Odo Ota Local Government Area of Ogun State, Nigeria. *The Pacific Journal of Science and Technology*, 18(1), 163–173. http://www.akamaiuniversity.us/PJST18_1_163.pdf
- Konečný, V., Brídžiková, M., Gažo, P., & Semanová, Š. (2019). The Influence of Demographic Development and Population Structure on the Demand for Public Passenger Transport. *LOGI – Scientific Journal on Transport and Logistics*, 10(2), 70–81. <https://doi.org/10.2478/logi-2019-0017>
- Kothari, C. R. (2004). *Research methodology: Methods & techniques* (2nd rev. ed.). New Age International (P) Ltd. Publishers. <http://site.ebrary.com/lib/academiccompletetitles/home.action>
- Kumar, A. (2011). Understanding the emerging role of motorcycles in African cities: A political economy perspective. *Sub-Saharan Africa Transport Policy Program*.
- Kumar, R. (2012). *Research methodology: A step-by-step guide for beginners* (3rd ed. repr). Sage. <http://worldcatlibraries.org/wcpa/oclc/1056150527>

- Limtanakool, N., Dijst, M., & Schwanen, T. (2006). The influence of socioeconomic characteristics, land use and travel time considerations on mode choice for medium- and longer-distance trips. *Journal of Transport Geography*, *14*(5), 327–341. <https://doi.org/10.1016/j.jtrangeo.2005.06.004>
- Lucas, K., Mattioli, G., Verlinghieri, E., & Guzman, A. (2016). Transport poverty and its adverse social consequences. *Proceedings of the Institution of Civil Engineers - Transport*, *169*(6), 353–365. <https://doi.org/10.1680/jtran.15.00073>
- Mackett, R. L., & Brown, B. (2011). *Transport, Physical Activity and Health: Present knowledge and the way ahead*. London, UK. Centre for Transport Studies, University College London. <https://discovery.ucl.ac.uk/id/eprint/1333502/>
- Márquez, L., Pico, R., & Cantillo, V. (2018). Understanding captive user behavior in the competition between BRT and motorcycle taxis. *Transport Policy*, *61*, 1–9. <https://doi.org/10.1016/j.tranpol.2017.10.003>
- Maslow, A. H. (1943). A theory of human motivation. *Psychological Review*, *50*(4), 370–396. <https://doi.org/10.1037/h0054346>
- Mbabazi, E. (2019). Impact of unpaved road condition on rural transport services. *Proceedings of the Institution of Civil Engineers - Municipal Engineer*, *172*(4), 239–245. <https://doi.org/10.1680/jmuen.18.00048>
- Mbegu, S., & Mjema, J. (2019). Poverty Cycle with Motorcycle Taxis (Boda-Boda) Business in Developing Countries: Evidence from Mbeya—Tanzania. *OALib*, *06*(08), 1–11. <https://doi.org/10.4236/oalib.1105617>
- McCarthy, L., Delbosc, A., Currie, G., & Molloy, A. (2017). Factors influencing travel mode choice among families with young children (aged 0–4): a review of the literature. *Transport Reviews*, *37*(6), 767–781. <https://doi.org/10.1080/01441647.2017.1354942>
- Meyer, M. D., & Miller, E. J. (2010). *Urban transportation planning: A decision-oriented approach* (2nd ed.). *McGraw-Hill series in transportation*. McGraw-Hill Primis.

- Michael, C. E., Ojedoku, U. A., & Chinwokwu, E. C. (2012). Abolition of Commercial Motorbikes and Its Implication on Transportation and Criminality in Calabar Metropolis. *International Journal of Social Science Studies*, 1(1). <https://doi.org/10.11114/ijsss.v1i1.103>
- Mishra, P., Pandey, C., Singh, U., Gupta, A., Sahu, C., & Keshri, A. (2019). Descriptive statistics and normality tests for statistical data. *Annals of Cardiac Anaesthesia*, 22(1), 67. https://doi.org/10.4103/aca.ACA_157_18
- Mkutu, K., & Mkutu, T. R. (2019). Public health problems associated with “Boda boda” motorcycle taxis in Kenya: The sting of inequality. *Aggression and Violent Behavior*, 47, 245–252. <https://doi.org/10.1016/j.avb.2019.02.009>
- Muchira, N. (2016, September 27). Motorcycles set to become main mode of transport in Africa. *BizCommunity*. <https://www.bizcommunity.com/Article/196/582/151424.html>
- Muindi, K., & Nyabuta, O. J. S. (2018). Informal Motorcycle Business and Livelihoods in Urban Areas of Kenya: Evidence from Eldoret and Kakamega Towns. *International Journal of Innovative Research and Development*, 7(3). <https://doi.org/10.24940/ijird/2018/v7/i3/MAR18011>
- Muyanga, M., Olwande, J., Mueni, E., & Wambugu, S. (2010). Free Primary Education in Kenya: An Impact Evaluation Using Propensity Score Methods. In *Child Welfare in Developing Countries* (Vol. 38, pp. 125–155). Springer. https://doi.org/10.1007/978-1-4419-6275-1_5
- Naybor, D., Poon, J. P. H., & Casas, I. (2016). Mobility Disadvantage and Livelihood Opportunities of Marginalized Widowed Women in Rural Uganda. *Annals of the American Association of Geographers*, 106(2), 404–412. <https://doi.org/10.1080/00045608.2015.1113110>
- Ng, C., & Yi, S. (2016). *Rethinking Sustainable Mobility: Understanding the use of boda-boda motorcycle taxis in Kampala, Uganda* (IIIEE Theses 2016:16) [Published Master's Thesis]. Lund University, Lund, Sweden. <http://lup.lub.lu.se/student-papers/record/8895390>

- Nurhafizhah, T., Susilowati, I. H., Maulana, A., & Habibullah, M. F. (2018). Safety and Fatigue Risk Factors among Online Motorcycle Drivers in Depok City, Indonesia. *KnE Life Sciences*, 4(5), 702. <https://doi.org/10.18502/cls.v4i5.2600>
- Nutsugbodo, R. Y., Amenumey, E. K., & Mensah, C. A. (2018). Public transport mode preferences of international tourists in Ghana: Implications for transport planning. *Travel Behaviour and Society*, 11, 1–8. <https://doi.org/10.1016/j.tbs.2017.11.002>
- Ogola, F. O. (2010). *Free education in Kenya's public primary schools: Addressing the challenges*. Organisation for Social Science Research in Eastern and Southern Africa.
- Olsen, J. R., Macdonald, L., & Ellaway, A. (2017). Changes over time in population level transport satisfaction and mode of travel: A 13 year repeat cross-sectional study, UK. *Journal of Transport & Health*, 6, Article 2214-1405, 366–378. <https://doi.org/10.1016/j.jth.2017.03.012>
- Olvera, L. D., Plat, D., Pochet, P., & Maïdadi, S. (2012). Motorbike taxis in the "transport crisis" of West and Central African cities. *EchoGéo*. Advance online publication. <https://doi.org/10.4000/echogeo.13080>
- Olwande, J., & Mathenge, M. K. (2012). Market Participation among Poor Rural Households in Kenya. In *International Association of Agricultural Economists: 2012 Conference*, Foz do Iguacu, Brazil. <http://ageconsearch.umn.edu/record/126711/files/Olwande.pdf>
- Opondo, V. O., & Kiprop, G. (2018). *boda boda Motorcycle Transport and-Security Challenges in Kenya* (NCRC Research Report No. 14). Nairobi. National Crime Research Centre (NCRC). <http://crimeresearch.go.ke/wp-content/uploads/2018/11/Research-Report-of-Boda-Boda-Motorcycle-Transport-and-Security-Challenges-in-Kenya-2.pdf>
- Oppenheimer, J. A. (2008). Rational Choice Theory. In *The Sage Encyclopedia of Political Theory*. <https://doi.org/10.4135/9781412958660.n377>
- Owolabi, A. O. (2010). Trip patterns in Akure, Nigeria: A land-use analytical approach. *Journal of Transportation Management*, 21(3), 63–71. <https://doi.org/10.22237/jotm/1285891560>

- Owuor, D. A., Ayiro, L. P., & Jackson, T. (2018). The Impact of Free Primary Education Inputs on Educational Outcomes in Kenya (2003 To 2013): The Rate of Enrolment and Retention at Primary School Level as a Factor. *European Journal of Educational Sciences*, 05(01). <https://doi.org/10.19044/ejes.v5no1a2>
- Panou, K., & Proios, G. (2013). Modeling Transportation Affordability with Cumulative Density Function of Mathematical Beta Distribution. *Transportation Research Record: Journal of the Transportation Research Board*, 2397(1), 53–60. <https://doi.org/10.3141/2397-07>
- Paramita, P., Zheng, Z., Haque, M. M., Washington, S., & Hyland, P. (2018). User satisfaction with train fares: A comparative analysis in five Australian cities: 10.1371/journal.Pone.019944. *PloS One*, 13(6), e0199449. <https://doi.org/10.1371/journal.pone.0199449>
- Parsa, A. B., Bakhtiari, A., Habibian, M., & Mohammadian, A. (2020). Survival analysis Motorcycle parking in workplace-tours. *International Journal of Transportation Science and Technology*. Advance online publication. <https://doi.org/10.1016/j.ijtst.2020.03.005>
- Peraphan, J., Hermann, K., & Markus, M. (2017). The conundrum of the motorcycle in the mix of sustainable urban transport. *Transportation Research Procedia*, 25, 4869–4890. <https://doi.org/10.1016/j.trpro.2017.05.365>
- Peters, K., Mokuwa, E., Richards, P., & Jenkins, J. (2018). Gender Mainstreaming in the Motorcycle Taxi Sector in Rural Sierra Leone and Liberia. <http://research4cap.org/ral/Petersetal-SwanseaUni-GM-2018-GMMotorcycleTaxiSectorRuralSierraLeoneLiberia-AfCAP-GEN2044K-180524.pdf>
- Polat, C. (2012). The Demand Determinants for Urban Public Transport Services: A Review of the Literature. *Journal of Applied Sciences*, 12(12), 1211–1231. <https://doi.org/10.3923/jas.2012.1211.1231>
- Pongprasert, P., & Kubota, H. (2017). Switching from motorcycle taxi to walking: A case study of transit station access in Bangkok, Thailand. *IATSS Research*, 41(4), 182–190. <https://doi.org/10.1016/j.iatssr.2017.03.003>

- Porter, G. (2011). 'I think a woman who travels a lot is befriending other men and that's why she travels': mobility constraints and their implications for rural women and girls in sub-Saharan Africa. *Gender, Place & Culture*, 18(1), 65–81. <https://doi.org/10.1080/0966369X.2011.535304>
- Porter, G. (2016). Mobilities in Rural Africa: New Connections, New Challenges. *Annals of the American Association of Geographers*, 46(4), 1–8. <https://doi.org/10.1080/00045608.2015.1100056>
- Porter, G., Tewodros, A., Bifandimu, F., Gorman, M., Heslop, A., Sibale, E., Awadh, A., & Kiswaga, L. (2013). Transport and mobility constraints in an aging population: health and livelihood implications in rural Tanzania. *Journal of Transport Geography*, 30(C), 161–169. <https://doi.org/10.1016/j.jtrangeo.2013.05.001>
- Qian, J. (2015). No right to the street: Motorcycle taxis, discourse production and the regulation of unruly mobility. *Urban Studies*, 52(15), 2922–2947. <https://doi.org/10.1177/0042098014539402>
- Research, & Markets (4/25/2017). Africa Two-wheeler (Motorcycle vs. Scooter) Market Competition Forecast & Opportunities, 2021 - Research and Markets. <https://www.prnewswire.com/news-releases/africa-two-wheeler-motorcycle-vs-scooter-market-competition-forecast--opportunities-2021---research-and-markets-300444172.html>
- Rosenbloom, S., & Burns, E. (1993). Gender Differences in Commuter Travel in Tucson: Implications for Travel Demand management Programs. *UC Berkeley: University of California Transportation Center*. <https://escholarship.org/uc/item/036776w2>
- Ryley, T. (2006). Use of non-motorised modes and life stage in Edinburgh. *Journal of Transport Geography*, 14(5), 367–375. <https://doi.org/10.1016/j.jtrangeo.2005.10.001>
- SA, B., & MM, Z. (2018). Motorcycle Riders' Risky Behaviors and Safety Measures: A Hospital-Based Study. *Egyptian Journal of Occupational Medicine*, 42(3), 453–468. <https://doi.org/10.21608/ejom.2018.12210>

- Sacks, E., Vail, D., Austin-Evelyn, K., Greeson, D., Atuyambe, L. M., Macwan'gi, M., Kruk, M. E., & Grépin, K. A. (2016). Factors influencing modes of transport and travel time for obstetric care: a mixed methods study in Zambia and Uganda. *Health Policy and Planning*, *31*(3). <https://doi.org/10.1093/heapol/czv057>
- Sahlqvist, S., Song, Y., & Ogilvie, D. (2012). Is active travel associated with greater physical activity? The contribution of commuting and non-commuting active travel to total physical activity in adults. *Preventive Medicine*, *55*(3). <https://doi.org/10.1016/j.ypmed.2012.06.028>
- Scott, J. (1999). Rational Choice Theory. In G. Browning, A. Halcli, & F. Webster (Eds.), *Understanding Contemporary Society: Theories of the Present*. Sage.
- Sen, A. (2009). *The Idea of Justice*. Harvard University Press. <https://doi.org/10.2307/j.ctvjnrv7n>
- Singoro, B. W., Wakhungu, J., & Obiri, J. (2016). Causes and trends of public transport motorcycle accidents in Bungoma County, Kenya. *International Journal of Multidisciplinary Academic Research*, *4*(1), 36–42. <http://erepository.kibu.ac.ke/handle/123456789/1091>
- Starkey, P. (2016a). The benefits and challenges of increasing motorcycle use for rural access. In *International Conference on Transport and Road Research (iTRARR)*, Sarova Whitesands Hotel, Mombasa, Kenya. http://research4cap.org/Library/Starkey-ReCAPPMU_2016_BenefitsChallengesofIncreasingMotorcycleUseRuralAccess_iTRARR_160314.pdf
- Starkey, P. (2016b). Provision of rural transport services: user needs, practical constraints and policy issues. In *Sustainable Rural Access: Vol. 86. Transport and Communications Bulletin for Asia and the Pacific* (pp. 6–22). <http://www.indiaenvironmentportal.org.in/files/file/Bulletin%2086%20Sustainable%20Rural%20Access.pdf>
- Starkey, P., Hine, J., Workman, R., & and Otto Andrew (2019). Interactions between improved rural access infrastructure and transport services provision: Phase 1 Scoping Report. <http://www.research4cap.org/Library/Starkeyetal-TRL-2019-IMPARTS-WorkshopReport-ReCAP-GEN2136A-190114-compressed.pdf>

- Thompson, C. B. (2009). Descriptive Data Analysis. *Air Medical Journal*, 28(2), 56–59. <https://doi.org/10.1016/j.amj.2008.12.001>
- Tuan, V. A., & Mateo-Babiano, I. B. (2013). Motorcycle Taxi Service in Vietnam – Its Socioeconomic Impacts and Policy Considerations. *Journal of the Eastern Asia Society for Transportation Studies*, 10, 13–28. <https://doi.org/10.11175/easts.10.13>
- Tuckman, B. W. (1999). *Conducting Educational Research* (Fifth Edition). Harcourt Brace Jovanovich. <http://ww2.odu.edu/~jritz/attachments/coedre.pdf>
- Tuffour, Y. A., & Appiagyei, D. K. N. (2014). Motorcycle Taxis in Public Transportation Services within the Accra Metropolis. *American Journal of Civil Engineering*, 2(4), 117. <https://doi.org/10.11648/j.ajce.20140204.12>
- Vaziri, M., Dashtestaninejad, H., Asgari, H., & Salimi, F. (2014). Rural Travel Behaviour in Developing Countries: A Study of Farm-Based Villages in Iran. *The Journal of Sustainable Mobility*, 1(2), 25–45. <https://doi.org/10.9774/GLEAF.2350.2014.no.00004>
- Warburton, D. E. R., Nicol, C. W., & Bredin, S. S. D. (2006). Prescribing exercise as preventive therapy. *CMAJ: Canadian Medical Association Journal*, 174(7), 961–974. <https://doi.org/10.1503/cmaj.1040750>
- Wonga, N. (2019). A mobile solution to self-regulate the Boda-Boda industry in emerging economies. In *Proceedings of the 14th Annual Conference on World Wide Web Applications*. https://www.academia.edu/26115643/A_mobile_solution_to_self_regulate_the_Boda_Boda_industry_in_emerging_economies
- World Health Organization (WHO). (2018). *Global status report on road safety 2018*. World Health Organization. <https://apps.who.int/iris/bitstream/handle/10665/276462/9789241565684-eng.pdf?ua=1>
- Yamane, T. (1967). *Statistics, An Introductory Analysis* (2nd Ed.). Harper and Row.

Zuure, D. N., & Yiboe, A. (2017). The phenomenon of commercial motorbike transportation and its impact on the youth of Agbozume traditional area in the Ketu south municipality in the Volta region of Ghana. *International Journal of Development and Sustainability*, 6(11), 1689–1700. <https://isdsnet.com/ijds-v6n11-13.pdf>

APPENDICES

Appendix 1: Questionnaire for Main Respondents

Section A: Consent form

My name is Samora Marcheche Obudho, a Master of Arts student at Rongo University. I am collecting data for my research study entitled “**Patterns of Utilisation of Motorcycle Taxis in Rural Kenya: A Study of Rongo Sub-county, Migori County.**” All data collected in this study is purely for academics. I have selected you as a respondent because you are a resident of this village, and you know your motorcycle activities. I request you to fill in this questionnaire. I will treat the information you share with me with the utmost confidentiality and use it only for this study. Kindly note that participation in this study is voluntary and that you may discontinue without being penalised or disadvantaged. There will be no monetary compensation for participation in this study.

Thank you for participating in the study.

Samora Marcheche Obudho

Certificate of Consent

Patterns of Utilisation of Motorcycle Taxis in Rural Kenya: A Study of Rongo Sub-county, Migori County

I agree to participate in the above research study. The researcher has explained the purpose of the study. Any information I provide is confidential, and this study will disclose no information that could lead to the identification of any individual, or any other party in any reports on the study. I also understand that my participation is voluntary, that I can choose not to participate and that I can withdraw at any stage of the study without being penalised or disadvantaged.

Participant’s name:

Signature:Date:

Location _____ Sub-Location _____ Village _____

1. Gender
 - Male
 - Female

2. Age
 - Below 30 years
 - 31-40 years
 - 41-50 years
 - 51-60 years
 - 51-70 years
 - 70 years and above

3. Highest educational attainment
 - No formal schooling
 - Primary
 - Secondary
 - Post-secondary

4. Marital status
 - Single
 - Married
 - Separated
 - Widowed

5. Occupation

6. Average monthly net income in Kenya shillings
 - 5000 and below
 - 5,001-10,000
 - 10,001-20,000
 - 20,001-30,000
 - Above 30,000

7. Do you own a car?
 - Yes How many?.....
 - No

8. Do you own a motorcycle?
 - Yes How many?.....
 - No

Section C: Prevalence of Utilisation of Motorcycle Taxis

Please think of an example journey or a trip wherein you have alternately used a conventional mode of transport and a *boda boda*.

9. Trip Origin.....
10. Trip destination.....

11. Trip purpose
- | | |
|-----------------------------|--------------------------|
| Home | <input type="checkbox"/> |
| Work | <input type="checkbox"/> |
| School/university | <input type="checkbox"/> |
| Hospital/clinic | <input type="checkbox"/> |
| Market | <input type="checkbox"/> |
| Transfer to other modes | <input type="checkbox"/> |
| Others, please specify..... | |
12. Please state the approximate distance of the trip: Min.....
- Max.....Kilometres
13. At which periods does the example trip happen? *(Please tick all that applies)*
- | | |
|-------------------|--------------------------|
| 05:00 am-10:00 am | <input type="checkbox"/> |
| 10:01 am-01:00 pm | <input type="checkbox"/> |
| 01:01 pm-04:00 pm | <input type="checkbox"/> |
| 04:01 pm-06:00 pm | <input type="checkbox"/> |
| 06:01 pm-08:00 pm | <input type="checkbox"/> |
| 08:01 pm-04:59 am | <input type="checkbox"/> |
| Only Occasionally | <input type="checkbox"/> |
14. For the example trip, which mode of transport do you use
- | | |
|--------------------------------|--------------------------|
| Motorcycle Taxi | <input type="checkbox"/> |
| Conventional mode of transport | <input type="checkbox"/> |
15. How often do you use a motorcycle taxi?
- | | |
|--|--------------------------|
| More than twice daily | <input type="checkbox"/> |
| Once or twice a day | <input type="checkbox"/> |
| 4 to 6 times a week | <input type="checkbox"/> |
| 1 to 3 times a week | <input type="checkbox"/> |
| Only Occasionally: Please elaborate..... | |
16. Are you satisfied with the service of motorcycle taxi providers?
- | | |
|-----------------------|--------------------------|
| Strongly Dissatisfied | <input type="checkbox"/> |
| Dissatisfied | <input type="checkbox"/> |
| Neutral | <input type="checkbox"/> |
| Satisfied | <input type="checkbox"/> |
| Very satisfied | <input type="checkbox"/> |
17. Please explain your response to Question 16.
-
-
-
-

Section D: Drivers of Motorcycle Taxi Use

18. In the table below, please list your reasons for using *boda boda*, starting with the most important to the least important

No.	Reasons
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	

19. How do you procure motorcycle taxi services?

By walking to the motorcycle taxi stage. Specify the stage.....

By making a call to a motorcycle taxi rider []

Others: Please specify.....

20. Please compare motorcycle taxis and the conventional mode of transportation in an example journey or a trip wherein you have alternately used a conventional mode of transport and a motorcycle taxi.

	Using Motorcycle Taxi	Using Conventional Mode of Transport
How long does it usually take to wait for the mode?		
How long does it usually take to complete the trip with the mode?		
How long does it usually take to wait for the mode?		
How much does it usually cost with the mode?		

Thank You for Taking the Time to Respond to Questions.

Appendix 2: Key Informant Interview Schedule

Section A: Consent form

My name is Samora Marchele Obudho, a Master of Arts student at Rongo University. I am collecting data for my research study entitled **“Patterns of Utilisation of Motorcycle Taxis in Rural Kenya: A Study of Rongo Sub-county, Migori County.”** All data collected in this study is purely for academics. I have selected you as one of the key informants because you know MT issues in this sub-county. I request you to participate in this interview. I will treat the information you share with me with the utmost confidentiality and use it only for this study. Kindly note that participation in this study is voluntary and that you may discontinue without being penalised or disadvantaged. There will be no monetary compensation for participation in this study.

Thank you for participating in the study.

Samora Marchele Obudho

Certificate of Consent

Patterns of Utilisation of Motorcycle Taxis in Rural Kenya: A Study of Rongo Sub-county, Migori County

I agree to participate in the above research study. The researcher has explained the purpose of the study. Any information I provide is confidential, and this study will disclose no information that could lead to the identification of any individual, or any other party in any reports on the study. I also understand that my participation is voluntary, that I can choose not to participate and that I can withdraw at any stage of the study without being penalised or disadvantaged.

Participant's name:

Signature:Date:

Section B: Questions

Name of institutionGenderAge.....
Position of the respondent in the institution.....
Date of interview.....Venue.....Duration.....
Interviewer.....

Please Answer These Questions.

1. How frequently do people use a motorcycle taxi in this study area?
2. At what times do motorcycle taxis operate in this area? Where do they take people at such times?
3. How far in kilometres can a motorcycle taxi take you to?
4. What are some of the motorcycle taxi trip purposes?
5. Are people satisfied with motorcycle taxi services in this study area?
6. Are there any safety concerns when using motorcycle taxis? Which ones?
7. In your view, what are the social characteristics of motorcycle taxi users in the study area?
Regarding gender, age, educational attainment level, marital status, occupation, average family monthly income, car ownership, and the number of motorcycles owned.
8. What are some reasons for the use of motorcycle taxis in the study area?

Thank you for participating in this interview.

Appendix 3: Focus Group Discussion Guide

Date Venue: Time: Start: End.....

Number of Participants: (See Participants list attached)

Facilitator:

- *The facilitator shall welcome members and facilitate introductions.*
- *The facilitator shall reassure members of anonymity and oversee the generation of ground rules.*

Discussion Questions

1. How frequently do people use a motorcycle taxi in this study area?
2. At what times do motorcycle taxis operate in this area? Where do they take people at such times?
3. How far in kilometres can a motorcycle taxi take you to?
4. What are some of the motorcycle taxi trip purposes?
5. Are people satisfied with motorcycle taxi services in this study area?
6. Are there any safety concerns when using motorcycle taxis? Which ones?
7. In your view, what are the social characteristics of motorcycle taxi users in the study area?
Regarding gender, age, educational attainment level, marital status, occupation, average family monthly income, car ownership, and the number of motorcycles owned.
8. What are some reasons for the use of motorcycle taxis in the study area?

Thank you for participating. This discussion has been very fruitful

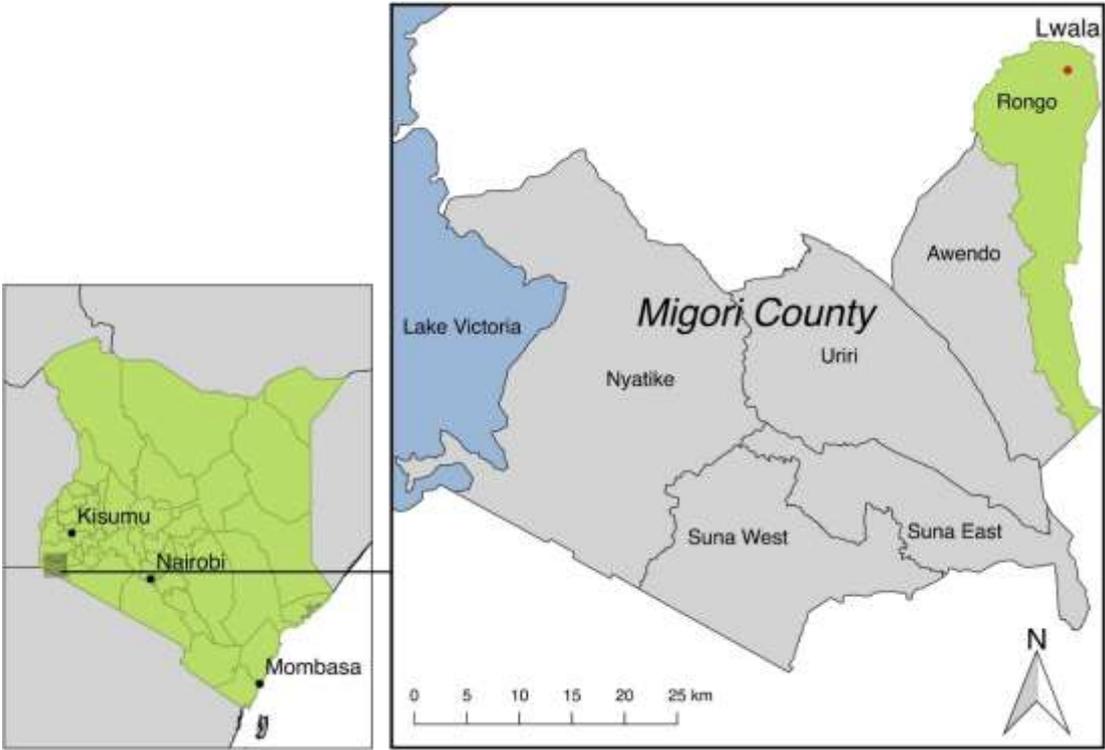
Appendix 4: Observation Checklist

Date.....Observation site:

Time: Start:End..... Observer:

	OBSERVATION ITEM	NUMBER		REMARKS
A	Motorcycle taxis			
1	Number of motorcycle taxis parked at roadsides, sheds, or under trees.			
2	Number of motorcycle taxis moving around			
B	Motorcycle taxi riders	M	F	
1	Number of motorcycle taxi riders			
2	Number of motorcycle taxi riders wearing helmets			
3	Number of motorcycle taxi riders wearing reflector jackets			
C	Motorcycle taxi passengers	M	F	
1	Number of motorcycle taxi passengers			
2	Number of motorcycle taxi passengers seated astride			
3	Number of passengers seated with both legs on one side			
4	Number of motorcycle taxi riders wearing helmets			
5	Number of motorcycle taxi passengers wearing reflector jackets			
D	The general state of roads			
E	Items carried on motorcycle taxis			
1				
2				
3				
4				
Observation of interactions between motorcycle taxi riders and the police (if any)				

Appendix 5: Map Showing Location of Rongo Sub-county in Kenya



Appendix 6: Introductory Letter to NACOSTI



OFFICE OF THE DEAN
SCHOOL OF GRADUATE STUDIES

Tel. 0771349741

P.O. Box 103 - 40404
RONGO

Our Ref: **MSOC/8027/2014**

Date: Monday, May 6, 2019

The Chief Executive Officer,
National Commission for Science, Technology & Innovation,
off Waiyaki Way, Upper Kabete,
P.O Box 30623-00100,
Nairobi-KENYA.

Dear Sir,

**RE: RESEARCH PERMIT FOR MR. SAMORA MARCHELE OBUDHO-
MSOC/8027/2014**

We wish to inform you that the above person is a bona fide graduate student of Rongo University in the School of Arts and Social Sciences pursuing a Master degree in Sociology. He has been authorized by the University to undertake research titled; **"Impact of Commercial Motorcycles (Boda-Boda) on Social Development in Rural Kenya: The Case of Rongo Sub-County"**.

This is, therefore, to request the commission to issue him with a research permit to enable him proceed for field work.

Your assistance to him shall be highly appreciated.

Thank you.

Dr. Edward Anino
DEAN, SCHOOL OF GRADUATE STUDIES

Copy to: Vice Chancellor
Deputy Vice Chancellor (Academic and Student Affairs).
Dean, School of Arts and Social Sciences
HoD, Language, Linguistics and Literature



Appendix 7: NACOSTI Research Authorisation Letter



NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,
2241349, 3310571, 2219420
Fax: +254-20-318245, 318249
Email: dg@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

NACOSTI, Upper Kabete
Off Waiyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/19/93698/30317**

Date: **24th June, 2019.**

Samora Marchele Obudho
Rongo University
P.O. Box 103-40404
RONGO.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on *“Impact of commercial motorcycles (boda-bodas) on social development in rural Kenya: The case of Rongo Sub-County.”* I am pleased to inform you that you have been authorized to undertake research in **Migori County** for the period ending **24th June, 2020.**

You are advised to report to **the County Commissioner, and the County Director of Education, Migori County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.


BONIFACE WANYAMA
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Migori County.

The County Director of Education
Migori County.

Appendix 8: NACOSTI Research Clearance Permit

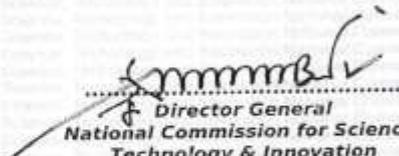
THIS IS TO CERTIFY THAT:
MR. SAMORA MARCHELE OBUDHO
of RONGO UNIVERSITY, 0-40404
RONGO, has been permitted to conduct
research in Migori County

Permit No : NACOSTI/P/19/93698/30317
Date Of Issue : 24th June, 2019
Fee Received : Ksh 1000

on the topic: **IMPACT OF COMMERCIAL
MOTORCYCLES (BODA-BODAS) ON
SOCIAL DEVELOPMENT IN RURAL
KENYA: THE CASE OF RONGO
SUB-COUNTY**

for the period ending:
24th June, 2020


Applicant's
Signature



Director General
National Commission for Science,
Technology & Innovation

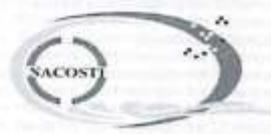
**THE SCIENCE, TECHNOLOGY AND
INNOVATION ACT, 2013**

The Grant of Research Licenses is guided by the Science,
Technology and Innovation (Research Licensing) Regulations, 2014.

CONDITIONS

1. The License is valid for the proposed research, location and specified period.
2. The License and any rights thereunder are non-transferable.
3. The Licensee shall inform the County Governor before commencement of the research.
4. Excavation, filming and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
5. The License does not give authority to transfer research materials.
6. NACOSTI may monitor and evaluate the licensed research project.
7. The Licensee shall submit one hard copy and upload a soft copy of their final report within one year of completion of the research.
8. NACOSTI reserves the right to modify the conditions of the License including cancellation without prior notice.

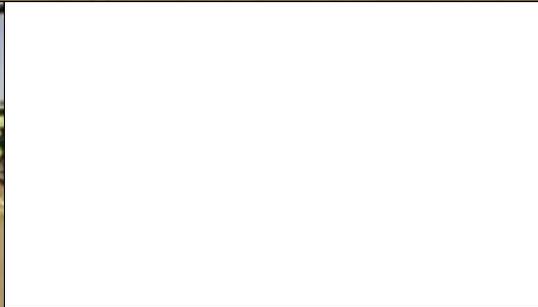

REPUBLIC OF KENYA


National Commission for Science,
Technology and Innovation
RESEARCH LICENSE

National Commission for Science, Technology and Innovation
P.O. Box 30623 - 00100, Nairobi, Kenya
TEL: 020 400 7000, 0713 788787, 0735 404245
Email: dg@nacosti.go.ke, registry@nacosti.go.ke
Website: www.nacosti.go.ke

Serial No.A 25400
CONDITIONS: see back page

Appendix 9: Photolog



The main street in Rongo town, a high-income residential and formal commercial area



Kitere, a middle-income area characterised by mixed land use, and social groups, including students.



Kanyawanga, a low-income residential area, and school.



Motorcycle taxi stage at the side of the road in Kanga, a small-scale commercial area.



Motorcycle taxis at a stage, also available at night.

Motorcycle taxis during a market day in Rongo Town.



Motorcycle taxis are carrying more than one passenger with their goods on a low volume rural road.

Working lady carried on a motorcycle taxi on a low volume rural road.



Motorcycle taxis are used for goods delivery from suppliers.

A scene when unknown thugs killed one motorcycle taxi operator in Rongo-Nyamarambe road.