NON-MOTORISED TRANSPORT (NMT) INFRASTRUCTURE ALONG SELECTED ROADS IN THE CITY OF LUSAKA: STATUS, EXPERIENCES AND POLICY

By

Raymond Lukomona

A dissertation submitted to the University of Zambia in partial fulfillment of the requirements of the degree of Master of Science in Spatial Planning

---

THE UNIVERSITY OF ZAMBIA

LUSAKA

2017

Declaration

I hereby declare that this dissertation is my own work. It has not previously been submitted for any other degree or examination at the University of Zambia or any other university. It has therefore been submitted for the Master of Science in Spatial Planning at the University of Zambia.

Name: ……

Signature: ……

Date: ……

Certificate of Approval

This dissertation of Raymond Lukomona has been approved as fulfilling the requirements for the award of Master of Science in Spatial Planning by the University of Zambia.

Name Signature

…… ……

Examiner

Name Signature

…… ……

Examiner

Name Signature

…… ……

Examiner

…….

Date of Approval

Abstract

The majority of residents in the City of Lusaka rely on non-motorised transport (NMT) for their daily movement within the City. Paradoxically City authorities have concentrated investments on road infrastructure which favours the minority motorised transport (MT) users through construction and widening of City roads. This has had the effect of reducing transport options for the majority as their NMT environment remains in a poor state. Therefore, this study sought to examine NMT infrastructure along selected roads in the City of Lusaka with a focus to its state, challenges faced by users, integration in City policies and potential.

A case study approach was used and four City roads studied were purposively selected. The selected roads were Alick Nkhata, Burma, Dedan Kimathi and Independence Avenue. Data was collected through direct observations and in-depth interviews with key informants and NMT users. Key informants were identified from institutions dealing with road transport in the City of Lusaka while convenience sampling was used to select NMT users. The resultant sample was 40 people comprising 9 key informants and 31 NMT users. Data was mainly analysed through narrative and content analyses. Simple descriptive statistics were also used where appropriate.

The study revealed that NMT infrastructure on the selected roads is inadequate. It showed that the roads under study only have a total of 8047 metres of paved walkways compared to 18,180 metres of paved carriageway. As a percentage of carriageways on the selected roads, walkways make up only 44.3 percent. Other NMT infrastructure is virtually inexistent on the roads under study. NMT users are thus subjected to the dusty, disjointed, and uneven foot tracks which are barely passable after heavy rains. The study has also shown that NMT users face challenges such as difficulties in crossing the roads due to inadequacy of crossing facilities on the selected roads. Furthermore, NMT users make up 57 percent of all road traffic accidents, a situation which is not only undesirable but also avoidable. Therefore, NMT usage on the selected roads is unsafe, inconvenient and unattractive making it a less preferred but only available option to the less privileged majority of users on the selected roads. The study has revealed that some Lusaka City Plans, road projects and legislation have made provisions for NMT infrastructure. Nevertheless, such provisions are inadequate and largely unrealistic. City policies have completely left out hand carts which were found to be a common feature on Dedan Kimathi Road and playing an invaluable role in the City's freight transport system. Ultimately, the study demonstrates that all the selected roads can adequately accommodate NMT infrastructure owing to the favourable climate, good terrain, and space availability.

Formulation of a stand-alone NMT policy and plan for Lusaka City is thus recommended. It is also proposed that institutions responsible for road transport should establish positions and recruit staff to specifically deal with NMT issues. To adequately capture and address challenges faced by NMT users, it is recommended that NMT users be involved in the design of roads.

Acknowledgements

During the course of this study, I received generous and invaluable support from numerous people. To list all of them here is impossible. However, the efforts of the following people cannot go unmentioned;

First and foremost, my supervisors, Dr. Wilma S. Nchito and Dr. Orleans Mfune, for their selfless efforts, guidance, direction and wise counsel. May God, bless you and yours richly.

My sincere gratitude also goes to all lecturers and staff in the Department of Geography and Environmental Studies for their support. Special gratitude goes to Mr. Gilbert Siame for his constructive comments on this work.

All my research participants from Road Development Agency (RDA), Road Traffic and Safety Agency (RTSA), Lusaka City Council, Ministry of Local Government and Housing, Ministry of Transport, Communication, Works and Supply and all the NMT users who allowed me to interview them. I'm grateful for their time, comments and answering my questions.

All my classmates. Thank you all for your support. We came in as strangers but left as family, a very good family indeed.

Collins – I'm deeply indebted to you for all your help. You understood all the challenges I was facing during this study and took them upon yourself as if they were your own. Thank you.

Mike, Mwila, Mutale and Christabel thank you for your constructive comments. I owe you. Mike, the Urban Design handbook you prepared gave birth to this work.

My sponsors-The Government of the Republic of Zambia through the Department of Physical Planning. I'm grateful to the Directorate of Physical Planning and staff at the Central Province office. I'm also indebted to Mrs. Edwidge Mutale, Permanent Secretary for Central Province for her encouragement and support.

My family members for their love, care, understanding and patience during the course of this work. I'm forever grateful to the love of my life, Victoria for always being there for me. My children, Bukata and Malumbo for keeping me 'sane'. I always looked forward to your 'thunderous welcome' whenever I came back home from school. I love you dearly. Mum, I'm eternally grateful for all those encouraging words, love and prayers. I'm also indebted to my in-laws Honourable and Mrs. Shawa for all their encouragements, wise counsel and kindness. To Bridget and Taziona, you literally kept me at the beginning of this work. Thank you very much.

Most importantly I thank God Almighty for His unfailing love, mercies, patience and kindness towards me. You are wonderful. In you I live and have my being. Thank you for the gift of life.

Table of Contents

List of Tables

List of Figures

List of Abbreviations and Acronyms

AAPS	Association of African Planning Schools
CCAP	Center for Clean Air Policy
CCTV	Closed-Circuit Television
CSO	Central Statistical Office
DETRAN	*Departamento de Trânsito do Estado do Rio de Janeiro*
DOT	Department of Transport
GIS	Geographic Information System
GRZ	Government of the Republic of Zambia
IMT	Intermediate Modes of Transport
JICA	Japan International Cooperation Agency
Km	Kilometers
LCC	Lusaka City Council
MMD	Movement for Multi-Party Democracy
MT	Motorised Transport
NMT	Non-motorised transport
NRFA	National Road Fund Agency
RDA	Road Development Agency
RTA	Road Traffic Accident
RTSA	Road Traffic and Safety Agency
SSA	Sub-Sahara Africa
SSATP	Sub-Sahara Africa Transport Programme
UN	United Nations
UNEP	United Nations Environment Programme
VOC	Vehicle Operating Cost
ZACA	Zambia Consumers Association
ZIPAR	Zambia Institute of Policy Analysis and Research
ZP	Zambia Police

CHAPTER 1: INTRODUCTION

1.0 Background

Non-motorised Transport (NMT) is a very important transport option that increases accessibility and mobility for city residents. According to Godefrooij *et al.,* (2009:15) NMT also called "Active Transport", "essentially refers to walking and cycling (and all other modes that have wheels but no engine such as pedicabs and freight tricycles), as well as related infrastructure, policies and education." Statistics from various cities have shown that NMT constitutes the majority of transport options for city dwellers especially in global south countries. For example, studies from selected Sub-Sahara African (SSA) cities indicate that walking alone accounts for 81 percent of all trips in Dakar, 70 percent in Addis Ababa and Kinshasa and 67 percent in Morogoro (Sub-Saharan Africa Transport Policy Program (SSATPP), 2005; Ogendi *et al.,* 2013). However, these cities have also witnessed an increase in the number of motor vehicles. Studies have shown that the bulk of future demand for motor vehicles will be in global south cities (Freund and Martin, 1999; Zambia Institute for Policy Analysis and research (ZIPAR), 2014). Apart from the attendant environmental effects of this increase in motor vehicles, is a concern that road infrastructure investments in these global south cities are biased towards the motor vehicle. Studies in SSA cities have shown that recent road development projects are mainly expansion of carriageways which mostly means reallocation of road space from NMT to motorised transport (Nantulya *et al, 2005*; Becker, 2011; UN Habitat, 2013).

Furthermore, the cost of urban transport is another major consideration which seems not to favour the poor urbanites in cities of developing countries. Urban transport accounts for a significant percentage of household incomes of residents of cities in the SSA region. According to the SSATPP (2005) report, urban transport accounted for 12.4 percent of household expenditures in Abidjan (1993), 13 percent in Ouagadougou, Lomé and Cotonou (1996) and 17 percent in Yaoundé (1996). From 1993 to 2002, the overall household outlays on transport in Abidjan increased by 20 percent whereas in 1999, Dakar city's poor spent as much as 28 percent of their income on transport (UN Habitat, 2013).

In the City of Lusaka, the situation is similar to other African cities. Walking has always been the most dominant transport mode followed by public transport (Simoonga, 2009). However, unlike other Sub-Saharan African cities, forms of NMT such as bicycles and wheelbarrows make up only a trace of the modal share in the City of Lusaka. The modal share of road transport options in Lusaka City in percentages are as follows; walking 65, Bus/minibus 21, private cars 12 and others 5 (Japan International cooperation agency (JICA), 2009).

Despite the above statistics, transport decisions in the City are such that an increase in the number of vehicles almost always culminates in road expansions (mainly increasing carriageway width) and paving. Examples of such decisions are the on-going expansions of Chilimbulu and Burma Roads under the L400 project, the recent expansion of the Kafue Road, resurfacing of the Great East Road, Link Zambia 8000 and Formula One* road projects. Commenting on road widening responses of road authorities in America decades ago, Mumford (1955;109) remarks that "adding highway lanes to deal with traffic congestion is like loosening your belt to cure obesity". This implies that widening of city roads leads to increased carrying capacities of such roads but does not lead to reduced traffic congestions as recent studies in other cities have confirmed (Newman, 2003; Nantulya *et al.,* 2005). Besides the attendant repercussions of the increased vehicle carrying capacity, widened roads are difficult to cross for the majority who depend on walking as a means of transportation. According to Mercier (2009: 149) "much of what happens to an urban environment is determined by its basic choices and its choice of the dominant transport medium." This means that transport decisions in a global south city such as Lusaka ought to take full cognizance of the demographic and socio-economic profile of its citizens to ensure that interventions are not only responsive but also beneficial to the majority of its dwellers as opposed to favouring only the minority.

*Formula One road projects refer to a road upgrading program that was initiated by the Movement for Multi-Party Democracy (MMD) government towards the September, 2011 elections. Lusaka urban roads were paved and widened but the project could not be continued after change of government.

1.1 Statement of the problem

The City of Lusaka has continued to experience an increase in both human and vehicular populations in the past few years. Human population of the City soared from 1,084,703 in the year 2000 to over 1,715,032 in 2010 (Central Statistical Office (CSO), 2003; 2012). On the other hand, the estimated number of vehicles in the City of Lusaka was reportedly between 152,411 and 294,316 (JICA, 2009; Simoonga, 2009). Between 2000 and 2007 , 10 vehicles per day were added on Lusaka City roads (UN-Habitat, 2007). The effects of this increase in the number of vehicles are evident in increased traffic congestions, increased Road Traffic Accidents (RTAs) and pollution (noise and air) (UN Habitat, 2007; Simoonga, 2009). Solutions to these transport challenges have eluded City decision makers. Planners and engineers assume that building and widening city roads would alleviate this problem. Therefore, road development and policies have continued to concentrate on infrastructure for motor vehicles (Zambia Consumers Association (ZACA), 2007).

However, this response is lopsided as it favours only motorists, side-lining other road transport options such as pedestrians,cyclists and cart users who comprise fifty seven (57) percent of road users in the City of Lusaka. Infrastructure for NMT on City roads is thus inadequate resulting in challenges by NMT users when crossing roads thus impeding their movements.

Unless City authorities rethink their response, challenges for both NMT and motorised transport (MT) users will persist and adversely affect other sectors of the economy of the City of Lusaka. Prioritising NMT infrastructure in road development can alleviate current transport challenges that the City of Lusaka faces. This qualitative case study therefore sought to explore issues of NMT infrastructure on selected roads in the City of Lusaka. The selected roads were Alick Nkhata, Burma, Dedan Kimathi and Independence Avenue.

1.2 Aim of the Study

The aim of this study was to examine NMT infrastructure along selected road in the City of Lusaka relation to its state, challenges and integration in urban policy and plans.

1.3 Objectives

In light of the above aim, this study had the following objectives;

1. To evaluate the state of NMT infrastructure on selected roads in the City of Lusaka
2. To assess challenges faced by NMT users on selected roads within the City of Lusaka
3. To examine the extent to which NMT infrastructure is integrated in City Policies, Plans and Road Projects of the City of Lusaka
4. To determine the potential of selected roads to accommodate NMT infrastructure

1.4 Research Questions

To help in meeting the set objectives, this study responded to the following questions;

1. What is the state of NMT infrastructure on the selected roads in the City of Lusaka?
2. What challenges do NMT users on the selected roads face?
3. To what extent is NMT infrastructure integrated in plans and policies of the City of Lusaka?
4. To what extent do the reserves of the selected roads have the potential to accommodate NMT infrastructure?

1.5 Significance of the study

The results of this study are important to city planning and road development of the City of Lusaka as they have potential to inform policy and planning. Furthermore, the results of this study will contribute to the knowledge base on the subject of NMT. Results of this study will also act as a platform upon which several issues regarding NMT in the City of Lusaka can be explored to enhance accessibility for all.

1.6 Structure of the dissertation

This dissertation is divided into five chapters. Chapter one comprises the introduction and background to the study. It highlights the aim and key objectives that this study sought to address Chapter two comprises a review of relevant scholarly works on the subject matter. Various examples are cited and lessons explored on what has worked in different contexts in relation to NMT infrastructure. The chapter concludes by

highlighting the gap that this study sought to fill on the subject matter. Details about the selected roads are provided in the third chapter which comprises the methodology of the study. The chapter further provides details on how the study was conducted. Data collection methods used, the sample size and data analysis procedures are discussed in the third chapter. Chapter four consists of research findings and discussions. This chapter links the first three chapters by presenting and discussing findings in line with objectives and the research problem formulated in chapter one while relating and contrasting with existing body of knowledge (that is chapter two). The last chapter comprises a summary of findings, research objectives, conclusions and recommendations.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

Non-motorised transport attracts attention of a variety of professions such as Urban Design, Architecture, Transport Planning, Urban Planning and Public Health, all with different inclinations. In this chapter, literature across all these professional divides is reviewed owing to the rich interconnections between the professions and the common origins. The chapter is divided into five main sections with the first providing definitions of what NMT is and what constitutes NMT infrastructure. Section two looks at the evolution of road transport whereas the third section looks at transport planning approaches employed by different cities and NMT infrastructure in cities. Difficulties associated with NMT use in global south cities are highlighted in section four. Section five provides concluding remarks to this whole chapter.

2.1 Definition of NMT and its infrastructure

Literature is not short of definitions for NMT. Although there are varieties in these definitions, there seems to be general agreement that NMT refers to all means of facilitating movement of people and goods on roads which do not involve the use of an engine such as walking, cycling, wheelchair, scooter, handcart, bicycles/tricycles, human porterage, wheelbarrows, animal drawn carts and other human powered vehicles (Godefrooij *et al.*, 2009; Becker, 2011; Litman, 2014). What generally differentiates NMT from MT is the use of human/animal power to facilitate movement of people and goods as opposed to engine. However, recent innovations in personal transportation devices have defied such conceptions of NMT. The Segway developed in North America is basically a variant of a two-wheeler designed in such a way that it uses electric power and can go to speeds of 27.68 km/h up to a distance of 19.31 km (Segway, 2015). This makes it ideal for longer distances that may not be feasible with bicycle use and in cities that are sprawled like Lusaka. Its use is however not wide spread as it has received negative publicity due to safety issues especially in North America where accidents have been reported (Bellies, 2000).

NMT infrastructure refers to physical road facilities or installations that facilitate movement of all of the above NMT. Therefore, facilities such as footpaths, sidewalks, crossing facilities, kerb ramps, pedestrian stairways, street lighting and cycle ways comprise what is referred to as NMT infrastructure in transport literature (United Nations Environment Programme (UNEP), 2004; Government of Western Australia, 2012). For purposes of this study however, besides the above itemized infrastructure, road infrastructure elements such as road traffic signs, humps and traffic lights shall be construed as NMT infrastructure. This broad definition is adopted on the premise that these facilities have a significant impact on NMT users than any other road users.

2.1.1 Benefits of NMT

One of the most obvious benefits of NMT is the minimal space requirements for functioning of NMT modes of transport as compared to MT. Research has shown that, to facilitate the movement of a motor vehicle, disproportionately large amounts of scarce urban land are needed as compared to land requirements for pedestrians and cyclists. For example Blanco *et al* (2009) suggest that a minimum of $1.4m^2$, $0.3m^2$ and $9.9m^2$ are required to accommodate bicycle, pedestrian and car respectively. The benefit is that NMT infrastructure takes up far less of the scarce urban land when compared to that of MT thus making it more sustainable.

Studies have shown that cities occupy less than 4 percent of the earth's surface but account for over 75 percent of all greenhouse gas emissions and motor vehicles, being dependent on fossil fuels are cited as the major contributors (Rees, 2003; Dewar, 2011; Zambia Green Jobs, 2016). Further, NMT does not depend on or need fossil fuels for it to function. This essentially implies that use of NMT has extra environmental benefits as there is no increased pressure on the diminishing global fossil fuel reserves and thus no pollution as the case is with MT (Campbell, 2003). Therefore, in terms of energy consumption, NMT presents the most efficient and economical option with bicycles being the most energy efficient as shown in Table 1. It is thus not surprising to see that most global north cities are encouraging use of bicycles (Dekoster and Schollaert, 1999; City Government of Modesto, 2009; Government of Western Australia, 2012; Ashden, 2012; Hogan, 2015) while the situation is different in global south cities (City

Government of Cape Town, 2005; Pardo, 2010; Mitullah and Opiyo, 2012; Goyal, 2014). In some countries, such as the Netherlands, the number of bicycles is even more than that of humans at a rate of 1.2 bicycles per person (Rietveld, 2000 ; Brussel, 2011). Other global north cities are emphasizing reduction of space for MT through initiatives dubbed as "road dieting" or reclaiming city space for people to accommodate NMT infrastructure without really affecting road capacity (Burden and Lagerwey, 1999 ; Dekoster and Schollaert, 1999 ; Gemzoe and Gehl, 2006 ; Speck, 2015).

Table 1: Energy equivalents of different modes of transport

Type of transport	Litres of fuel, *or energy equivalent*, consumed per person to travel 100 km
Car (single occupant)	9.00
Car (2 occupants)	4.50
Minibus (12 passengers)	1.00
Bus	0.70
Train	0.50
Walking	1.00
Cycling	0.36

Source: Gauge, 2009

The third and most equitably sound benefit of NMT is that walking, cycling and other NMT options are the main modes of transport for the majority of city residents especially in global south cities (Tiwari, 2002; Becker, 2011). Therefore, investment in NMT infrastructure yields considerable benefits to the majority of city residents and makes cities more livable (Efroymson and Shama, 2007; Kennedy and Buys, 2010). This means that household income expenditure by poor city urbanites on transport would be reduced and savings reallocated to other needs.

Other studies have shown that making the environment conducive for NMT contributes significantly to a reduction in road traffic accidents (RTAs) (UNEP, 2010; Morar and Bertolini, 2013; Litman, 2014). An environment conducive for NMT provides separate infrastructure for NMT and MT. This reduces chances of RTA as there is little contact in the usage by both modes of transport. As a result, reductions in RTAs imply less public expenditure on health and increased human productivity.

The other benefit of NMT usage though largely uncelebrated relates to the psychological effects on users. The International Charter for Walking (2006) advances that when people use NMT such as walking and cycling, they feel better, become more relaxed and accumulate less mental clutter. This implies that cities which are conducive for NMT users are more attractive and desirable as people experience less urban stress. This also relates to public health benefits as heavy reliance on automobile in urban centres and increase in sedentary jobs has defeated the need for people to take hearty health walks. This has resulted in the increase in non-communicable diseases such as obesity and hypertension as various studies have shown (Blanco *et al.*, 2009; Kennedy and Buys, 2010; Urbanized, 2011; Koohsari *et al.*, 2013; UN-Habitat, 2013; Litman *et al.*, 2014). In its Share the Road Project, UNEP (2010) summarises the merits of investing in NMT infrastructure as a triple win situation as shown in Figure 1.

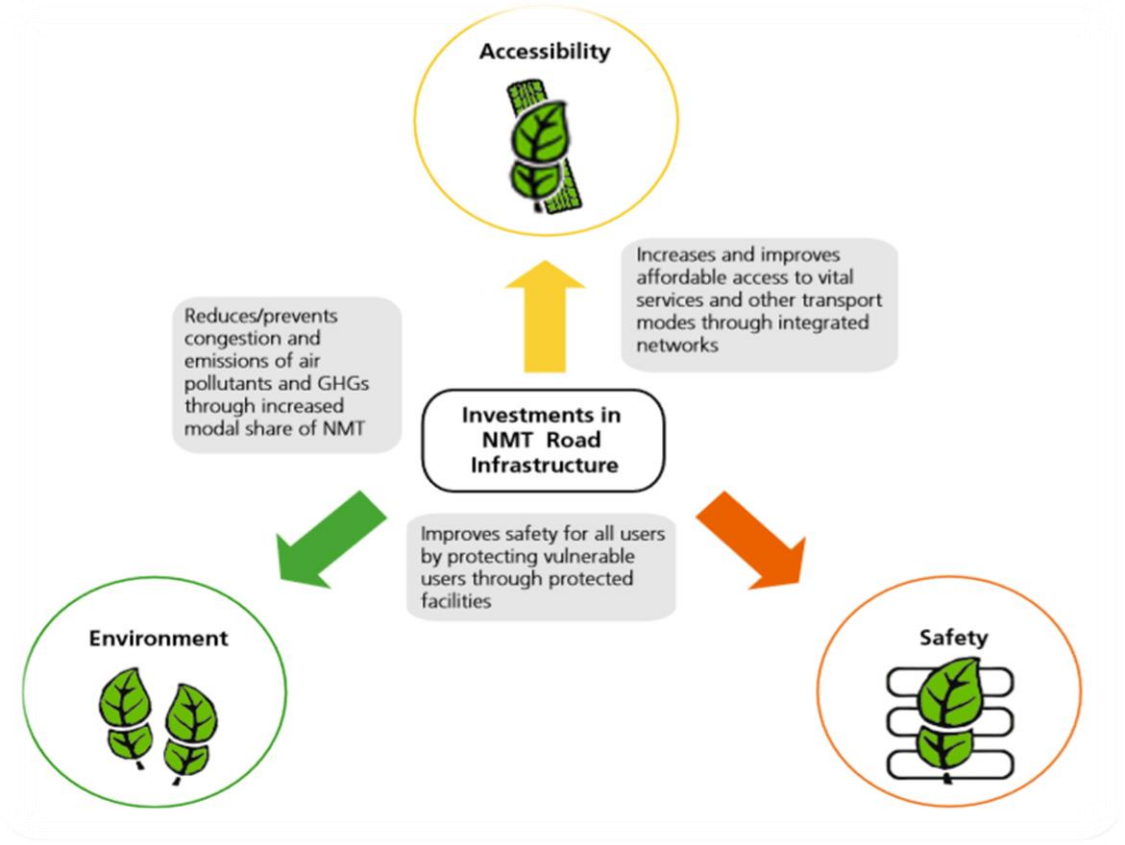

Figure 1: Triple win scenario of Investing in NMT Infrastructure

Source: UNEP, 2010

This entails that investment in NMT infrastructure by any city results in a balance where safe accessibility for the majority of city residents is assured while pollution to the environment is also reduced. The third aspect of the triple win opportunity shown in figure 1 relates to the increase in affordable access to services and other transport modes that investment in NMT infrastructure brings. This aspect of improving accessibility is akin to what other sustainable transport advocates term as "complete streets" which are roads designed and operated to enable safe access for all users regardless of age, disability, gender or economic status (National Complete Streets Coalition, 2011). In that regard, streets which are designed to facilitate movement of only cars while limiting transportation choices by making other options such as NMT and public transportation inconvenient, unattractive and unsafe could be termed as incomplete. Streets should facilitate movement of all users without bias.

2. 2 Evolution of road transport in cities

Ancient cities were generally clustered together over a small radius. According to Newman (2003), medieval cities were built around a radius of 300-450 metres. However, subsequent cities grew to be between 5-8 kilometres in diameter. This radius was sufficient to sustain city life with all its different activities within walking distances taking only 8 minutes to cover the whole city (Morar, *et al*., 2013). On the other hand, animal drawn carts were used especially to transport heavy loads between places within the city. In such cases, some cities had distinct division of streets for pedestrians and animal drawn transport. These streets were narrow despite these distinctions. However, the main streets that connected the city centre to the gates were wider and allowed all kinds of traffic, while other streets were only for pedestrians. In addition, pedestrian-only connections were present, in the form of passageways cutting through the built environment. Cities were compact with almost all land uses such as residential, commercial and workplaces within walking distance in spite of some studies suggesting that defense against invasions was the main motive for such compact city designs (Koohsari *et al*., 2013; UN Habitat, 2013b). In any case, a smaller and compact city was also easier to manage in terms of transportation, as well as protection in times of crises.

The industrial revolution with its technological advancements and invention of engines resulted in rethinking and redesigning of towns and cities. The introduction of coal and steam engines in the 18th Century significantly increased transport speed and distance covered which led to a shift from animal drawn wagons (which littered streets with horse excrement) to mechanized ones for transportation of heavy goods and people over a long distance (Erickson, 2012). The invention of engines had an impact on transportation which resulted in the separation of land uses which previously had been clustered together. Consequently, uses such as residential were separated from obnoxious ones like industrial. It also led to the development of rail systems, water pipes and other infrastructure and cities sprawling. Cities expanded to a wider radius of 20-30 kilometres but still within one hour reach owing to the new inventions (Koohsari *et al*., 2013).

Besides new inventions, the sprawl of settlements and separation of activities was further precipitated by pollution emanating from industries and overcrowding, the consequence of which was unsanitary environmental conditions in human settlements which needed to be addressed. Overcrowding came about due to employment opportunities which attracted a lot of people to industrial centres (UN Habitat, 2013b). The profession of town planning is actually alleged to have been born as a response to these public health problems (Erickson, 2012). Fostering order, convenience, beauty and public health became the aims of the new town planning profession, values against which the profession is judged even today (Ahmed and Dinye, 2011). The Urban space emanating from the planning activity had to be a coherent system so that it would integrate amenities such as hospitals, markets, schools, prisons and other urban functions despite them being located at different geographical places (Coppola and Papa, 2013). The theory behind these developments was the neighborhood unit concept which required that the new city assigned one hectare of land to 300 to 500 people and $12m^2$ of floor space per person regardless of the size (Lambert, 2014). The neighborhood units would have a population of 7000 inhabitants and have utilities like kindergartens, playgrounds, schools and shops. There would be a separation between automobile and pedestrian traffic and the complex would be delimited by major transportation routes

(Morar *et al*., 2013). These cities however, relied more on NMT for transportation within their boundaries whereas MT was used for inter-city mobility.

There are insufficient and inconclusive studies on the development of road transport on the continent of Africa. However, some recent studies have linked the development of road transportation in Africa to the introduction of the motor vehicle. Njoh (2007) suggests that before Europeans came to Africa, Africans had trained some animals to help the movement of goods, people and services over land. As such, tracks for pedestrian and animal traffic were available on the continent but no motorised roads. The introduction of the motor vehicle on the African continent in the late 20th century undeniably increased the movement of people and raw materials between places but to a greater extent, construction of roads was mainly to serve the needs of the minority colonial settlers that possessed motor vehicles. The increased mobility of people, goods and information resulted in the development of new economies and enabled colonial settlers to easily stamp their authority on native African communities and thus enforce their rule. Gewald (2005:8) contends that "roads were built not so much for function but as a measure of colonial control and status; as a means by which to discipline a subject population and to create confidence amongst colonizers in a time when roads were a symbol of speed and modernity ". The automobile on the African scene thus had both desirable and negative effects which irreversibly changed primitive societies.

In Northern Rhodesia, as Zambia was called, the automobile came quite late as compared to her neighbors. Gewald (2007) attributes this delay to two main issues *viz* the absence of suitable roads to support wheeled transportation and the presence of tsetse flies and Trypanosomiasis. The implication of the latter was that, where as other countries depended on animal driven transport such as ox-carts, Zambia could not. Therefore, walking and head loading were the most prominent means of transportation of people and goods.

What is clear from the historic background of road transport is that motor vehicles invaded human societies after other modes of transport had been developed. The motor

vehicle has obvious and irreplaceable benefits as a means of transportation. However, the motor vehicle has continued to attract prime attention of transport and urban planners even in the 21st century society. This is seen through the prevailing bias towards road infrastructure developments such as road expansion which takes up space for other uses such as NMT infrastructure and the devastating effects of pollution emanating from fossil fuel consumption by motor vehicles. Transport policy approaches of cities of developing countries tend to nonetheless encourage use of vehicular traffic as opposed to other modes of road transport.

2.3 Transport Policy Approaches of Cities

There is disproportionate attention paid to infrastructure for MT as compared to other modes of road transport as shown by various studies (UN-Habitat, 2010; Morar and Bertolini, 2013). This tendency has reduced options for the majority that depend on and are in need of NMT infrastructure. This biased tendency is paradoxically rife in cities of developing countries where development of roads is almost synonymous with the construction of carriageways and other MT infrastructure (Tiwari, 2002a; Angira, 2013). Studies have shown that many global south cities are widening existing city roads and paving urban roads largely to accommodate more motor vehicles despite the majority of residents being dependent on NMT (Guitink *et al., 1994;* Abuhamoud *et al.,* 2011; Sietchiping *et al*., 2012; UN-Habitat, 2013). Such motor vehicle biased transport policy approaches tend to obscure the existence of other road transport options making them virtually invisible (Gemzoe, 2006; Becker, 2011). From the historic background, it is clear that roads have played duo roles of facilitating movement of people and goods while also being places of interaction and city life. For example, Jacobs (1961) notes that much of what people experience and say about a city is basically as a result of its streets. She argues that when cities are said to be safe or otherwise, it is principally in reference to their streets. Dewar (2011) stretches that argument by postulating that the social function of a street is what provides a difference between mobility and accessibility planning. In this regard, mobility planning preoccupies itself with fulfillment of engineering standards which tend to consolidate a motor vehicle bias in the design of roads while accessibility planning is people centered emphasizing human interactions in public spaces and focusing on the social function of streets. Therefore,

accessibility planning is concerned with opportunities that a street creates for public life and interaction while simultaneously serving its traditional function of facilitating the movement of people and goods. In a similar manner, Jones *et al* (2008) advance a phrase they term "link and place" in which "link" refers to the traditional street function of facilitating movement while "place" captures all the opportunities that road users are exposed to as social beings. They further assert that engineers and transport planners are concerned with the link function whereas urban planners and designers are inclined towards the place function of streets. It is mainly the appreciation of this difference between mobility and accessibility planning that influences the policy approach that a city adopts. In other words, transport approaches that focus on link tend to largely favour movement of motor vehicles while place approaches foster the use of streets as places of human activity. It is not thus surprising that some studies have called for re-ordering of transport policy priorities to focus on human beings and not motor vehicles (Morar and Bertolini, 2013). Tiwari (2002) has even gone further to advance the order for road infrastructure development stating that it should cater for pedestrians, cyclists, public transport and private cars, in that order otherwise the whole city transport system would operate at sub-optimal levels. Some cities, despite having initially spearheaded the widespread use of motor vehicles, have taken firm policy decisions to reclaim city streets to people as opposed to vehicles.

According to Moody (2012), before the 1960s streets of the City of Copenhagen, Denmark were dominated by motor vehicles moving at high speeds and making the streets unattractive to NMT users. However, the City of Copenhagen made unpopular but necessary decisions to pedestrianize some streets and reclaim city space for residents. Car parking space was gradually reduced and converted into space for social interactions of residents. This yielded amazing results as city life was restored to the streets and residents preferred pedestrianized streets to non-pedestrianized ones. For example, the main street of *Stroget* was the first one to be pedestrianized in early 1960s although amid public outcries (Gemzoe, 2006). Car entry into the city centre was nevertheless restricted and car parking made expensive (Gehl and Gemzoe, 2006). Within a short period *Stroget* witnessed street life and was preferred by people resulting

in increased demands for more streets to be pedestrianized. NMT especially cycling is a serious policy and political issue for the City of Copenhagen. According to Ayfer Baykal, Mayor of Technical and Environmental Administration for the City of Copenhagen, "… cycling is not a goal in itself but rather a highly prioritized political tool for creating a more liveable city" (City Government of Copenhagen, 2011:5). This has had the potential of shifting motorists to NMT or public transport and thus leading to attainment of set targets of modal shifts over four decades. As a result of such policy decisions, Copenhagen City is said to have circa 350 kilometres of dedicated bicycle lanes. Consequently, the city has a comparatively high number of commuters who cycle to work and school daily adding up to an estimated 37 percent of the city's modal share (Moody, 2012). The City has even made a commitment to invest 200 million dollars between 2006 and 2024 on bicycle facilities (UNEP, 2010). This is a clear demonstration of the positive effect that can come from re-ordering of road transport infrastructure priorities. More developed cities such as Gent and Victoria have also made similar transport policy decisions (Dekoster and Schollaert, 1999; Ashden, 2012; Government of Western Australia, 2012; Litman, 2014). The most recent of such policy interventions is the first ever super highway exclusive to bicycles launched by the City of London (Speck, 2015). This demonstrates a significant shift from MT to NMT by city governments of developed countries. The Copenhagen case provides useful insights into what deliberate reordering of transport policy approaches can produce with regard to sustainable urban transportation. It also stresses the point that, cities are meant for people and not just vehicles. Thus, city streets need to be safe for use by all city residents regardless of age, social status or ability. Such policy shifts are not restricted to global North cities. Any city has the potential to successfully make such transformative strides as can be seen from the example from Latin America which represents a developing country perspective. `

Between 1998 and 2001, the Mayor of Bogota, Colombia, Enrique Penalosa held a referendum and reallocated the City's transport budget to improve road infrastructure for the poorest residents. This reallocation of municipal budget culminated in the City of Bogota launching its master plan *interalia* proposed to construct 320 kilometres of cycle

and pedestrian ways over a nine-year period (Hidalgo, 2004; Nair and Kumar, 2005; Centre for Clean Air Policy (CCAP), 2013). During implementation, the municipality of Bogota made a deliberate decision to first construct NMT infrastructure before MT infrastructure. In the documentary, Urbanized (2011), NMT users are seen using paved cycle paths and walkways while the adjoining carriageway was unpaved and muddy. Such an unconventional approach to road development implied that city authorities cared for their majority road users and adds to their self-dignity. Bogota municipality also introduced a public bus system called the *TransMilenio* which runs on a dedicated lane of public road network of the city. This system is reliable and affordable leading to more accessibility of the poorest people in the City to jobs and other opportunities. The *TransMilenio* bus network adequately covers its costs and makes a profit whilst providing efficient transport to all city residents regardless of their economic or social status (UN-Habitat, 2013). A reduction in air pollution was recorded in the city of Bogota as a result of these transport policy interventions which allowed more people to move by NMT means or public transport (CCAP, 2013). This creates a suitable environment for NMT as pollution is low making the streets attractive to NMT which fosters public health as was also observed in Chinese cities (Wang *et al*, 2011).

The Bogota example provides lessons on the influence of strong political will on transport planning approaches. Like the Copenhagen case, it also re-emphasizes Tiwari's (2002) point that reordering of road transport priorities in road infrastructure investment is essential for the optimal operation of a city's transport sector.

Over some decades, most African cities developed and applied policies that favour vehicular usage such as widening of city roads and sprawled/low-rise developments (Porter, 2007). Thus, most African cities have lacked policies to address issues of NMT. In countries, such as South Africa, Kenya, Uganda and Tanzania city plans and policies have been reviewed to accommodate NMT issues (SSATPP, 2005; Nantulya *et al.,* 2005; Becker, 2011). Notable among these are Cape Town and Nairobi that have since formulated NMT policies (City Government of Cape Town, 2009; Nairobi City County Government (NCCG), 2015). Exclusive bicycle policies have been reported in South

Africa (Gwala, 2007). These policy documents have identified the need for NMT, focused on increasing and promoting bicycle usage for low and medium income communities.

These cities have developed transport policies that favour NMT and have utilised interventions such as increasing vehicular parking fees, retrofitting of existing streets with NMT infrastructure and speed controls to ensure compliance. More radical options have included reallocation of road and car parking space to NMT infrastructure and complete pedestrianization of city streets.

2.4 NMT Infrastructure in Cities of Developing Countries

A look at NMT infrastructure in cities of developing countries is important to the understanding of NMT and this study in particular as it reveals a contrast with the situation in developed cities. It also provides important lessons to this study considering some similarities with the City of Lusaka.

Streets of many Asian cities lack NMT infrastructure. In some cases it is said to be available but only in affluent neighbourhoods where it is used mainly for recreation purposes such as in Delhi of India and Kuala Lumpur, Malaysia (Parida *et al.,* 2011; Shamsuddin *et al*, 2012). In other Asian Cities such as Dhaka ,Bangladesh and Manila in the Philippines, NMT infrastructure is in short supply and with obstructions mainly from tree out-crops and hoardings (Guillen, 2006 ; Efroymson and Shama, 2007). In most cases, NMT infrastructure is said to be non-existent and posing safety risks to NMT users who are forced to share the only paved part of a road with motor vehicles speed not withstanding (Puchera *et al.,* 2005). This creates very unpleasant environments for NMT users making NMT use in these cities unattractive and unsafe. However, some Asian Cities, especially the developed ones, are designed and developed with road infrastructure to encourage NMT usage. For example, most Chinese cities are generally laid out to support NMT and thus have extensive bicycle and pedestrian infrastructure (Pardo, 2010).

NMT infrastructure is also insufficiently provided in most South American cities. In Cali (Colombia), for example, the UN-Habitat (2013) reports that sidewalks are barely sufficient for one person and blocked by construction waste, parked vehicles or informal street vendors. The report further states that a lack of lighting forces pedestrians to use car lanes especially at night although it is unsafe. In Brasilia (Brazil), Tenorio and Dos Santos (2009) report that networks of sidewalks and bike paths are non-existent which discourages NMT use and puts its users in situations of risk and discomfort. This risk is evident in the fact that 46.5 percent of the 456 traffic casualties in 2008 were NMT users. Therefore, like in Cali, NMT infrastructure in Brasilia is not adequately supplied and city authorities favor MT to NMT. It is reported that NMT is negatively tagged as "a poor people's thing" (*Departamento de Trânsito do Estado do Rio de Janeiro* (DETRAN), 2008 cited in Tenorio and Dos-Santos, 2009; 8).

In most African cities, the scenario is similar to Latin American cities. In Nairobi (Kenya), 95 percent of roads have high pedestrian flows but only 20 percent have designated pedestrian footpaths, while in Kampala (Uganda) more than 60 percent of the road network has no footpath segregated from motorised traffic. In Lagos (Nigeria), NMT space is inadequately protected (UN-Habitat, 2013).

For Lusaka City, anecdotal data points to the existence of walk and cycle paths on roads such as Burma Road. This is also supported by some literature which reports of NMT infrastructure on some roads in the City of Lusaka (UN Habitat, 2007; JICA, 2009). However, most of this infrastructure may have been fitted decades ago and its current state remains undocumented.

The studies reviewed provide sufficient evidence that NMT infrastructure in global south cities is in short supply. However, little is documented on the state of this little infrastructure hence this study. Further, these studies tend to be inclined towards quantitative methods. Others tend to give general claims on the state of NMT treating cities in the global south as though they were one whole city with homogenous transport

policies which are uniformly implemented. This generalization has a potential of over simplifying the issue of NMT infrastructure.

2.5 Difficulties Associated with NMT usage in Cities

NMT usage is associated with various challenges in cities and towns. Most of these challenges vary from city to city but are largely associated with the adequacy or inadequacy of NMT infrastructure. Besides the adequacy or inadequacy of NMT infrastructure, city authorities have little or insufficient understanding of the depth and extent of the problems that NMT users face. Commenting on the status quo of NMT infrastructure in South African Cities, Ribbens (2014) point out that it is inadequate, discontinuous, poorly designed and maintained. Thus, the resultant environment is inconvenient and unsafe for NMT users.

The challenges of NMT users in Kenya and Tanzania are also similar to those of South Africa. A study conducted by the SSATP (2005) in the two countries revealed that NMT as compared to MT was neglected. This has had the consequence of making the roads unsafe as studies have reported higher NMT casualties emanating from road traffic accidents than any other mode of transport (World Health Organisation (WHO), 2013; Ribbens, 2014; NCCG, 2015). The other challenge faced by pedestrians and cyclists is encroachment of NMT spaces by parked vehicles and hawkers as was observed in the City of Nairobi (Angira, 2013). These encroachments obstruct NMT users making the space inconvenient and unsafe to users as they are forced to use the carriageway. However, what is most apparent in these challenges is that they are avoidable as they border on law enforcement. Most cities have laws governing activities that can be allowed along thoroughfares and such should be enforced. Hawkers can be relocated to markets or organized so as not to obstruct NMT usage. This is based on Tiwari's (2002a) argument that they provide a service to NMT users similar to that performed by takeaways and service stations for motorists.

Challenges faced by NMT users examined above appear to be views of observers as opposed to being those of NMT users. This arises from the methodologies used in these studies which suggest generalization of findings as opposed to depth. The observers are

basically professionals in the field making observations rather than experiencing the phenomenon as NMT users. Their observations may hold but not to the extent of replacing views and experiences of NMT users hence the need for this study which sought to obtain the users' perspectives.

There are few studies that have been done on NMT related issues in the City of Lusaka. A study regarding a project dubbed "road for people" was undertaken by ZACA (2007). The concept sought to introduce the idea of sustainable transport but did not receive favourable response from politicians and the general public (ZACA, 2007). Another attempt was made by UN Habitat (2008) through the urban profile to propose road infrastructure investments. None of these studies provided adequate policy actions to comprehensively address issues of NMT infrastructure challenge in Lusaka City. No study could be found that demonstrates whether NMT infrastructure is incorporated in policies and plans of the City of Lusaka.

2.6 Conclusion

This review has shown that NMT has several benefits to offer the road transport sector which if harnessed can significantly reduce the ecological footprint of cities. Streets serve various functions besides facilitating movement of people and goods in the city system. The review has also shown that commercial and social functions of streets have been overshadowed by the mobility function owing to the advent of the motor vehicle. In addition, the review has shown that owing to the less attention paid on NMT infrastructure, users face various challenges most of which relate to safety. Safety concerns arise due to the fact that NMT users are forced to share paved carriageway space with motor vehicles despite being at different speeds resulting in traffic conflicts. Some cities have made remarkable efforts to correct the motor vehicle bias. Efforts such as road diets, complete streets and reclaiming of street space all endeavor to return street space to people and not vehicles.

CHAPTER 3: METHODOLOGY

3.0 Description of the Study Area

This study focused on four roads within the City of Lusaka as shown in Figure 2. These are Alick Nkhata, Burma, Dedan-Kimathi Roads and Independence Avenue.

3.1 Justification of the Selected Roads

There were a number of reasons for selecting these roads for this study.

First, Alick Nkhata Road connects four densely populated unplanned settlements namely Kalingalinga, Mtendere, Helen Kaunda and Kalikiliki to areas of employment such as shopping areas, United Nations Offices and Long Acres. The road further links these low-income neighborhoods to two high income areas of Ibex Hill and Kabulonga which are also areas of employment for some residents of these unplanned settlements.

Independence Avenue was chosen owing to the existence of a walkway and being the road with the highest MT in the City of Lusaka (JICA, 2009). Independence Avenue was further chosen due to the various land uses present along the road such as residential, commercial and institutional making it a very busy road attracting people from all social groupings of the City.

On the other hand, Burma Road connects several medium cost residential areas of Chilenje and Kabwata to institutional and business opportunities in the Lusaka City Central Business District (CBD). Besides, Burma Road was picked because anecdotal data suggested that the road had a cycle lane and pedestrian walkway. The Road was also chosen because it was being widened under the L 400 project (Road Development Agency (RDA), 2013).

Dedan Kimathi Road connects Independence Avenue to Church Road and other major roads. Dedan Kimathi road presents a unique opportunity of linking a major commercial area of Kamwala and the City's only Inter-City Bus Station/terminus. Further, the road presented unique opportunities for understanding the experiences of cart users who provide freight services to and from Inter-City Bus Terminus. Lastly, Dedan Kimathi presents another unique opportunity to the study by being the only public road that

directly leads to Levy Junction Shopping Mall. Other relevant details about the selected roads are summarized in Table 2.

Table 2: Selected Roads for the Study within the City of Lusaka

No.	Road Name	Road Class	Length (km)	Surface type	Condition
1	Independence	Secondary	6.893	Bitumen	Good
2	Burma Road	Secondary	6.047	Bitumen	Good
3	Alick Nkhata	Tertiary	4.26	Bitumen	Good
4	Dedan Kimathi	Tertiary	0.98	Bitumen	Good

Source: JICA, 2009

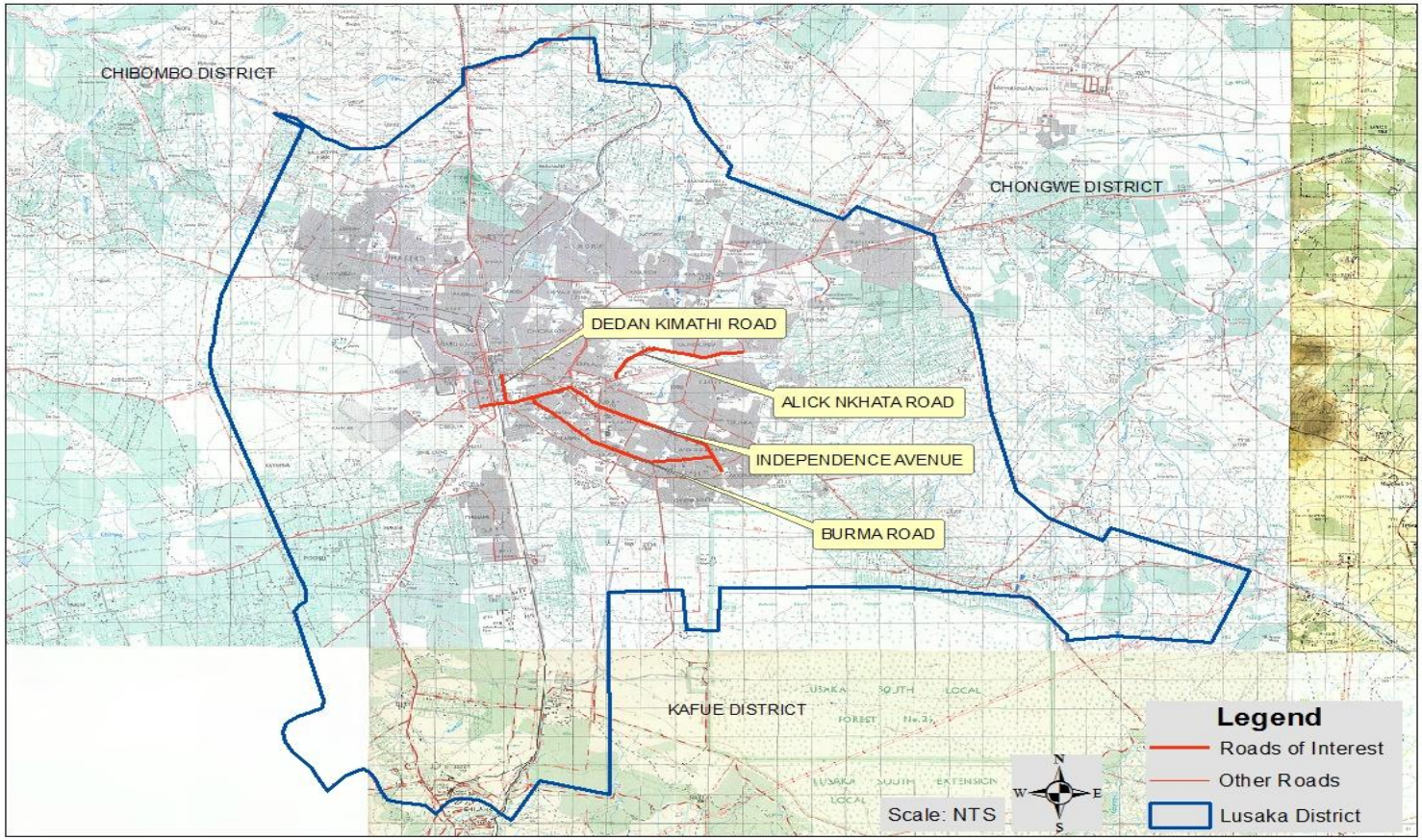

Figure 2: Map Showing Locations of the Selected Roads in Lusaka City

Source: Field Data, 2015

3.2 Research Design

This study used a case study approach. The choice of this approach was influenced by the intention to obtain detailed context specific information on the subject matter as recommended by Savin-Baden and Major (2013). Furthermore, the Association of African Planning Schools (AAPS) (2011) recommends the use of a case study approach on complex African urban systems which require in-depth understanding such as the case is with NMT infrastructure in the City of Lusaka. In addition, justification of the choice of the research design emanated from Yin (1994) who asserts that case study is the most appropriate approach when one seeks to answer questions of 'what', 'how' and 'why' which this study seeks to address as stated in chapter one.

3.3 Data Collection Methods

Data was collected through qualitative methods utilizing both primary and secondary data sources. Primary data was collected through in-depth interviews and direct observations while secondary data was obtained through a review of relevant literature on the subject matter.

3.3.1 Primary Data Sources

3.3.1.1 Semi-structured Interviews

Semi-structured interviews were conducted to collect data from key informants in the following organizations: Lusaka City Council (LCC); RDA; Ministry of Local Government and Housing (MLGH); Ministry of Communications, Transport, Works and Supply (MCTWS), Road Traffic and Safety Agency (RTSA) and the Zambia Police (ZP). Data collected from key informants related to aspects such as planning, works, designs, and construction of roads in the City of Lusaka. In that regard, use of semi-structured interviews provided an opportunity to probe and seek clarification whenever answers provided were not clear. Further, semi-structured interviews were conducted with NMT users to capture data on their experiences in the use of the selected roads. Semi-structured interviews provided verbal data which was captured through the use of a recorder. However, a recorder was only used with consent from research participants.

Where a research participant was uncomfortable, interview data was captured through note taking.

3.3.1.2 Direct Observations

Direct observations were also made during physical walks on the selected roads. This complimented and validated data collected through semi-structured interviews. Photographs of salient features on the selected roads were captured using a digital camera. Photographs provided a visual image of the state of NMT infrastructure on the selected roads and compliment data from in-depth interviews. Walks were undertaken at different times of the day in order to fully appreciate the road environment.

3.3.1.3 Satellite Imagery

Satellite images covering the selected roads were downloaded from Google earth as a primary data source. The downloaded images were manipulated using stitching software called ICE 14.1 and thereafter given spatial reference in a Geographic Information System (GIS) software called Arc Map 10.1. Widths of selected roads were measured from the merged geo-referenced image. This served as a compliment to data already provided on City plans. Therefore, widths of the selected roads on City plans were only taken as indicative and not final. Further, height on which the roads under study lie was determined by the generation of contour data using SRTM and ASER DEM data in software called Global Mapper 12.0.

Instruments for collection of semi-structured interview data were interview guides while observation schedules were used for direct observations as per Appendices A, B and C.

3.3.2 Secondary Data Sources

Secondary data collection method used for this study was an extensive review of documents. The Transport policy, City plans, relevant pieces of legislation, annual reports and work plans, magazines, project brochures and newspaper articles comprised secondary data sources. This in-depth review of documents was necessary to compliment primary data collection methods.

To minimize on the inherent weakness of the data collection methods, interviews were only conducted after undertaking direct observations and literature reviews. In that way, data collected through observations and literature review was validated through in-depth interviews with key informants and NMT users. This cautious effort worked as a triangulation measure. Further process allowed for undertaking multiple visits to observe and /or search for literature that may have been missed.

3.4 Population

The target group for this study was NMT users *viz* pedestrians, cyclist and cart users. The other interest group comprised officials from key institutions dealing in transport sector in the City of Lusaka and these were; LCC, RDA, RTSA, MLGH, MTWSC and ZP. These were targeted due to the fact that they each have a key role in road development for the City of Lusaka.

3.5 Sample and Sampling Technique

3.5.1 Sample Size

Determining a sample size in quantitative research is guided by rules and various formulae. The aim is to generate results from the sample which is representative of the population. As such sample sizes in quantitative studies are large and wide spread (Bryman, 2008). Qualitative research on the other hand has a different aim which is largely to get a deep understanding of the phenomenon under study (AAPS, 2011). Therefore, sample sizes in qualitative studies are generally small. Unlike in quantitative studies, determining a sample size in qualitative research is not guided by closely defined rules (Kothari, 2004). However, there is a general agreement in literature that sampling in qualitative studies continues until a researcher recognises that no new data are forthcoming or a point of data or information redundancy (Lincoln & Guba 1985; Brikci and Green, 2007).

The major factors that influenced determination of the sample size in this study were manageability of the sample due to the non-availability of statistics on NMT users in the City of Lusaka. Further the study sought depth and context over representation since the subject matter is complex as some studies recommend in such matters (AAPS, 2011).

Given the preceding factors, studies recommend that a cumulative approach would be most appropriate in arriving at a sample size. Denscombe (2010:47-48) advances that a cumulative approach relies on non-probability techniques such as purposive, theoretic or snowball sampling and is normally associated with research that is relatively small scale, uses qualitative data, cannot identify the research population in advance and aims to produce an exploratory sample, not a representative one. Other contributory factors identified in literature are; time and financial constraints as well as sample sizes used in similar research works (Denscombe, 2003; Brikci and Green, 2007).

Guided by all the above factors, the sample size arrived at for this study was 40 research participants broken down as follows; 9 key informants 21 pedestrians, 6 cart users and 4 cyclists. Key informants were purposively drawn from institutions such as LCC (2), RDA (1), MLGH (1), MCTWS (1), RTSA (4) and ZP (1). The National Road fund Agency (NRFA) was initially on the list of purposively identified institutions. However, officials were not available for interviews. Preliminary consideration of the institutional framework suggested that a review of budgets and annual work plans submitted by RDA to NFRA for funding was going to provide sufficient data for this study.

3.5.2 Sampling Techniques

Considering the nature of the targeted interviewees who were NMT users and key informants, this study utilised non-probability sampling techniques of convenience and purposive sampling.

3.5.2.1 Convenience Sampling

Bryman (2008:183) states that "a convenient sample is one that is simply available to the researcher by virtue of its accessibility". Due to the mobile nature of NMT users, it was anticipated that some would be too busy and therefore not willing to take part in the study. In that regard, the study depended on those who agreed to be interviewed hence the choice of convenience sampling. Further, the non-availability of statistics on NMT users translated into a non-availability of a sampling frame making the use of random sampling technique unattainable.

3.5.2.2 Purposive Sampling

Purposive sampling was used to determine key informants for this study. As postulated by Denscombe (2010; 25) "with purposive sampling the sample is 'hand-picked' for the research on the basis of relevance and knowledge." Therefore, key informants for this study were chosen based on the researcher's knowledge on their roles in influencing decisions on road development in the City of Lusaka by virtue of their institutions' mandates. Purposive sampling was also used in selecting roads for this study.

3.6 Data Processing and Analysis

Collected data was processed and analysed using both qualitative and quantitative methods as follows.

3.6.1 Narrative Analysis

Narrative analysis was used to analyse data obtained through interviews with NMT users especially in relation to their challenges and experiences in the use of the selected roads. This technique was significant in putting together and re-ordering different research participants' points of views and perceptions in a narrative form (Denscombe, 2003; Bryman, 2008). These views were presented in story form as NMT users narrated their experiences on the study roads.

3.6.2 Content Analysis

Content analysis is a research technique for systematically analyzing written communication such as books, essays, news articles, speeches, pamphlets and other written material (Savin-Baden and Major, 2013; Bengtsson, 2016). Content analysis breaks down lengthy text material into more manageable units of data. In this study content analysis was used to analyse data from literature and in-depth interviews (recorded audio data was transcribed to text) from key informant.

Sample text material selected for this study comprised: legislation, Plans for the City of Lusaka, and project documents. These documents were reduced to a more manageable set of data through reading and categorizing. The units of analysis and categories were defined using research objectives as guides. These comprised specific words, phrases and themes such as pedestrian, cyclist, carts, NMT, sustainable transport, and green

transport. Categories emerged comprising groups of words, phrases and themes with similar meanings. Textual material was then coded by highlighting keywords and/or phrases with a different colour and placing them in already identified categories. This was done several times to avoid leaving out any important data after which data with similar meaning was pasted together in MS Word to prepare drafts of findings on all related objectives.

In summary, content analysis for this study was undertaken in accordance with Bengtsson's (2016) four basic stages which are decontexualisation, recontextualisation, categorization and compilation.

3.6.3 Descriptive Statistics

Quantitative methods used were mainly descriptive statistics. This was used to tabulate accident and vehicular statistics from ZP and RTSA. Further quantitative data such as road widths and altitude upon which the selected roads lie was obtained through manipulation of Arc Map 10.2 and Global Mapper12.0 respectively which are GIS related software.

3.7 Ethical Considerations

In the course of this study, data was collected from key informants and NMT users whose identities have been withheld. Therefore, their identities and data they provided as research participants would remain confidential and were only used for academic purposes.

All research participants were not coerced into participating in the research and as such participation was on one's own volition. Further, as earlier alluded to, permission was sought from each research participant before use of digital data capture gadgets such as camera and voice recorder.

CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSIONS

4.0 Introduction

This chapter discusses findings of the study undertaken in respect of NMT infrastructure along selected roads in Lusaka City. It is divided into five sections. The first section discusses findings in relation to the state of NMT infrastructure while section two discusses challenges faced by NMT users on the selected roads. Integration of NMT infrastructure in City policy and plans is discussed in the third section. Potential of the selected roads to accommodate NMT infrastructure is discussed in section four whereas section five comprises the chapter's conclusion.

4.1 State of NMT Infrastructure on the Selected Roads

Based on the operational definition of NMT infrastructure stated in chapter two, this section looks at the availability and state of walkways, cycle tracks, foot tracks, pedestrian crossings, foot bridges, traffic lights, humps, signage and shoulders on the selected roads. The next section looks at what NMT infrastructure is available on selected roads.

4.1.1 NMT Infrastructure on the Selected Roads

Roads under study have various infrastructure to facilitate movement of people and goods. NMT infrastructure available on the selected roads is summarized in Table 3. The table shows that none of the selected roads has all the identified NMT infrastructure and in some cases, infrastructure such as cycle track and pedestrian stairway are not present on any of the selected roads. On the other hand, infrastructure meant for exclusive vehicular traffic use such as carriageway is whole tarred with no potholes.

4.1.2 Status of the Available NMT Infrastructure on Selected Roads

As shown in Table 3, infrastructure such as walkways is not completely available on all but one of the selected roads. In such cases, it expected that shoulders would serve an extra purpose to accommodate pedestrians. However, the shoulders are also narrow, irregular and/or absent in some cases as shown in Figure 3. This was confirmed by 29 of the 31 NMT users interviewed on the selected roads. In contrast, Figure 4 shows a 50 metre stretch of paved and well protected walkway on Alick Nkhata Road in front of United Nations (UN) Office Complex.

Table 3: NMT Infrastructure on the Selected Roads

Infrastructure / Road	Road Length (kilometres)	Foot trail (length)	Walk way (length in metres)	Cycle track	Crossing facilities (No.)	Kerb Ramps/ guard rail	Pedestrian stairways	Street lighting	Traffic lights (No.)	Humps \deeps (No.)	Signage	Shoulder Width (metres)
Alick Nkhata	4.26	√	-	-	1	-	-	-	3	3	-	1[a]
Burma	6.047	-	6047	-	8	√	-	√	0	0	√	1
Dedan Kimathi	0.98	-	30	-	0	-	-	-	0	0	-	0
Independence	6.893	√	1970[r]	-	0	^	-	√[+]	3	0	*	0
Total	18.18		8.047									

Source: Field Data, 2015

[a] Infrastructure not available the whole length and not uniform where it is available.

[r]Discontinued and dilapidated walkways are also available as part of the underpass, infrastructure only available for a stretch of 50 metres at UN Complex building,

^Infrastructure only available as part of underpass but is damaged by vehicles.

* Available but inappropriate.

√[+]Infrastructure available only from the avenue's junction with Nationalist Road to Kabulonga Road

Figure 3: Narrow Road Shoulder Encroached on by a Minibus, Alick Nkhata Road
Source: Field Data, 2015

On Alick Nkhata, there are only patches of paved and well protected walkways in front of institutional premises such as the UN Office Complex (Figure 4).

Figure 4: Patch of Paved Walkway at the UN Complex, Alick Nkhata Road

Source: Field Data, 2015

Generally walkways on the roads under study are almost absent and in a poor state as shown in Figure 5.

Figure 5: Deplorable State of Walkway above the Underpass, Independence Avenue

Source: Field Data, 2015

In some cases, such as some portions of Alick Nkhata road and Independence Avenue, NMT users end up using undesignated foot trails as shown in Figure 6 due to the absence or poor state of walkways. This was acknowledged by a majority of key informants and supported by 27 NMT users. Tiwari (2002a) refers to this group of road users as 'captive pedestrians' because of the fact that they have no option but to make do with any adverse road conditions to walk since any other transport option is not affordable to them. It is because of captive pedestrians and other vulnerable road users that recent advances in sustainable transport have been championing universal designs and complete streets which cater for all road users regardless of age, ability and economic status (National Complete Streets Coalition, 2011).

Figure 6: Undesignated Foot Trail, Alick Nkhata Road

Source: Field Data, 2015

Other key NMT infrastructure is crossing facilities such as Zebra Crossings and/or traffic lights. Study results show that 30 out of 31 NMT users made reference and identified traffic lights as the safest place to cross the selected roads. Conversely, traffic lights on the roads under study are not uniformly located and thus often not the nearest and preferable crossing point for NMT users. As a result it is not surprising that several NMT users were seen crossing at undesignated but shortest points which are not safe as shown in Figure 6. However, it should be noted that placement of traffic lights is largely based on engineering standards which aims at making movement of MT easier as opposed to NMT.

Besides being inappropriately situated, some pedestrian crossings are faded (Figure 7) making them barely visible to all road users. This inadequacy of crossing facilities is

similar to the situation observed in some Indian cities where Goyal (2014) reports that pedestrians are exposed to dangerous environments since urban roads do not have sufficient Zebra crossings.

Figure 7: NMT users running to cross at an undesignated point, Independence Avenue

Source: Field Data, 2015

Figure 8: Faded Pedestrian Crossing near Traffic Lights, Alick Nkhata Road

Source: Field Data, 2015

In addition to being faded, most pedestrian crossings on the roads under study have no signage to inform users making them unsafe as earlier alluded to. Road signage is an integral part of any good road network and necessary for its optimal operation. In commenting on the issue of road signage, one key informant from RTSA stated the following;

> "I have always said the difference between life and death could be a single road sign. The presence or absence of just a single road sign can make that important difference".

Generally, all key informants acknowledged that road signage was inadequate on the selected roads, or was misplaced and inappropriate in cases where it was provided. Misplaced and inappropriate signage was observed on Independence Avenue, near its junction with Dedan Kimathi Road (Figure 9).

Figure 9: Inappropriate, Misplaced and Incompatible Road Signs, Independence Avenue

Source: Field Data, 2015

At this junction, a pedestrian crossing sign has been placed next to a speed limit sign of 65 km/h while the pedestrian crossing itself is less than 100 m away and after the junction. Such inappropriate placement of signage and NMT infrastructure sends conflicting messages to road users making the spot dangerous and susceptible to accidents.

Expounding on the matter of inadequate road signage, one senior official from RDA stated that vandalism by some members of the general public was responsible for the absence of signage on the some selected roads and other city roads. This claim is also consistent with official reports from RDA and its publications where the agency warned members of the public against vandalizing road traffic signage and other road installations (RDA, 2014; 2015). However, it is important to note that this view was disputed by some NMT users who claimed that some road signs were just made of poor quality materials and thus could not last. About 15 NMT users backed that claim whilst

16 seemed to concur with the earlier official position on the matter. To curb vandalism of road signage, City officials can mark road markings on the pavement or carriageway surface. Marking of some important road user information on the pedestrian pavement and carriageway is seen as a norm which is practiced even in developed cities in Australia and the United States of America (United States of America Federal Highway Administration (FHWA), 2004; Government of Western Australia, 2012).

During three hours of observations on Dedan Kimathi Road, 57 carts were seen ferrying cargo between Kamwala Area and Intercity Bus Terminus. However, Dedan Kimathi Road has no designated space for use by carts or parking space. This forces carts onto the carriageway as shown in Figure 10. All cart users confirmed that they had no designated parking space within or outside Intercity Bus Terminus but parked illegally near bus loading and offloading bays. They complained of occasional harassment from LCC officials who demanded parking fees and/or chased them from the bus terminus.

Figure 10: Carts on the Carriageway Due to Lack of NMT Infrastructure, Dedan Kimathi Road

Source: Field Data, 2015

A senior officer from RTSA acknowledged the presence of hand carts on Dedan Kimathi Road and added that there was an urgent need to regulate them as they were a 'menace' and cause of accidents and congestions. This perception from a government official strengthens Porter's (2007:251) assertion that "there is a tendency among government staff at all levels to view Intermediate Modes of Transport (IMT) as merely backward technology for backward areas."

Further, none of the commercial entities on the selected roads has made parking provisions for carts and bicycles. Both RTSA and LCC officials admitted that there was no management plan for carts on Dedan Kimathi Road despite their important role in meeting small freight transport needs of small and medium enterprises. Thus cart usage on Dedan Kimathi Road is unregulated. It is thus not surprising that neither LCC nor RTSA has statistics on the number of carts on Dedan Kimathi Road, a situation which complicates any feasible management of this NMT equipment. The lack of statistics on the number of carts or bicycles that use the selected roads consolidates Gemzoe's (2006) claim that NMT users are invisible to city authorities.

The state of NMT infrastructure on the selected roads was evaluated based on availability and the condition of that infrastructure. The Table 3 has shown that NMT infrastructure on the selected roads is inadequate. For example paved walkways make up only 44.3 percent of the combined total length of the roads under study. NMT users on these roads end up using undesignated and unpaved foot trails which are dirt and muddy in the dry and rainy seasons respectively. Further NMT infrastructure such as cycle tracks, crossing facilities and signage are not adequate. On the other hand, some NMT infrastructure on selected roads is in poor condition. The discussion has shown that some walkways are in a deplorable state. Road shoulders of the selected are not only narrow but also irregular and in some cases not such as Independence and Dedan Kimathi not even available. Based on these facts, it can be said that objective one which sought to evaluate the state of NMT infrastructure on selected roads is achieved. With regard to research question one, it can be stated that the state of NMT infrastructure on the selected roads is poor and inadequate. As a result, NMT users on the selected roads face a number of challenges which are discussed in the next section.

4.2 Challenges Faced by NMT Users on the Selected Roads

NMT users on the selected roads face various challenges which remain unknown to City Authorities. Challenges faced by NMT users emanate from four broad areas which relate to the state and inadequacy of NMT infrastructure as discussed in section 4.1. These areas are safety of roads for NMT use, appeal of NMT environment, space availability and road user awareness.

4.2.1 Safety of Roads for NMT Users on the Selected Roads

All research participants agree that the selected roads are not safe especially to NMT users. Although, official records for road traffic accidents (RTAs) are not disaggregated for each district or road thereof, the views of research participants resonate with the general trend of RTAs in Lusaka Province which confirm that NMT users comprise the majority of accident victims. As can be seen from Figure 10, close to 57 percent of RTA victims in Lusaka Province are NMT users. This shows how risky it is for NMT users to move from one point to another in the Province and Lusaka City in particular.

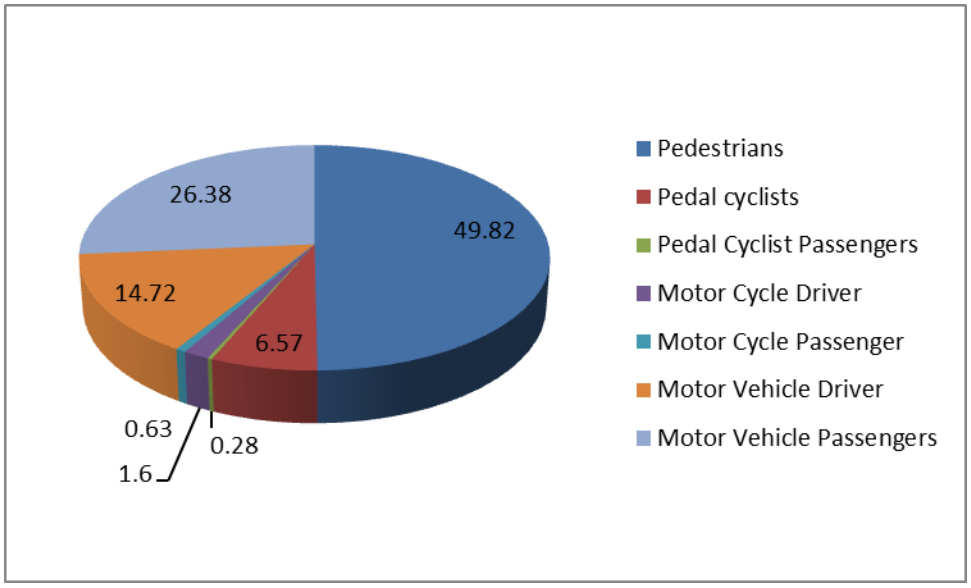

Figure 11: Percentages of Road Traffic Accidents in Lusaka Province in 2014

Source: Zambia Police Service (ZP), 2015

These statistics are not surprising considering the inadequacy of NMT infrastructure on the selected roads discussed in the previous section. However, the findings are worrying considering that human life is irreplaceable and that these RTAs can be avoided or

significantly reduced if all City roads were retrofitted with NMT infrastructure. It is also akin to Angira's (2013) findings in Nairobi's Nyamakima area where the movement of NMT users is said to be a matter of life and death. Table 4 provides details of the nature of casualties of victims of RTAs and demonstrates that the effects of all RTAs weigh heavily on NMT users.

It should be noted that statistics in Table 4 refer to the whole Lusaka Province as the cited report does not breakdown the casualties of RTA by district or road. However, considering the fact that the City of Lusaka has more than 80 percent of all vehicles in the Country (JICA, 2009; ZIPAR, 2014), it is not illogical to conclude that the majority of these RTAs happened in Lusaka City. The implication of these statistics is that City roads which also include the selected roads are unsafe to NMT users. This was also supported by all key informants and 30 NMT users.

Table 3: Victims of Road Traffic Accidents in Lusaka Province for 2014

Casualties	Killed	Seriously injured	Slightly Injured	Total No. of Victims	Percentage
Pedestrians	277	563	1458	2298	49.82
Pedal cyclists	25	39	239	303	6.57
Pedal Cyclist Passengers	1	3	9	13	0.28
Motor Cycle Driver	7	9	58	74	1.60
Motor Cycle Passenger	2	5	22	29	0.63
Motor Vehicle Driver	57	116	506	679	14.72
Motor Vehicle Passengers	78	348	791	1217	26.38
Total	447	1083	3083	4613	100

Source: Zambia Police Service (ZP), 2015

Further, according to the Zambia Police Report on RTAs for 2014, over 1,135 RTAs recorded in Lusaka Province involved pedestrians who were hit by vehicles whilst trying to cross the roads (ZP, 2015). The situation should even be worse on roads such as Dedan Kimathi which do not have traffic lights. This finding shows how, simple actions

such as crossing the road can be life-threatening to NMT users on City of Lusaka roads and roads under study due to inadequacy of NMT infrastructure.

On the other hand 29 NMT users cited excessive speeding as a major challenge to their safety. This claim was supported by official reports from the Zambia Police which attributes over 1323 RTAs recorded in the year 2014 in Lusaka Province to excessive speeding (ZP, 2015). Further all key informants seem to agree that excessive speeding was a major issue on the selected roads. Despite the issue of excessive speeding, it was observed as shown in Table 3 that some roads, such as Alick Nkhata and Dedan Kimathi, do not have speed signs making it difficult for one to know the appropriate speed limit. When asked about this observation, a RTSA official, though skeptical, hinted that 40 km/h was the maximum speed limit for all urban roads in Lusaka City. This claim is in contrast to the observations on Independence Avenue and Burma Road where speed limits are above that limit. Speed limit setting is an important aspect of traffic management which should not be left to the discretion of motorists as it has a significant bearing on the lives of road users especially NMT users who bear the highest brunt of RTAs as depicted in Table 4. It may be useful to set the speed limit of the selected roads at 30km/h which is incidentally the maximum speed at which humans have a high survival rate when there is human and motor vehicle accident (Government of Western Australia, 2012; Goyal, 2014).

It is clear that the selected roads are not safe for NMT users. Contributing factors to this situation are inadequate crossing facilities, inadequate signage, and excessive speeding. The scenario put forward in this section also results in reducing transport options for most vulnerable road users (NMT users) and should thus convince policy and decision makers to prioritize infrastructure that supports walking and other NMT modes of transport instead of just widening carriage ways.

4.2.2 Attractiveness of the Road Environment to NMT Users

Conditions of the selected roads present different challenges to NMT users at different seasons of the year. During the rainy season, road edges are flooded and muddy forcing NMT users onto carriageways as shown in Figure 12. During the dry windy season, dust and dirt were identified as the main challenges faced by a majority of NMT users

interviewed. These situations make NMT use unattractive to potential users and is a disincentive to private motorists who would ideally be urged to shift to either NMT or public transport.

Figure 12: Unattractive Road Reserves Due to Bad Weather, Alick Nkhata Road

Source: Field Data, 2015

Road reserves of the selected roads have no tree canopy or cover to protect users from direct sunlight and/or rains apart from the 800 metres walkway on Independence Avenue stretching from Woodlands roundabout to the road's junction with Nationalist Road which is partially covered by a tree canopy as shown in Figure 13. This is dissimilar to practices in other countries where transport and road authorities prescribe and ensure details for protection of NMT users from adverse weather elements included in design guidelines for NMT infrastructure (United States of America FHWA, 2004; Litman *et al*., 2014; Government of Western Australia, 2012).

Figure 13: Designated Walkway Covered by Tree Canopy, Independence Avenue

Source: Field Data, 2015

The attractiveness of the environment is also negatively affected by the increased presence of vehicles on the selected roads making NMT users to feel unsafe since road infrastructure seem to cater only for vehicles and not people. All NMT users interviewed indicated that they had noticed an increase in the number of vehicles making the roads more dangerous for them. The increase in the number of vehicles was also confirmed by an official from RTSA who stated the following;

> As at 4th quarter 2014, the Country had over 605,000 vehicles. On average, we register over 16000 vehicles per quarter nation- wide. On average we register over 330 vehicles per day and over 200 of that number is in the City of Lusaka alone. This means that slightly over 50 percent of the total vehicle population is in Lusaka City and the majority of these vehicles are light passenger vehicles. Something urgently needs to be done.

This observation was supported by consolidated statistics from RTSA and ZP (Tables 5 and 6) and a recent study by ZIPAR (2014) which confirmed the increase in the number of vehicles and bemoaned that the majority of those were used motor vehicles imports.

Table 4: Number of Vehicles Registered in Lusaka Province, 2008-2013

Year	Vehicles Registered
2008	28665
2009	17711
2010	18254
2011	26794
2012	42587
2013	49420

Source: RTSA, 2015

Apart from the continued rise in the number of vehicles as shown in Table 5, an important concern is that private car ownership is on the increase as shown in Table 6. Increase in private car ownership may be as a result of the neglect of transport options such as NMT and public transport which manifests in affluent households to purchase more private cars to meet their transport needs. Public transport in Lusaka City is characterized by failure and inefficient resulting in it not being a preferred option especially to affluent households (JICA, 2009; Chikuba, 2014).

Table 5: Breakdown of Registered Vehicles per Category in the Country

Vehicle Type	2008	2009	2010	2011	2012	2013
Light Passenger Vehicles	31375	19384	19979	29327	46613	54092
Heavy Passenger Vehicles	780	481	496	728	1158	1344
Light Load vehicles	7292	4506	4644	6816	10834	12572
Heavy Load vehicles	5514	3407	3512	5154	8192	9507

Source: RTSA, 2015

The increase in vehicular traffic is a common phenomenon in cities of developing countries while developed ones are moving in the opposite direction (Becker, 2011; UN Habitat, 2014). Development of safe, convenient and more appealing NMT infrastructure such as bike superhighway can help to reverse the trend of people's penchant for vehicles (Appleyard and Lintell, 1972; Hogan, 2015).

4.2.3 Encroachments on Road Reserves

It was observed that road reserves and shoulders on the selected roads are usually encroached on by bill boards and informal trading as shown in Figure 3 earlier. This observation was validated by 27 NMT users who participated in this study. On the other hand, only 2 officials seem to be aware of this encroachment on road reserves as a challenge to NMT users. This also resonates with Tiwari's (2002) findings in New Delhi that merchandise along NMT infrastructure serves a similar role to that of takeaways and eating places on highways for motorists as prescribed by highway design manuals. This argument holds to a large extent if the type of items on sale along these NMT routes are daily household consumables such as bread and vegetables but not metal work products such as door and window frames as the case is on the selected roads. Persistence of such merchandise on the NMT spaces on the roads under study is a failure of LCC to adequately manage trading places in the City given the availability of designated space for such merchandise. Given that the City authorities are not aware of the challenge of merchandise that encroaches on road reserves on the selected roads expose a critical gap and perhaps justifies arguments for the involvement of NMT users in the design of City roads (Dewar, 2011). NMT users may point out important considerations that need to be included in the road design based on their experience which may not have been adequately captured in engineering manuals and standards. Involvement of NMT users would thus ensure sustainability of roads since they would have adequately addressed concerns of NMT users.

4.2.4 Inadequate Road User Education

From the sample of NMT users interviewed, only 3 are aware of road user regulations such as the Highway Code and other legislation. Majority (28) of the NMT users seem to assume that road traffic regulations and laws were meant for motorists and not NMT users. This finding was echoed by a RTSA official who noted that;

> Most pedestrians assume that the Highway Code is just meant for motorists. In contrast, it is for all road users. You see it in the manner that pedestrians behave on the road. For example you will see some Evelyn Hone College students crossing that Zebra cross adjacent to their school on Church Road with headphones in their ears or busy talking on the phone assuming that a motorist has seen them and will automatically stop

> for them. People need to be educated on the use of the road. That is why you see us every now and then in the media trying to reach out to everyone.

Observations on the selected roads concur with RTSA official's sentiments as several NMT users were seen using the wrong side of the road and talking on the phone while crossing the selected roads as show in Figure 14.

Figure 14: Pedestrian Crossing a Road while using a Phone, Independence Avenue

Source: Field Data, 2015

Road user education is also needed to change the perception that people have of NMT usage. Perceptions of City Officials on NMT use can be summed up in the following comments from a senior government officer who said;

> *We realize that if we are going to decongest our cities, we have to encourage people to start using these IMTs or NMTs. Some people here (referring to his workplace) have no business using vehicles when reporting for work. They stay very near to this place. In my view, anyone who stays within a radius of 5 kilometres from here can come to work on a bicycle or by walking. However, the problem is that there are cultural issues involved whereby, me as Assistant Director, if I come on a bicycle or walking, people will question and say what is wrong with this man. He is now finished. He is now suffering.*

NMT use is associated with poverty not only in the City of Lusaka (ZACA, 2007) but also in other cities especially in global south cities where residents hanker to own a car as a status symbol (Porter, 2007). It all points to the fact that much needs to be done to increase awareness on the benefits of NMT use to users, society and the environment. A lot can and should be done to sensitize NMT users on their responsibilities and obligations when using roads.

The main challenges faced by NMT users on the selected roads relate to personal safety and moving on the roads in the rainy season. These challenges arise as a result of inadequate NMT infrastructure, encroachment of NMT spaces by motor vehicles and merchandise and inadequate road user education resulting in conflicts with motor vehicle traffic. Most prominent of these challenges are safety concerns arising from difficulties in crossing the selected roads and excessive speeding by motorists. Official statistics also validate these findings by revealing that 57 percent of all RTAs recorded in Lusaka Province involve NMT users. Combined ZP and RTSA statistics of RTA for the year 2014 show that 1135 NMT users were hit by motor vehicles whilst trying to cross the roads while 1325 of all RTAs recorded were attributed to excessive speeding. Based on these facts, it can be said that the second objective which aspired to assess the challenges faced by NMT users on the selected roads has been achieved.. In response to the second research question, it can be stated that NMT users face difficulties in crossing the selected roads. The roads are not safe for NMT users. NMT users also find it difficult to use the selected roads during the rainy season when the roads are flooded.

4.3 Integration of NMT infrastructure in Policies of the City of Lusaka

Like any city, road development in Lusaka is guided and influenced by policies, legislation and plans, which are translated into projects. Policies provide the broad direction on road development and set priority of investments. Laws give enforcement to the policy while plans are an implementation strategy to the realization of the goals and objectives set out in the policies. Projects actualize the plans and outline intricacies of road developments. Projects detail what road infrastructure are to be developed and on what roads.

4.3.1 Transport Policy, 2002

For the City of Lusaka, there is no specific transport policy. However, there exists a Zambia Transport Policy of 2002 which provides broad guidelines on road development for the whole Country. Among other provisions, the Zambia Transport Policy, 2002 makes explicit statements for MT transport and related infrastructure. On the other hand, only broad references are made to sustainable transport but no specific mention of NMT and its related infrastructure (Government of the Republic of Zambia (GRZ), 2002). However, the policy is under review and it is anticipated that unambiguous statements for NMT infrastructure will be made in the final policy document.

4.3.2 Road Traffic and Public Roads Acts

Despite the lack of explicit reference to NMT or its infrastructure in the transport policy, legislation that emanated from the policy that is, the Road Traffic Act No. 11 and Public Roads Act No. 12 of 2002 have made some explicit provisions for NMT and its infrastructure. The focus of the Road Traffic Act is to manage and control all road traffic which includes NMT users and thus stipulates how road users ought to conduct themselves on public roads (GRZ, 2002a). The Public Roads Act, on the other hand makes provisions for road development and administration. In the Public Roads Act, RDA is established as an agency responsible for all public roads and appoints councils such as LCC as road authorities. With regard to specific NMT infrastructure, Section 52 of the Public Roads Act, 2002 provides that "…a road authority shall provide where it shall consider it necessary or desirable, for the safety or accommodation of pedestrians and pedal cyclists, proper and sufficient footpaths by the side of roads under its control ..." (GRZ, 2002b). Unlike other provisions of the Public Roads Act relating to MT, Section 52 is not prescriptive. The section suggests that provision of NMT infrastructure is at the discretion of a road authority who may even decide not to erect it. Further, the section seems to suggest that NMT infrastructure should be provided only to ensure safety of NMT users and not merely on its own merit as a viable transport option. Further, the limitation of circumstances under which NMT infrastructure should be provided on roads to safety and tolerance of NMT users ascribes NMT infrastructure an inferior role to MT.

On the other hand, absence of widths for infrastructure such as walkways and cycle tracks in the Public Roads Act reinforces the notion that NMT infrastructure is sidelined. In addition to giving the standard widths of public roads, the Act should have prescribed minimum widths for NMT infrastructure as the case is in other Countries (Government of Western Australia, 2012). Further, unlike the Road Traffic Act, the Public Roads Act has no subsidiary regulations or guidelines to provide detailed standards for road elements such as prescribed widths of NMT infrastructure. Such omissions have an effect on NMT infrastructure provision.

Although the Public Roads Act has made some provisions for NMT, it can be noted that such provisions seem to look at provision of NMT infrastructure primarily for the purpose of safety. It should be re-emphasized that NMT infrastructure should be provided simply as a preferred and readily available transport option to the majority of road users as opposed to it being seen as a means of avoiding accidents on roads meant for vehicles as the Public Roads Act implies.

4.3.3 Planning Legislation and Plans for the City of Lusaka

The City of Lusaka and the rest of the Country use the Urban and Regional Planning (URP) Act of 2015 to prepare plans which guide all land developments including road transport (GRZ, 2015). The URP Act repealed the Town and Country Planning (TCP) Act of 1962. The URP Act like its precursor has made general reference to sustainable infrastructure while explicit prescriptions have been made for MT infrastructure such as parking and loading bays. Essentially, planning legislation has not adequately provided for NMT infrastructure.

In terms of City plans, there are basically 3 plans that are responsible for guiding development of Lusaka City and these are; the Doxiadis Plan, 1972, Lusaka Comprehensive Master Development Plan (LCMDP) of 2009 and the Strategic Plan 2010-2015. These plans were all developed based on the TCP Act, 1962 which had no specific provisions for NMT infrastructure but demanded of all commercial and industrial developers to make provision for vehicular parking and loading (GRZ, 1962). It is thus not surprising that the Doxiadis Plan made recommendations for road infrastructure that would only favour motorists and no other road users such as

pedestrians and cyclists. Commenting on the Doxiadis Plan, Nachengwa (1990; 79) remarks that "…one of the most important shortfalls of the plan was the failure, despite having emphasized the urgency of expanding public transport, to take into account the needs of the majority of the City's population-cyclists and pedestrians. Instead, private car ownership was assumed, leading to the proposal for a tremendous network of freeways and expressways". The plan did not thus provide for NMT infrastructure.

The more recent successor plans such as the LCMDP which was prepared by JICA attempted to redress the shortfalls of the Doxiadis Plan. Provisions for NMT infrastructure in the JICA sponsored plan are made through two objectives namely provision of safe and comfortable pedestrian routes and promotion of NMT (JICA, 2009). Pedestrian facilities at black spots, sidewalk network and bicycle road network are proposed in the plan and based on those proposals, 3 projects related to NMT infrastructure make the list of 34 projects earmarked for implementation in the short term (2010-2015). Remarkably, all the 3 NMT infrastructure related projects are deemed to be of "medium and low relevance" and thus of low priority (JICA, 2009; 53). The plan goes further to make detailed future traffic volume forecasts and future network capacities for the City of Lusaka road network with specific reference to Burma Road and Independence Avenue. Parameters used in making this future traffic forecasts and network capacity analyses are based on MT and not NMT. The criterion for evaluating traffic forecast and network analysis are clearly identified as "vehicle–kilometres, vehicle–hours, vehicle operating cost (VOC), travel time cost (TTC), fuel consumption (or CO2 emission), first year return (FYR), and maximum volume to capacity ratio (V/C)" (JICA, 2009; 2-3). NMT infrastructure seems not to be adequately catered for in the LCMDP and that is why the proposals in the plan do not state distances of proposed NMT infrastructure whereas that of the MT infrastructure is clearly stated. The role that carts play in the City transport system is not acknowledged as only analyses and projections for vehicular and rail freight services are made in the plan. This reinforces arguments that NMT users are invisible to planners (Gemzoe, 2006).

The most recent of City plans is the Strategic Plan (2010-2015) which seems to fully acknowledge the importance of NMT infrastructure. Through this plan, LCC makes an

audacious but unrealistic commitment that "by 2015, the City of Lusaka will have closed the gap in infrastructure renewal of roads, sidewalks, traffic control signals, traffic signs and streetlights" (LCC, 2011;18). This goal seemed ambitious given the Council's capacity. The Council does not have adequate resources both financial and human to achieve that goal. These assertions can be substantiated by the fact that there appears to be a gap between what was planned and the reality. Section 4.1 has clearly shown that NMT infrastructure on the roads under study is inadequate and in poor state. This demonstrates that the gap with regard to NMT infrastructure is still unfilled. It can thus be concluded that such statements by the LCC were mere rhetoric. Further, the pronouncement is unrealistic in that the plan does not provide statistics of the NMT infrastructure gap of the City. The Strategic Plan, similar to the plans discussed earlier, does not indicate distances of NMT infrastructure to be erected or improved upon.

It should be noted that there have been a number of road developments projects in the City. Apart from the Ring Road projects, a majority of these road infrastructure development projects are as a result of political pronouncements and not any of the City Plans discussed earlier.

4. 3.4 The L 400 Road Project

The L400 Road Project is a National Road Project in which 408 Kilometres of Lusaka Township Roads (Burma Road included) have been earmarked for tarring, expansion and/or rehabilitation (RDA, 2013). The scope of works include widening of some roads such as Burma and Chilimbulu Roads, upgrading of some existing gravel roads, construction of sidewalks, construction and rehabilitation of drainage systems, junction improvement, installation of street lights and construction of walk ways on the roadsides (RDA, 2014a). Distances and specific details of NMT infrastructure to be built under this project are not available in all the documents reviewed for this study. However, observations on Burma Road reveal that NMT infrastructure has been retrofitted covering the whole road length. However, it is not known how much NMT users were involved in the project as some of the issues such as placement of pedestrian crossing facilities do not seem to have followed pedestrian routes. For example, during a 2 hour period, 60 pedestrians were observed crossing the widened Burma Road from

Chimbokaila Prison camp to the market but there is no pedestrian crossing at this common crossing point. It seems City Authorities were only concerned with fulfillment of engineering aspects of the road without understanding the movement patterns of NMT users. Further the speed limits of 60km/h and 80km/h placed on Burma Road is excessive considering that the road abuts residential and primary schools. In addition, sufficient Island or median on the widened Burma Road should have been provided so that NMT users cross only two lanes per time.

The discussion has shown that the Transport Policy has made no specific mention to NMT infrastructure while the Road Traffic and Public Roads Acts have made some specific references to NMT infrastructure. However, there is no subsidiary legislation to the Public Roads Act such as regulations or guidelines to operationalize the Act in terms of prescribing standard dimensions for NMT infrastructure. The discussion has shown that the City of Lusaka has no specific policy for NMT and some Plans have made unsubstantiated references and provisions for NMT infrastructure. Based on these grounds it can be seen that NMT infrastructure is not fully integrated in Policy documents of the City of Lusaka. Therefore, the third objective which sought to examine the extent to which NMT infrastructure is integrated in policies of Lusaka City has been achieved. In response to the third question it can be said that NMT infrastructure is not fully integrated in policies of the City of Lusaka.

4.4 Potential of the Selected Roads to Accommodate NMT Infrastructure.

4.4.1 Space Requirements for NMT in the City of Lusaka

Officials from LCC and RDA stated that the City of Lusaka does not have specific guidelines for NMT infrastructure. They instead relied on regional and international ones when designing NMT infrastructure for the City of Lusaka. It is important for the City to have specific guidelines for road and NMT infrastructure design instead of leaving such matters to the whims of professional engineers who may omit critical issues which are important to NMT users. It should be noted that the LMDP proposed some standards for road elements as depicted in Table 8 although key informants do not seem to be aware because none made any reference to them.

Table 6: Proposed Cross-Section Elements for the Urban Roads

Road Classification	No of lanes	Cross-Section Elements (m)					
		Carriageway	Shoulder	Marginal strip	Median strip	Service Road	Buffer Zone
I	4 or more	3.75	3.00	0.20	3.00	3.5	5.0 minimum (Residential Area)
IA	4 or more	3.50	1.50	0.25	1.50 (min)	3.00	
IB	2 or more	3.50	1.50	(0.25) if required	(0.5 min) if required	-	
IC	2 or more	3.25	1.00	(0.25) if required	(0.5 min) if required	-	
II(ID)	2	3.00	0.50	-	-	-	
III	1	5.50(min)	1.00	-	-	-	

Source: JICA, 2009

Road elements proposed in Table 8 do not specify widths for NMT infrastructure although it can be assumed that the 5 metres minimum allocated to buffer zone is meant to accommodate NMT infrastructure. This omission consolidates earlier assertions that the JICA study did not prioritise NMT infrastructure and consequently made unrealistic cost estimates for NMT infrastructure in its proposals for roads in the City of Lusaka because it prioritised MT infrastructure. Table 8 shows that the widest urban road in the City of Lusaka, which is, road classification I requires maximum space of 29.9 metres to accommodate all road elements. It is therefore not surprising that all key informants and 30 NMT users indicated that all the selected roads have sufficient space to accommodate NMT infrastructure. Analysis of the widths of the selected roads in a GIS software program also confirms that the space is adequate to accommodate both NMT and MT infrastructure and the widths are as shown in Table 9. Widths of the roads under study are not uniform due to encroachments and existence of some trading activities. Prevalent activities observed on the selected roads are car washes, restaurants, kiosks and

hoardings which the LCC regard as temporary and whose land lease renewal is at its discretion. The inadequacy of NMT infrastructure on the selected roads despite the availability of space is clear evidence that City Authorities do not prioritise it as their focus is on MT.

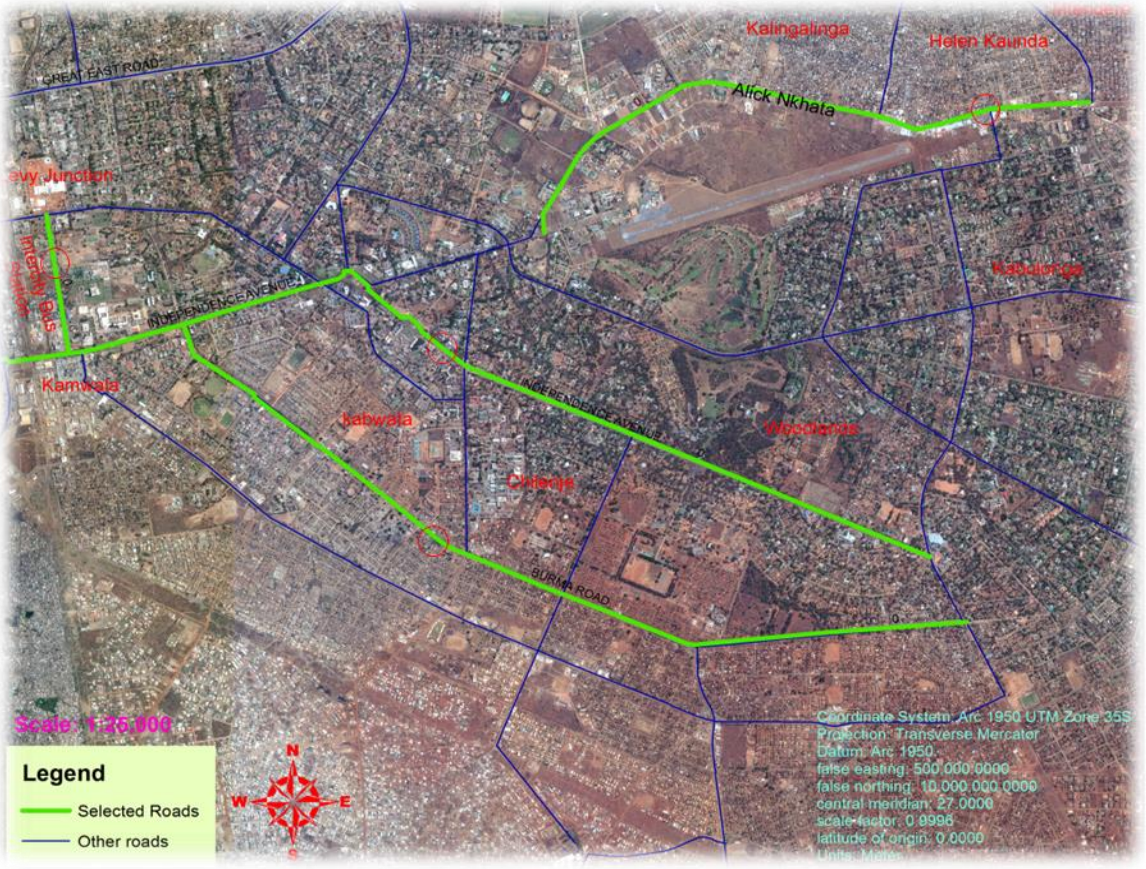

Figure 15: Narrowest Points on the Selected Roads Highlighted in Red

Source: Field Data, 2015

Furthermore, even at their narrowest points (Figure 15) the selected roads are wide enough to accommodate NMT infrastructure. The widths of the selected roads at the narrowest points are stated in Table 9 and depicts that all of the selected roads except Alick Nkhata Road are more than 30 metres at their most narrow points.

Table 7: Widths of Selected Roads at Narrowest Points

S/No.	Name of Road	Width at Most Narrow Point (in Metres)	Length of Road
1	Alick Nkhata	26.877	4.26
2	Burma	30.02	6.047
3	Dedan Kimathi	45.39	0.98
4	Independence	31.66	6.893

Source: Field Data, 2015

Widths of the selected roads at their narrowest point as shown in Table 9, implies that 3 of the selected roads have sufficient space to accommodate road classification I which is a dual carriage way and NMT infrastructure. Alick Nkhata Road which has a width of less than 29.9 metres at its narrowest point can also sufficiently accommodate NMT infrastructure and maximum 3 lanes for motorized traffic as not all roads should be dual carriageways. However, even if it was necessary that Alick Nkhata should also be dual carriageway, LCC could thus decide not to renew land lease agreements of permitted trading activities on the road so that a minimum of 4 metres is secured for dual carriageway and NMT infrastructure. It therefore, means that all the roads under study can adequately accommodate NMT infrastructure based on space requirements proposed by JICA (Table 7). In addition to surface space there is great potential in utilizing the space above the ground such as the University of Zambia (UNZA) and Manda Hill foot bridges and underground space to accommodate NMT infrastructure on the selected roads. It should be appreciated that continued expansion of City roads has a limit as surface space is finite but there still remains untapped space above ground for road infrastructure such as raised walkways and cycle tracks.

4.4.2 Terrain of Selected Roads

Further analysis in Global Mapper was undertaken to evaluate the topography of the land upon which the selected roads are built. This was done in order to ascertain the suitability of the selected roads to accommodate NMT infrastructure as topography has a significant impact on usability of pedestrian facilities (Institute of Highways and Transportation (IHT), 2000; Grava, 2004; Allan, 2013). All the roads under study are

built on land which is at the following altitudes in metres above sea level: Alick Nkhata lies between 1270m and 1280m ; Burma between 1280m and 1310m ; Dedan Kimathi is whole at 1280m while Independence Avenue is between 1280m and 1320m. These gradients show that the selected roads are on flat land which implies that NMT use is feasible as NMT users can move on the selected roads almost effortless without expending extra energy. To that effect some studies have recommended a gradient of 5 percent (1 in 20) as being an ideal incline for pedestrian sidewalks while the maximum grade is set at 8.3 percent (United States of America Federal Highway Administration (FHWA), 2004). Since all the roads under study fall within recommended gradients, it is hereby stated that they are suitable and conducive for NMT infrastructure.

4.4.3 Climatic Conditions of the City of Lusaka

The City of Lusaka experiences weather conditions which is in three distinct seasons. This means that the City of Lusaka enjoys tropical climate with the dry season comprising the majority of days in a year. More dry days imply more conducive natural conditions for walking and cycling and less hostile environments. As a result NMT usage is naturally feasible for a longer period of the year on the selected roads. This gives credence to this appeal for appropriate NMT infrastructure on the roads being studied as natural conditions already favour NMT use. Based on these considerations it is apparent that the selected roads have great potential to accommodate NMT infrastructure. Investment in this infrastructure would therefore increase transport options for the majority of City residents.

Potential of the selected roads to accommodate NMT infrastructure was determined based space requirements, terrain and climatic conditions. The study established that there is sufficient space on all the roads under study. Further it was shown that all the selected roads are on relatively flat ground and climatic conditions are favourable and adequate to enable them accommodate NMT infrastructure. Thus objective 4 was achieved and concerning the fourth research question it can be stated that all the selected roads have potential to adequately accommodate NMT infrastructure as all prevailing parameters are favourable.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

Chapter five is made up of four sections with this introduction being the first. Section two is a summary of key findings of the study. Conclusions of the study constitute section three. Recommendations and areas for further research comprise section four.

5.2 Summary of Findings

The study revealed that NMT infrastructure on the selected roads is inadequate, largely in a poor state and not appealing to current and potential users. It was found that NMT infrastructure such as walkways make up a combined length of only 8,047 metres as compared to 18,180 metres for carriageway of the roads under study. This is only 44.26 percent as compared to paved MT carriageway which runs for the whole combined length of the selected roads. Some infrastructure such as parking for hand carts is completely unavailable on the selected roads.

NMT users face a lot of challenges when using the roads under study. Owing to the inadequacy of NMT infrastructure, NMT users face challenges to cross the roads. Apart from inadequate crossing facilities, some of the selected roads have inadequate signage while others have inappropriate speed limits. The study revealed that close to 57 percent of RTA victims are NMT users. The study shows that there are several RTAs caused by excessive speeding but two of the roads under study (Alick Nkhata and Dedan Kimathi) do not have speed limit signage while the other two have high speed limits ranging between 60 to 80 km/h. Further, during adverse weather conditions, NMT users put up harsh conditions such as dust and dirt in order to meet their transport needs.

NMT infrastructure is not adequately integrated into plans and policies of the City of Lusaka. A review of policy documents revealed that the City has no stand-alone policy for NMT and its infrastructure. The study also reveals that NMT infrastructure only features as a component of road designs and bills of quantities often resulting in it being sidelined in preference of carriageways for motor vehicles. Some proposals made in the

current development plan of the City of Lusaka with respect to NMT infrastructure were developed with inadequate baseline information. The Transport Policy and all its derivatives have conspicuously left out carts which are a common feature on Dedan Kimathi Road. In addition, this study has shown that none of the institutions has a dedicated department or staff to specifically look into matters of NMT and its related infrastructure in the City of Lusaka.

The study has shown that the selected roads have potential to accommodate NMT infrastructure. This is on account of road widths with the narrowest being 26.877 metres while the widest is 45.39 metres on Alick Nkhata and Dedan Kimathi Roads respectively. These widths are sufficient to accommodate both NMT and MT infrastructure. In addition, the roads under study are built on flat land which is conducive for all manner of NMT infrastructure. The City of Lusaka also enjoys good tropical weather conditions making NMT usage feasible nearly throughout the year.

5.3 Conclusions

The inadequacy of NMT infrastructure on the selected roads is a clear demonstration of the neglect of NMT as a viable transport option. It reinforces the view that road infrastructure developments have an engineering bias which caters for needs of only motorists at the expense of the majority of road users. It also implies that NMT is not considered as an important transport option on the selected roads. This may compound the transport challenges on the roads under study.

NMT users on the selected roads face numerous challenges which City authorities do not fully understand. The absence of NMT dedicated staff and/or units in all institutions dealing in road development of the City is not only proof of that, but also points to the neglect of NMT issues. Continued neglect of NMT issues would mean continued disservice to the majority of road users and forfeiture of all the benefits that accrue to a city as a result of the use of NMT.

With regard to the integration of NMT infrastructure in policy documents, concern is raised that some City Plans attempted to provide unsubstantiated costs for NMT infrastructure on some roads with little regard to proposed lengths of NMT

infrastructure. This implies that City authorities are paying lip service to the issues NMT infrastructure. The absence of a policy for NMT in the City is another matter of concern is a clear example. There is need for more pragmatic actions such as Council by-laws or NMT design manuals to guide NMT issues in the City of Lusaka. The fact that some NMT infrastructure developed on the City roads such as Burma Road was influenced by political pronouncements rather than planning activity presents an opportunity for City professionals to actively lobby for NMT infrastructure provision.

The roads under study lie on flat land implying that the current terrain already favours NMT usage. This implies that provision of NMT infrastructure on the selected roads would not require huge costs. NMT infrastructure can be easily installed and consequently increase transport options for NMT users on these roads.

5.4 Recommendations

It is recommended that City Authorities in Lusaka City prioritise NMT infrastructure issues to not promote NMT as a transport option but to also help alleviate the current transport challenges being faced.

It is proposed that institutions dealing in road transport issues in the City establish departments or units specifically mandated to look into NMT issues.

It is also suggested that the City of Lusaka formulates distinct NMT policy and develop NMT plans to guide investment in NMT infrastructure on the selected roads. This would help in mobilizing resources specifically for NMT infrastructure and narrow the infrastructural gap between NMT and MT.

Regarding inadequate signage on the selected roads, it is recommended that some road information such as speed limits and warning signs be marked on the carriageway or walkway surface using durable paint.

Further research is recommended on the operations of carts on Dedan Kimathi Road. This would help in formulation of a plan to manage this NMT freight transport option.

6.0 References

Abuhamoud, A. M., R. Rahmat, and A. Ismail (2011). Transportation and its Concerns in Africa: A Review. *The Social Sciences*, 51-63.

Ahmed, A., and R. D. Dinye. (2011). Urbanization and the Challenges of Development Controls in Ghana: A Case Study of Wa Township. *Journal of Sustainable Development in Africa*, 210-235.

Allan, A. (2013). *The Effects of Topography on Walking and Cycling in Suburban Centres: A Comparison of Flat Salisbury with Hilly Golden Grove in Adelaide's North-East*. In: Australasian Transport Research Forum 2013 Proceedings, October 2 – 4, 2013. Pearl Louis,ed. Brisbane: http://www.patrec.org/atrf.aspx, pp. 1-12.

Angira, O. C. (2013). *Challenges and Opportunities for Sustainable Urban Mobility (Non-Motorised Transport): A Case Study of 'Nyamakima Area', Nairobi County, Kenya.*Masters Dissertation,University of Nairobi.

Appleyard, D. and M. Lintell. (1972). *The Environmental Quality of City Streets: The Resident's Viewpoint.* Berkeley: IURD.

Ashden. (2012). Case study Summary City of Ghent. Ghent : Ashden .

Association of African Planning Schools (AAPS). (2011). *Guidelines for Case Study Research and Teaching. Association of African Planning Schools (AAPS) Case Research Toolkit.* Cape Town: AAPS.

Becker, T. (2011). *Obstacles for Non-Motorised Tranport in Developing Countries – A Case study of Nairobi,Kenya.* Dresden: Association for European Transport and Contributors.

Bellies, M. (2000). *Segway Human Transporter*. [Online] Available at: http://inventors.about.com/od/sstartinventions/a/segway.htm. [Accessed 23 July, 2015]

Bengtsson, M. (2016). How to Plan and Perform a Qualitative Study Using Content Analysis. *NursingPlus One*, 8-14.

Blanco, H., M. Alberti, A. Forsyth, K. J. Krizek, D. Rodrı´Guez and E. Talen. (2009). Hot, Congested, Crowded and Diverse: Emerging Research Agendas in Planning. *Progress in Planning* , 153-205.

Brussel, M. (2011). *Have Dutch Cities Made the Transition Towards Non-Motorised Transport?* Twente: University of Twente.

Bryman, A. (2008). *Social Research Methods.* Oxford: Oxford University Press.

Brikci, N. and J. Green. (2007). *A Guide to Using Qualitative Research Methodology*. London : Medicins Sans Frontiers.

Burden, D. and P. Lagerwey. (1999). *Road Diets; Fixing the Big Roads, Walkable Communities*. [Online] Available at: www.walkable.com [Accessed 27 October, 2014]

Campbell, C. J. (2003). The Peak of Oil: An Economic and Political Turning Point for the World Making Urban Transport Sustainable. In N. Low and B. Gleeson (Eds). New York: Palgrave Macmillan.

Center for Clean Air Policy (CCAP). (2013). *Reducing Traffic Congestion in Bogotá through Bus Rapid Transit and Non-Motorised Transport.* [Online] Available at: www.ccap.org [Accessed 18 June, 2014]

Central Statistical Office (CSO). (2003). *2000 Census of Population and Housing Summary Report.* Lusaka: Central Statistical Office.

Central Statistical Office (CSO). (2012). *2010 Census of Population and Housing.National Descriptive Tables. :* Lusaka: Central Statistical Office.

Chikuba, Z. (2014). Lusaka Needs Public Transport Reforms. *The ZIPAR Quaterly*, pp. 4-5.

City Government of Cape Town. (2005). *City of Cape Town: NMT Policy and Strategy Volume 2: Policy Framework.* Cape Town: Directorate of Transport.

City Government of Modesto. (2009). *Modesto Non-Motorised Transportation Master Plan* . Modesto : City of Modesto.

Coppola, P. and E. Papa. (2013). Accessibility Planning Tools For Sustainable and Integrated Land Use/Transport (LUT) Development: An Application to Rome. *Procedia - Social and Behavioral Sciences*, 133 - 146.

Dekoster, J. and U. Schollaert. (1999). *Cycling: The Way Ahead for Towns and Cities*. Brussels: European Communities.

Denscombe, M. (2003). *The Good Research Guide for Small-Scale Social Research Projects.* Berkshire: Open University Press.

Denscombe, M. (2010). *The Good Research Guide for Small-Scale Social Research Projects.* Berkshire: Mc Graw Hill.

Dewar, D. (2011). The Relationship Between Spatial Planning and Transportation Planning in Southern Africa and Its Consequences for Human Settlement. *World Academy of Science, Engineering and Technology*, 5-20.

Efroymson, D. and R. Shama. (2007). *Making Cities More Livable: Ideas and Action.* Dhaka: Health Bridge – WBB Trust.

Erickson, A. (2012). *A Brief History of the Birth of Urban Planning*. [Online] Available at:http://www.citylab.com/work/2012/08/brief-history-birth-urban-planning/2365/ [Accessed 4 February, 2015]

Freund, P. and G. Martin. (1999). *Driving South: The Globalization of Auto Consumption and Its Social Organization of Space*. New Jersey: Montclair State University

Gauge. (2009). *Cycle Friendly Environments*. Hatfield: Pedal Power Association.

Gehl, J. and L. Gemzøe. (2006). *New City Spaces.* Copenhagen: The Danish University Press.

Gemzøe, L. (2006). *Are Pedestrians Invisible In The Planning Process? Copenhagen as a Case Study*. Copenhagen: Royal Academy of Fine Arts.

Gewald, J. (2005). *The Impact of Motor-Vehicles in Africa in the Twentieth Century: Towards a Socio-Historical Case Study*. [Online] Available at: http://asc.leidenuniv.nl/staff/jbgewald.htm [Accessed 20 June, 2014]

Gewald, J. (2007). *Transport Transforming Society: Towards a History of Transport in Zambia, 1890 - 1930.* [Online] Available at : http://www.ascleiden.nl [Accessed 6 June, 2014].

Godefrooij, T. C. (2009). *Cycling Inclusive Policy Development: A Handbook.* Eschborn.

Government of the Republic of Zambia (GRZ). (2002). *The Zambia Transport Policy*. Lusaka: Government Printers.

Government of the Republic of Zambia (GRZ). (2002a). *Road Traffic Act No. 11 of 2002*. Lusaka: Government Printers.

Government of the Republic of Zambia (GRZ). (2002b). *Public Roads Act No. 12 of 2002*. Lusaka: Government Printers.

Government of the Republic of Zambia (GRZ). (2015). *The Urban and Regional Planning Act, No. 3 of 2015*. Lusaka: Government Printers.

Government of Western Australia. (2012). *Planning and Designing for Pedestrians: Guidelines.* Perth: Department of Transport .

Goyal, V. S. (2014). Planning for Non-Motorised Transport in Urban Areas. In: *National Capacity Building Workshop for Sustainable and Inclusive Development, August 12-13, 2014* . Dhaka: GIZ,pp. 1-59.

Guillen, M. D. (2006). *A Study of Non-Motorized Public Transportation in Urban and Urbanizing Areas: The Case of Pedicab Operations in the City of Manila and in the Municipality of Los Baños, Laguna.* Manila: University of the Philippines Diliman.

Grava, S. (2004). *Urban Transportation Systems: Choices for Communities.* New York: McGraw-Hill.

Guitink, P., S. Holste and J. Lebo. (1994). Non-Motorised Transport: Confronting Poverty through Affordable Mobility. In Department of Transportation, Water, and Urban Development. *Infrastructure Notes.* New York: World Bank.

Gwala, S. (2007). Urban Non-Motorised Transport (NMT): A Critical Look at the Development of Urban NMT Policy and Planning Mechanisms in South Africa from 1996 - 2006. In: *Southern African Transport Conference, July 9-12, 2007.* Pretoria: Document Transformation Technologies,pp. 15-25.

Hidalgo, D. (2004). *Bogota Experience in Sustainable Transportation.* [Online] Available at:dariohidalgo@akiris.net [Accessed 18 August, 2014]

Hogan, M. K. (2015). *London Mayor Approves Europes First Bike Superhighway*. [Online] Available at: http://inhabitat.com/london-mayor-approves-europes-first-bike-superhighway/ [Accessed 19 February,2015]

Institute of Highway and Transportation (IHT). (2000). *Guidelines for Providing for Journeys on Foot.* London: IHT.

International Charter for Walking. (2006). *International Charter for Walking.*[Online] Available at: www.walk21.com [Accessed 23 May, 2015].

Jacobs, J. (1961). *The Death and Life of Great American Cities.* New York: Vintage Books.

Japan International Cooperation Agency (JICA). (2009). *The Study on Comprehensive Urban Development Plan for the City of Lusaka in the Republic of Zambia:Final Report Volume II-Chapter 1 Urban Transportation.* Lusaka: Ministry of Local Government and Housing.

Jones, P., S. Marshall and N. Boujenko. (2008). Creating More People-Friendly Urban Streets Through ‘Link and Place’ Street Planning and Design. *IATSS Research*, 14-25.

Kennedy, R. and L. Buys. (2010). Dimensions of Liveability: A Tool for Sustainable Cities. In: *Sustainable Building Conference*. Brisbane: SB10mad, pp. 1-11.

Kothari, C. (2004). *Research Methodology:Methods and Techniques.2nd Edition.* New Delhi: New Age International.

Koohsari, M. J., H. Badland and B. Giles-Corti. (2013). (Re) Designing the Built Environment to Support Physical Activity: Bringing Public Health Back into Urban Design and Planning. *Cities*, 294-298.

Kumar, A. and F. Barrett. (2008). Stuck in Traffic: Urban Transport in Africa. *Africa Infrastructure Country Diagnostic*, 1-10.

Lambert, T. (2014). *A Brief History of Transport*. [Online]. Available at: http://www.localhistories.org/transport.html [Accessed 9 August,2014]

Lincoln, Y. S., and E.G. Guba. (1985). *Naturalistic Inquiry*. Beverly Hills, CA: Sage

Litman, T. (2014). *Evaluating Active Transport Benefits and Costs. Guide to Valuing Walking and Cycling Improvements and Encouragement Programs.* Victoria: Victoria Transport Policy Institute.

Litman, T., R. Blair, B. Demopoulos, N. Eddy, A. Fritzel and D. Laidlaw. (2014). *Pedestrian and Bicycle Planning; A Guide to Best Practices.* Victoria: Victroria Transport Policy Institute.

Lusaka City Council (LCC). (2011). *Lusaka City Council Corporate Strategic and Operational Plan [2010-2015]*. Lusaka: Lusaka City Council.

Mercier, J. (2009). Equity, Social Justice, and Sustainable Urban Transportation in the Twenty-First Century. *Administrative Theory and Praxis*, 145-163.

Mitullah, W.V. and R. Opiyo. (2012). Mainstreaming Non-Motorised Transport (NMT) in Policy and Planning in Nairobi: Institutional Issues and Challenges. In: *The 31st Southern African Transport Conference,July 7-12, 2012*. Pretoria: Document Transformation Technologies, pp. 296-307.

Moody, M. (2012). *The Case for Transition to a Sustainable Transport System in Stellenbosch.* Masters Dissertation,University of Stellenbosch.

Morar, T. and L. Bertolini. (2013). Planning for Pedestrians: A Way Out of Traffic Congestion. *Procedia - Social and Behavioral Sciences* , 600-608.

Morar, T., V. Grecu and I. Costescu. (2013). Administration's Role in Managing Urban Pedestrian Accessibility. *Procedia - Social and Behavioral Sciences*, 594 - 599.

Mumford, L. (1955). *The Roaring Traffic Boom-III*. New York:The Sky Line.

Nachengwa, L. (1990). *A History of Public Road Transport in Lusaka, 1889-1987*.Masters Dissertation, University of Zambia.

Nair, P. and D. Kumar. (2005). Transformation in Road Transport System in Bogota: An Overview. *The ICFAI Journal of Infrastructure*, 20-28.

Nairobi City County Government (NCCG). (2015). *Non-Motorised Transport Policy:"Towards NMT as the Mode of Choice".* Nairobi: United Nations Environment Programme (UNEP).

Nantulya, V., M. Kheyesi and W. Odero. (2005). Urban Transport in Africa: Opportunities for Maximizing Intervention in Complex Systems. In G. Jornson, and E. Tengstrom, *Urban Transport Development: A Complex Issue.* Lund: Springer.

National Complete Streets Coalition. (2011). *Complete Streets.* [Online] Available at: www.completestreets.org. [Accessed 5 July, 2014].

Newman, P. (2003). Walking in a Historical, International and Contemporary Context. In: R. Tolley (ed),2003. *Sustainable Transport Planning for Walking and Cycling in Urban Environments*. Cambridge: Woodhead Publishing, pp. 48-58.

Njoh, A. J. (2007). *Implications of Africa's Transportation Systems for Development in the Era of Globalization.* St. Petersburg: University of South Florida.

Ogendi, J., W. Odero, W. Mitullah and M. Khayesi. (2013). Pattern of Pedestrian Injuries in the City of Nairobi: Implications for Urban Safety Planning. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, 849-859.

Pardo, C. F. (2010). *Sustainable Urban Transport.* [Online] Available at: www.//sustainabledevelopment.un.org.content/documents/shanghaimanual.pdf [Accessed 1 July 2014].

Parida, P., Najamuddin and Parida, M. (2007). Development of Qualitative Evaluation Methodology for Sidewalks in Delhi. *ITPI Journal*, 27 - 33.

Porter, G. (2007). Transport Planning in Sub-Saharan Africa. *Progress in Development Studies* , 251-257.

Puchera, J., N. Korattyswaropama, N. Mittala, and N. Ittyerah. (2005). Urban Transport Crisis in India. *Transport Policy*, 185-198.

Rees, W. (2003). Ecological Footprints and Urban Transportation. In R. Tolley, *Sustainable Transport:Planning for Walking and Cycling in Urban Environments.* Cambridge: Woodhead Publishing Limited.

Ribbens, H. (2014). Reducing Non-Motorised Transport Casualties in African Cities: A Multi-Sectoral Approach. Glenstantia: SARF/IRF .

Rietveld, P. (2000). Non-motorised Modes in Transport Systems: A Multimodal Chain Perspective for the Netherlands. *Transportation Research Part D* , 31-36.

Road Development Agency (RDA). (2013). 400 Kilometres of Lusaka City Roads to be Rehabilitated . *ROADS 6th Edition*, July - December 2012, p. 16.

Road Development Agency (RDA). (2014). Vandalism and Encroachment worries RDA. *ROADS* 10th *Edition*. Lusaka: RDA.

Road Development Agency (RDA). (2015). Vandalism of Road Furniture Worries RDA. *ROADS.* 12th *Edition*. Lusaka: RDA.

Savin-Baden, M., and C.H. Major. (2013). *Qualitative Research.The Essential Guide to Theory and Practice.* Abingdon,Oxon: Routledge.

Shamsuddin, S., N. Abu Hassan and S.I. Bilyamin. (2012). Walkable Environment in Increasing the Liveability of a City. *Procedia - Social and Behavioral Sciences* , 167 - 178.

Segway. (2015). *Fastest Hoverboard Segway of 2016*. [Online] Available at: http://www.hands-free-segway.reviews/self-balancing-scooter/guides/fastest-hoverboard-segway/ [Accessed 9 February, 2016].

Sietchiping, R., M.J. Permezel and C. Ngomsi. (2012). Transport and Mobility in Sub-Saharan African Cities: An Overview of Practices, Lessons and Options for Improvements. *Cities* , 183-189.

Simoonga, M. (2009). *Road Safety in Lusaka City and Community Approaches to Road Safety.* [Online] Available at: www.gtkp.com/userfiles/LCC%2520road [Accessed 18 May 2014].

Speck, J. (2015). *A Wonderful Clear Explaination of How Road Diets Work.* [Online] Available at: www.citylab.com/design/2015/08/a- wonderful-clear- explaination -of-how-road- diets- work/401951 [Accessed 1 September 2015].

Sub-Saharan Africa Transport Policy Program (SSATPP). (2005). *Non-Motorised Transport in African Cities Lessons from Experience in Kenya and Tanzania. SSATPP Working Paper No. 80.* Washington DC: World Bank.

Tenorio, G. S., and R. Dos Santos. (2009). Brasilia's Urban Mobility Plan: Review and Speculations - An Environmental Approach. In: *45th ISOCARP Congress, May 27-30,2009.* Brasilia: 45th ISOCARP Congress, pp. 1-12.

Tiwari, G. (2002). Urban Transport Priorities: Meeting the Challenge of Socio-economic Diversity in Cities, a Case Study of Delhi, India. *Cities*, 95-103.

Tiwari, G. (2002a). *Planning for Bicycles and Other Non Motorised Modes: The Critical Element in City Transport System.* Delhi: Indian Institute of Technology.

United Nations Environment Programme (UNEP). (2004). *Share the Road: Design Guidelines for Non-Motorised Transport in Africa.* Nairobi: Publishing Services Section, UNON.

United Nations Environment Programme (UNEP). (2010). *Share the Road: Investment in Walking and Cycling Road Infrastructure.* Nairobi: United Nations Environment Programme (UNEP).

United Nations Human Settlements Programme (UN Habitat). (2007). *Zambia: Lusaka Urban Profile. Participatory Slum Upgrading Programme in African, Caribbean and Pacific Countries.* Nairobi: UN-Habitat.

United Nations Human Settlements Programme (UN Habitat). (2009). *Strategic Citywide Spatial Planning: A Situational Analysis of Metropolitan Port-Au-Prince, Haiti.* Nairobi : Nairobi Global Land Network.

United Nations Human Settlements Programme (UN Habitat). (2010). *Planning Sustainable Cities UN-Habitat Practices and Perspectives.* Nairobi: UN-Habitat.

United Nations Human Settlements Programme (UN Habitat). (2013). *Planning and Design for Sustainable Urban Mobility: Global Report on Human Settlementss 2013.* Oxon: United Nations Human Settlements Programme.

United Nations Human Settlements Programme (UN Habitat). (2013b). *Streets as Public Spaces and Drivers of Urban Prosperity.* Nairobi: United Nations Human Settlements Programme (UNEP).

United States of America Federal Highway Administration (FHWA). (2004). *Accessible Sidewalks and Street Crossings — An Informational Guide.* Washington DC: United States of America Department of Transportation.

Urbanized. (2011). [Film] Directed by G Hustwit. Switzerland: Swiss Dot.

Wang,F., R. Zhangb, S. Dongb, and L. Liangb. (2011). Urban Planning and Design of Pedestrian Space from Perspectives of Fitness. *Procedia Engineering 21*, 363 – 367.

World Health Organisation. (2009). *Global Status Report on Road Safety: Time for Action.* Geneva: World Health Organisation.

Yin, R.K. (1994). *Case Study Research: Design and Methods (2nd Edition).* Thousand Oaks: Sage

Zambia Consumers Association (ZACA). (2007). *Exploring Practical Alternatives to Car Dependency in Lusaka City: Roads for People Project Zambia*. Kitwe: ZACA.

Zambia Green Jobs Project. (2016). Sustainable Housing Guidelines. Lusaka: Government Printers.

Zambia Institute of Policy Analysis and Research (ZIPAR). (2014). *Used Motor Vehicle Imports and the Impact on Transportation in Zambia:Working Paper No. 21* . Lusaka: ZIPAR.

Zambia Police Service. (2015). *2014 Annual Road Traffic Accidents Report.* Lusaka: Zambia Police.

Date:……

Appendices

Appendix A: Interview Guide –key informants

Personal Details

Name of Organization

Sex

Age

Educational Level

Occupation

Position

1. Is there provision for NMT infrastructure in your plans?(if no, then jump to Q3)
2. If yes, what NMT infrastructure have you provided for in your plans?
3. If no, then is there anything being done with regard to NMT infrastructure in the city?
4. Is there a policy or guidelines for NMT infrastructure/design in the City of Lusaka?
5. If so what does it say with regard to NMT infrastructure provision? (Get document if yes)
6. Does the design of roads in the City such as Burma Road expansion include Infrastructure for NMT?
7. What would be your comment on the state of NMT infrastructure in the City?
8. Why in your opinion is it so?
9. How do you rate the efforts towards NMT infrastructure provision by your organization?
10. Is there a budgetary allocation for NMT infrastructure in your budgets? (if no, jump to Q14)
11. If yes, how much has been set aside for NMT infrastructure in 2014? (Get document if possible)
12. How much was actually spent on NMT infrastructure in 2014?
13. How has it been in the last five years?
14. If no, why do you think it is like that?
15. What challenges, if any, does your institution face with regard to NMT

Infrastructure provision /support /facilitating/ funding within the city of Lusaka?

16. How can they be overcome?

17. Who are the key stakeholders for NMT infrastructure provision?

18. Is there any infrastructure for NMT on the selected roads?

19. If yes, what infrastructure is there?

20. If no, is it necessary to have NMT infrastructure in the city of Lusaka? (Justify answer)

21. Would you have an idea on when it was built?

22. In relation to your policies or standards, how do you rate the existing NMT infrastructure? (independence Road)

23. Are there any rehabilitation and/or maintenance plans?

24. If so, when is it going to be done and how much has been set aside for the same?

25. In relation to the standards provided, can the selected roads accommodate NMT infrastructure? (Justify answer)

26. If so, how and what do you propose to be done on the existing roads? (Road dieting, making car-free streets).

27. What measures in your opinion should be put in place to support NMT infrastructure development?

28. Personal general comments on NMT infrastructure provision in the city of Lusaka/what can be done

.**THANK YOU VERY MUCH FOR YOUR COOPERATION**

Appendix B: Interview Guide –NMT users

Name of Road/Avenue Date:

1	Name (Optional)			2 Sex:	Male	Female
3	Age (Years)	Below 18	18-36	37-55	56-64	0ver 65
4	Marital Status	Single	Married	Divorced	Separated	Others
5	Educational	No formal education	Primary	Secondary	Tertiary	

	Level		level	level	level	
6	Occupation	Formal employment	Informal employment	Domestic worker	Self-employed	Other
7	Mode of transport used	Walking	Cycling		Others Specify……	
8	Where have you come from?					
9	Where are you going?					
10	Is this transport mode safe and convenient for you?			Yes	No	
11	If your answer to question 10 is No, please explain what makes it inconvenient and unsafe for you?					
12	How long does it take you to reach your destination?					
	1-20 minutes	21-40 minutes	41-60 minutes	Over one hour		
13	What is the purpose of your journey?	Work	School	Shopping	Business	others
14	Do you face any problems as you use this walkway/cycle path/footpath?					
	Yes		No			
15	If yes to above, what problems do you face?					
16	If relation to question 11, how would rate the condition of this walkway, cycle path/footpath?					
	Excellent	Good	Satisfactory	Poor		
17	What do you suggest the Council can do to improve non-MT infrastructure in Lusaka City?					

Appendix C: Observation Guide

NAME OF ROAD

1	Footpath			
2	Walk ways			
3	Cycle ways			
4	Surface of NMT infrastructure	Paved	unpaved	Others(specify)
5	Street furniture			

	Benches
6	Impediments
	Plant outgrowths
	Hoardings
	utility boxes
	poles
	Service infrastructure
	blocking NMT such as
	ditch ,water leakage
	Others (specify)
7	Connectivity
8	Protection from
	weather agents
9	Safety of NMT users
	Street lighting
	Façade of adjoining
	wall fences
	Distance from ROW
	Others(specify)
10	Parking space
	Bicycle Rack
	Designated parking
	space for wheelbarrows
	Others