AN ASSESMENT OF NON-MOTORIZED AND PUBLIC TRANSPORT CHALLENGES FOR PEOPLE WITH DISABILITIES IN NAIROBI CITY

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DECLARATION

This Research Project is my original work and has not been presented for a degree in any other university

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This Research Project has been submitted for examination with my approval as the University Supervisor.

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

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DEDICATION

I dedicate this to all the Persons with Disabilities in Kenya who live with the challenges of access every day, and to all interested readers.

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The completion of this work has come as a product of hard work and would not have been possible without the support received from many people who merit my appreciation.

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ACRONYMS

ADA	-American Disability Act
AMACO	-African Merchant Assurance Company
AND	-Actions Network for the Disabled
APDK	-Association of Physical Disabled in Kenya
APEC	-Aviation Projects Engineering Company
APTAC	- Disabled Persons Transport Advisory Committee-British
AU	-African Union
AVA	-Association of Vehicles Assemblers
BRT	-Bus Rapid Transport
CAD	- Computer Aided Design
CBD	-Central Business District
CCN	-City Council of Nairobi
DETR	- Department of Transport Research- UK
DIFD	-Department of International Development-UK
ECMT	-European Conference of Ministries of Transport
EIA	-Environmental Impact Assessment
EMCA	-Environmental Management and Co-ordination Act
ERC	-Energy Regulatory Commission
ERSWEC	-Economic Recovery Strategy for Wealth Employment Creation
GDP	- Gross Domestic Product
GIS	-Geogrpighal Information System
GNP	-Gross National Product
ICT	-Information and Communication Technology
INTP	-Integrated National Transport Policy
ITF	-International Transport Forum
IUDMP	-Integrated Urban Development Master Plan
JICA	-Japan International Cooperation Agency
KABA	-Kenya Auto Bazaar Association
KARA	-Kenya Automotive Repairs Association

KDHS	-Kenya Democratic and Health Survey
KEBS	-Kenya Bureau of Standards
KEMNOD	-The Kenya Media Network on Disability
KENAS	-Kenya National Accreditation Services
KENHA	-Kenya National Highway Authority
KERRA	-Kenya Rural Roads Authority
KES	-Kenya Shillings
KIRDI	-Kenya Industrial Research and Development Institute
KNBS	-Kenya National Bureau of Statistics
KNCHR	- Kenya National Commissioning for Human Rights
KNSPWD	-Kenya National Survey for Persons with Disabilities
KRB	-Kenya Roads Boards
KUMPIA	-Kenya Used Motor Parts Importers Association
KURA	-Kenya Urban Roads Authority
LGA	-Local Government Act
LRT	-Light Rail Transport
MDG	-Millennium Development Goals
MOA	-Matatu Owners Association
MOR	-Ministry of Roads
MOTC	-Ministry of Transport and Communication
MOTI	- Ministry of Transport and Infrastructure
MWA	-Matatu Welfare Association
NCC	- Nairobi City County
NCPWD	-National Council for Persons with Disability
NGO	- Non-Governmental Organization
NMIMT	-Non-Motorized and Intermediate Means Of Transport
NMT	-Non Motorized Transport
NTSA	- National Transport and Safety Authority
OAU	-Organization of Africa Unity
PRM	-Persons with Restrictive Mobility
PSV	-Public Service Vehicle

PT	-Public Transport
PWD	-Persons with Disability
ROK	-Republic of Kenya
SACCO	-Savings and Credit Cooperative Organization
SAFCD	-South African Federal Council on Disability
SIDA	-Swedish International Development Agency
SME	-Small and Medium Enterprises
SPSS	- Statistical Package for the Social Sciences
TRB	- Transportation Research Board
TRRL	-Transport and Roads Research Laboratory
UN	-United Nations
UNCHS	-United Nations Center for Human Settlement
UNCRPD	-United Nation Convection on the Rights of Persons with Disabilities
UNDP	-United Nation's Development Program
UNESCO	-United Nations Educational, Scientific and Cultural Organisation
UNPK	-United Disabled Persons of Kenya
VAT	-Value Added Tax
WBI	-World Bank Institute
WHO	-World Health Organization
WPA	-World Program of Actions

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ABSTRACT

Improving access to Non-Motorized Transport (NMT) facilities and Public Transport (PT) for people with disabilities is a necessary element of attaining urban sustainable accessibility among the Persons with Disabilities (PWDs) in developing countries like Kenya. This report is based on a research study on the assessment of the Non-motorized and public transport challenges for persons with disability in Nairobi City. The study's main objective is to further the understanding of the challenges experienced by people with disabilities in accessing non-motorized transport facilities and public transport in Nairobi, and identify specific steps that can be taken to improve the situation.

The study covered Nairobi city county where data was collected through a stratified random sampling of 100 PWDs [Physical and visual] users of public transport from twelve activity [development] nodes connecting major public transport routes within the city. Data was also collected through in-depth interviews with major public transport service providers as well as key informants from different key institutions.

Premised on the urban mobility concepts and disability theories in understanding urban movements and social interactions of PWDs, the study seeks to dissect the different variable which determines the travel pattern of PWDs, the challenges they face and factors which contribute to these challenges. The analyses demonstrate that majority of PWDs in Nairobi city face serious challenges of access to the poorly designed NMT facilities e.g sidewalks, footbridges and crossings. Public transport service vehicles in Nairobi city are also designed with standards which reduce their accessibility by majority of PWDs; most of them are designed with narrow doors, steep steps without ramps and poor seating arrangements. The operation and management of public transport is also characterized by poor reliability, varying availability, high cost, and pitiable safety standards. These factors have been ascertained to affect the travel patterns and general livelihood of PWDs.

Poor NMT infrastructural network and public service have been attributed to weak policy and institutional frameworks that guide the operations within the transport sector. There is

lack of proper guidelines to ensure the design and provision of inclusive infrastructure and service that meets the requirements of PWDs is provided. There are also capacity gaps for key institutions dealing with issues of for people with disability in creating awareness and implementing structures for their rights and under the international obligations such as the United Nations Convention on the rights of Persons with Disabilities (UNCRPD) of 2006, Article 54 of constitution of Kenya 2010 and the Persons with disability Act 2003.

In conclusion therefore, there is a greater need to improve the level of access to NMT and public transport for persons with disabilities in compliance with their constitutionally granted rights. This study has provided a selected overview of progress that has been made and the gaps that still exists towards achieving improved access to NMT and public transportation for PWDs in Nairobi City. A generalized framework is suggested for describing the phase implementation of activities towards improving access for PWDs in Nairobi City. Some critical priorities for actors at various levels of development have been suggested with a view to benchmark with the international best practices. It is irrefutable that failure to respond to these needs on time will deteriorate the social efforts aimed at reducing the gap between the PWDs and the rest of the population.

Key Words: *Persons with Disability, Mobility, Access, Non-Motorized Transport, Public Transport, Planning and Policy.*

1. INTRODUCTION

*"**Mobility** is not just about developing transport infrastructure and services; it is about overcoming the social, economic, political and physical barriers to movement, such as class, gender relations, poverty, physical disabilities and affordability," says UN Under-Secretary-General and UN-Habitat Executive Director, Dr Joan Clos. "The right to equitable access is about empowering people to exercise their basic human rights to the fullest."*

1.1. Background of the study

Globally there has been progress in reducing barriers in the transport environment for PWDs over the last four decades, particularly in the U.S. and some European countries in response to strong advocacy. Even in these high income countries implementation has spread slowly and the overall impact often remains disappointing. The majority of low and middle income countries now also have disability policies that reflect reasonably advanced concepts of disability, based on the UN 1982 World Program of Action Concerning Disabled Persons (WPA) and 1994 Standard Rules on the Equalization of Opportunities for Persons with Disabilities (Standard Rules) (Metts, 2000). However, the reality is that meeting the needs of people with disability is still largely seen as a welfare issue in most countries and even basic good practice in meeting those needs is rarely recognized, let alone implemented. As a result, inclusive transport systems have generally not been given significant priority in planning, design and construction in developing countries.

According to the World Health Organization (WHO) (2011) global report on disability, disability affects 10% of every population. An estimated 650 million people worldwide, of who 200 million are children, experience some form of disability. Surveys conducted in 55 countries by the Disability Statistics Compendium show prevalence rates varying from 0.2% to 21%. It goes ahead to state that about 80% of the world's persons with disabilities (PWDs) live in low income countries where they experience social and economic disadvantages and denial of rights (WHO, 2011). Their lives are made more difficult by the way society interprets and reacts to disability. In addition to this, environmental barriers and poor policies exacerbate the impact of disability. Affordable urban transport is an important aspect to

economic and social well-being. It means the low-income earner can afford access to healthcare, household goods, education, work and social activities.

The United Nations estimates that between 6 and 10% of the population in developing countries has a disability – some 600 million people worldwide. The challenges faced by these people vary considerably but the shortage of reliable data makes it difficult to form a useful picture of the scale and nature of their needs. Indications are that, generally in low income countries, 40 to 50% of all persons with disability have sensory disabilities (including blindness, low vision, deafness, poor hearing and impaired speech); while 20 to 50% people have various physical disabilities, and in the order of 7 to 15% have cognitive disabilities (Venter et al., 2002).

The United Nations (UN) embraced the plight of persons with disabilities since the early 1970s. This culminated in the declaration by the UN of 1981 as the International Year of the Disabled. The UN further declared 1983-1992 as the United Nations Decade of Disabled Persons. In 2006, The United Nations Convention on the Rights of Persons with Disabilities (UNCRPWD) concluded, as part of Article 4 General obligations: "*That, Governments should undertake or promote research and development of universally designed goods, services, equipment and facilities, which should require the minimum possible adaptation and the least cost to meet the specific needs of a person with disabilities, to promote their availability and use, and to promote universal design in the development of standards and guidelines"*

The Convention includes, as part of Article 9 on Accessibility: "*To enable persons with disabilities to live independently and participate fully in all aspects of life, Governments shall take appropriate measures to ensure to persons with disabilities access, on an equal basis with others, to the physical environment, to transportation, to information and communications, These measures, shall include the identification and elimination of obstacles and barriers to accessibility*."

In Africa, the Organization of African Unity (OAU), now African Union (AU), declared 1999-2009 as the African Decade for Persons with Disabilities and strengthened its Secretariat mandated to monitor the progress of the implementation of issues related to persons with disabilities, among others.

In low- income countries disabled people are more likely to be poor than is the rest of the population. Case studies in a number of countries show that higher disability rates are associated with higher illiteracy, poor nutritional status, lower inoculation and immunization coverage, higher unemployment rates, and lower occupational mobility, among other characteristics, all largely as a result of lack of transport access and mobility challenges (Elwan, 1999). The livelihoods and economic opportunities of People with disability in developing countries are often worse because they are more likely to be excluded from services, social contact and community activities. This exclusion in turn leads to reduced social, cultural, educational and economic opportunities; thereby increasing the risk that people with disability will further fall into poverty. Such exclusion also imposes direct costs on society by reducing the economic and social output, not only of those with disabilities but also of those who care for them and whose productive employment may be reduced as a result (Metts, 2000).

The Constitution of Kenya defines disability as “any physical, sensory, mental, psychological or other impairment, condition or illness that has, or is perceived by a significant sector of community to have, substantial or long term effects on an individual’s ability to carry out ordinary day to day activities.”

The Overall disability rate in Kenya was 4.6% in 2007, which translates to 1.6 million people living with disability countrywide. Of this, the largest proportion was physical impairment (1.6%, or 554,440 people). Of these only 31% had access to mobility device in the urban areas while 42% had mobility assistive devices in Nairobi County (2007 KNSPWD.) Persons with disabilities are not a homogeneous group but are varied in terms of the nature of their disability and their mental, physical and social needs, and majority live in extreme poverty. According to the national population and housing census 2009, persons with disabilities constitute 3.7% of the population which translate to 1.3million Kenyans. The world health

organization and the Kenya Demographic and Health Survey (KDHS 2008/9) estimate that about 10% of Kenya's population has a form of disability.

The draft Integrated National Transport Policy (2010) recognizes transport sector as one of the critical enablers in achieving Vision 2030. An appropriate Integrated National Transport Policy (INTP) is the prerequisite towards attaining a world class transport system that is responsive to the needs of the people and the industry. The INTP was meant to enhance Kenya's development in terms of integrating production, marketing and population centers, hence facilitating mobility in rural and urban areas; national and regional integration; trade promotions, improving the overall welfare of the people and Kenya's competitiveness.

The Policy Paper, whose theme is "Transport for Prosperity", identifies a number of challenges inhibiting the transport sector from performing optimally its facilitative role in respect of national and regional economies. Among the most notable challenges that are of interest to this study, and informs the need for the study include lack of an Urban/rural Transport Policy and that transport system not fully integrated. The policy indicates that these challenges will be addressed through integration of transport infrastructure and operations as well as responding to market needs of transport. Other interventions will include the enhancement of transport services and quality, consumer protection, catering for consumers with special needs (where PWDs are included), ensuring fair competition, use and integration of information and communication technologies in transport development and operations. (Draft INTP, 2010)Among the most notable focus of the policy is the recognition of the need to eliminate impediments to development and use of non-motorized and intermediate means of transport (NMIMT) in order to enhance transport safety and security, develop and maintain a safe and secure transport system, sustainable utilization of the environment, integration of meteorological information as well as development of the requisite human capacity.

The study on master plan for urban transport in the Nairobi metropolitan area in the republic of Kenya, funded by Japan International Cooperation Agency (JICA) in 2006 analyzed the present and future conditions and demand of urban transport in the Nairobi Metropolitan

Area. It comprehensively covered the issues of transport including road, public transport, traffic management, institution, legislation, financing and urban environment.

The JICA report established an integrated transport Master Plan to the year 2025, including a Short-Term Plan for urgent projects to be implemented in the years 2006 – 2010 (Most of the projects e.g. the Nairobi western missing links have since been implemented and are socially inclusive to the demands of the special groups). The outcome of the study concludes that the established plans are technically, economically, environmentally and socially feasible and will contribute to the development of the Nairobi Metropolitan Area. These are very important government interventions towards stanching this exclusion.

1.2. Statement of the problem

Significant improvements to the physical accessibility of public transport are typically achieved only once legislative and regulatory frameworks for equality of access are in place. At this point a sufficiently large number of people with disabilities are usually economically empowered and mobile enough to effectively advocate for accessibility.

In Kenya, the first initiative directed at persons with disabilities can be traced back to 1946 when the Salvation Army Church established a program to rehabilitate men who had lost their sight during the Second World War. This program resulted in the establishment of Kenya's first school for the blind, marking the commencement of the provision of formal education for blind children in Kenya and East Africa. Other churches, including the mainstream Catholic, Presbyterian, Anglican and Methodist, later established schools and institutions for children with visual, hearing and physical disabilities in various parts of the country.

The Government of Kenya has acknowledged disability as a phenomenon that cuts across all spheres of society and which requires support from all sectors. The first post-independence education and manpower inquiry, the Ominde Commission set up in 1964, recognized the need for education and training in the disability sector. It recommended measures to address the Government's role in the coordination and improvement of service quality, one of which resulted in the Parliamentary Sessional Paper No.5 of 1968 on special education, which set

the pace for Government leadership in the provision and coordination of services for persons with disabilities.

In addition, disability mainstreaming has been included in various government departments' performance contracts. It is therefore incumbent upon every government institution to undertake the necessary steps to ensure that persons with disabilities are able to access goods and services and are given an opportunity to participate in the decision-making for and implementation of relevant policies.

The issues of the rights of persons with disabilities are slowly gaining prominence in the country. It was not until 2009 that disability was explicitly incorporated into the national census. The Constitution of Kenya, under the Bill of Rights, has underlined the rights of persons with disabilities and their entitlements. However, the built environments, including those in the roads sub-sector, hardly take into account accessibility for persons with disabilities. Buildings, roads, public transport, etc., are far from accessible to persons with disabilities. While designing roads, little or no attempt has been made to incorporate the concerns of persons with disabilities. Limited accessibility to roads for persons with disabilities hinders their mobility and positive interaction with the rest of society. Consequently, it confines these people to their homes and forces them to lead a life of dependency. This study, therefore responds appropriately to the existing policy requirements and proven traditional practices in the country. It provides the benchmarks for participation of persons with disabilities in the planning, implementation, monitoring and evaluation of urban transport improvement programs.

According to the policy statements and guidelines on mainstreaming cross-cutting issues in the roads sub-sector (March 2013) report, the segment of Kenya’s urban population that most critically needs basic community services such as public transport is the same segment that tends to have the least physical access to these services. In filling this gap, it is recommended on the report that the government should develop ways by which an inclusive approach is adopted in Kenya’s transport policy systems where Persons living with disability (PWDs) are able to take full advantage of low cost public transport services to enhance their mobility.

Accessibility and mobility are embedded in the development nexus in far-reaching ways. Field studies of mobility among Persons with Disabilities (PWDs) in urban areas with poor road access illustrate the frustrations they face and the impacts to the costs of living. Successive Kenyan governments have been largely unresponsive to the demand for public transport access especially to the Persons with Disability. The existing road infrastructure and public transport service in most areas have not been designed to reduce the stress and difficulties they face in their mobility. Unaffordable public transport denies vulnerable groups such as persons with disabilities these opportunities and exacerbates poverty. This is evident with the latest report from UN-Habitat indicating that majority of the urban poor spend at least 30% of their earning on public transport (UN-HABITAT, 2010).

When government has attempted to respond to this issue, the focus has tended towards the development of new motor vehicle transport infrastructure projects and in particular major road building programs in urban areas dubbed decongestion projects-Examples include the Construction of Thika superhighway, The Nairobi bypass Projects as well as the Nairobi Eastern and Western missing links[1] projects. In general, there has been a very poor government response to the continuing transport needs of the disadvantaged groups like Persons with disabilities, who constitute a critical labor force of Kenya's urban population. "

Opportunities for taking first steps towards accessibility for PWDs are often presented during upgrading or construction of large-scale mass transit systems in major cities. While incorporating facilities for PWDs to the universal (inclusive) design features on formal systems may contribute towards achieving accessibility, it is clear that this may not solve all mobility problems. It is also important to address the service provision by privately operated "Matatus"[2] or small buses – which are increasingly important as transport providers in Kenya.

[1] [*It is worth commending the Nairobi western ring roads, which has been designed and built with standards that meet the requirements of PWDs, based on the JICA guidelines*].

[2] *An Omnibus or minibus used in Kenya largely for public transport services.*

Urban transport is important to livelihoods of PWDs because large numbers of trips in urban areas are made for the purpose of reaching a workplace. If transport is inaccessible and costs are high, people are able to seek jobs only within a limited area. Accessible and lower transport costs allow them to look for job opportunities farther away from where they live, Therefore there is great need to evaluate the challenges faced by Persons with disabilities in public transport before recommending guidelines on the provision of transportation improvements for the disadvantaged, because the existing frameworks have not satisfactorily been responsive to their basic requirements for travel. Failure to respond to these needs will deteriorate the social efforts aimed at reducing the gap between them and the rest of the population. This Research intends to identify steps that can be taken to begin filling the gap in inclusive urban transport planning in Kenya and particularly, Nairobi City.

1.3. Purpose of Study

Kenya has no urban transport policy yet. As such, there is no clear decision as to which modes of transport and facilities the urban areas should encourage or provide. The Metropolitan Growth Strategy for Nairobi formulated in 1973 with a plan period of 30 years, was never fully implemented. Currently, the City of Nairobi, like most other urban centres lacks an urban development strategy that would serve as a focus for urban transport development. Thus, development of an urban transport policy should aim at developing an integrated, socially balanced and environmentally sound urban transport system in which all modes efficiently play their roles. Although the proposed Nairobi Metropolitan Region Bus Rapid Transit System and the development of a light rail for Nairobi and its suburbs under Vision 2030 are meant to address this problem for Nairobi, there is a need for an urban policy for all cities, towns and other urban centres that among many objectives addresses the accessibility to public transport needs of Persons with disabilities in the long term.

Disability is a relatively new area of discourse in many developing countries like Kenya. Figures on the incidence, typology, and mobility impacts of disability are therefore rarely available. Even though there have been various efforts in Kenya to determine the disability status through census and surveys by civil societies, NGOs and government, these efforts have not been conclusive. Lack of evidence-based data on the nature and extent of

disabilities as well as other factors that affect Kenyan PWDs has posed challenges in terms of planning for this segment of the population. (KNSPWD, 2007)

This study aims to further the understanding of the mobility and access to NMT and public transport issues experienced by people with disability in Nairobi, and identify specific steps that can be taken to improve the existing situation. The study seek to provide baseline information for the development of guidelines and standards for road public transport, so as to address the issues of accessibility challenges experienced by PWDs in Nairobi, as a platform for integration in the planning, design and implementation of the intended public transport improvement projects.

1.4. Research Objectives

1.4.1. General Objective

This study aims to assess the challenges experienced by people with disabilities in accessing non-motorized transport facilities and public transport in Nairobi, and identify specific steps that can be taken to improve the situation.

1.4.2. Specific Objective

i. Examine the travel environment of Persons with Disability (PWDs) in Nairobi City
ii. Identify key challenges experienced by PWDs in accessing non-motorized transport facilities and public transport services.
iii. Propose specific recommendations on the integration of disability sensitive urban public transportation guidelines for Kenya.

1.5. Research Questions

i. What is the current Non-motorized and Public Transport travel environment of Persons with Disabilities with respect to safety, accessibility, reliability and affordability?
ii. What challenges do PWDs face while travelling on non-motorized transport facilities and using public transport services?
iii. What are the factors that generate or propel the accessibility challenges to PWDs when using NMT and PT?
iv. What standard guidelines need to be put in place to guide stakeholders in addressing the challenges of PWDs access to NMT and PT?

1.6. Scope of study

The study will look in to the travel environment, patterns and behaviors of PWDs, the policy and institutional framework in transport system as well as challenges faced within the sub-sector with respect to PWDs.

The research will look broadly at current transport accessibility and mobility challenges of people with disabilities and the prospects for improving the same services in urban areas.

The study is restricted to NMT and urban public road transport within Nairobi City. The challenges of the specific needs of persons with disability in public transport will also be reviewed with regard to policy and institutional arrangement.

The study also limited to people with disabilities (Physical, and Visual) as a socially excluded group in transport planning and provision.

1.7. Justification and Significance of the Study

Much academic research on transport planning in Sub-Saharan Africa, and more so in Kenya, has concentrated on economic importance, Environmental factors and rather narrow technical engineering issues and upon roads per se with very little considerations on the social profiling and inclusion of different social groups. To be beneficial to a wide sector of the

country's population, transport planning also requires a detailed understanding of the social and political environments in which transport takes place and interventions are made

Going by the 2007 Kenya National Survey for Persons with Disabilities, the most prevalent disability is physical at 30% while 65% of persons with disabilities interviewed regarded the environment as a source of major barriers including poor road and transport systems. One of the major causes of disabilities and especially physical disabilities in Kenya is road accidents. According to the Global Status Report on Road Safety released on 11th June, 2010, approximately 1.7 million people die each year on the world's roads, and over 10 million sustain injuries, and about 70 percent of these in developing countries. The report also revealed that Kenya suffers the highest number of road fatalities in East Africa.

Half of the sustained injuries lead to permanent disabilities like amputation, paraplegia or even quadriplegia. These persons will require mobility aids like wheelchairs, crutches, artificial limbs etc. alongside other forms of support like rehabilitation and awareness creation to change attitude for them to reintegrate into society.

The Government of Kenya acknowledges disability as a phenomenon that cuts across all spheres of society and which requires support from all sectors. The Government and other stakeholders offer a wide range of services to persons with disabilities; however, these services have only reached a small percentage of the population and are unequally distributed among various disabilities.

The situation analysis report of 2010 related to the mainstreaming of crosscutting social issues, by SIDA/MoR, preceding the development of this policy statement, revealed that the roads sub-sector in Kenya has put in place limited measures or mechanisms to address the plight of persons with disabilities. This study, therefore, seeks to address the policy issues relating to persons with disabilities with respect to standards and guidelines.

In this research on assessing the non-motorized and public transport challenges of the persons living with disabilities, the study addresses some of the principal challenges faced by

PWDs - and gaps in policy and institutional arrangements – through transport planning from a social inclusion perspective, with particular emphasis on standards for infrastructure and service provision.

1.8. Assumptions on the Study

The research will be based on the following assumptions

- That people with disabilities are a socially excluded group in public transport policy and provision.
- That there will be an increased demand for public transport for the PWDs as well as an increase in the number of PWDs in Nairobi and other urban areas.

1.9. Operational Definition of Terms and Variables

Disability: Is an umbrella term, covering impairments, activity limitations, and participation restrictions. Impairment is a problem in body function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action; while a participation restriction is a problem experienced by an individual in involvement in life situations.

Disability is thus not just a health problem. It is a complex phenomenon, reflecting the interaction between features of a person's body and features of the society in which he or she lives. Overcoming the difficulties faced by people with disabilities requires interventions to remove environmental and social barriers.

People with disabilities have the same health needs as non-disabled people – for immunization, cancer screening etc. They also may experience a narrower margin of health, both because of poverty and social exclusion, and also because they may be vulnerable to secondary conditions, such as pressure sores or urinary tract infections. Evidence suggests that people with disabilities face barriers in accessing the health and rehabilitation services they need in many settings.

"Disability" according to disability act: means albinism, a physical, sensory, mental or other impairment, including any visual, hearing, learning or physical incapability, whether arising from natural or artificial causes, which is irreversible and long term and which

impacts adversely on a person's capacity to participate in the social, economic, cultural or political activities;"

"Persons with Disabilities" includes persons with albinism and those who have long-term physical, mental, intellectual or sensory impairments which, in interaction with various barriers, may hinder their full and effective participation in society on an equal basis with others; (The Persons with Disabilities Bill, 2012). **Person with Disability (PWD)** in this study shall mean any person with restrictive mobility (PRM) due to Physical or Visual impairment.

Urban Public Transport

Public transport (public transportation or public transit) is a shared passenger transport service which is available for use by the general public, as distinct from modes such as taxicab, carpooling or hired buses which are not shared by strangers without private arrangement.

Public transport modes include buses, trolleybuses, trams and trains, rapid transit (metro/subways/undergrounds etc) and ferries. Public transport between cities is dominated by airlines, coaches, and intercity rail. High-speed rail networks are being developed in many parts of the world.

For historical and economic reasons, there are differences internationally regarding use and extent of public transport. While countries in the Old World tend to have extensive and frequent systems serving their old and dense cities, many cities of the New World have more sprawl and much less comprehensive public transport.

In this Study, **Public Transport** shall mean only road public transport infrastructure and service (Matatu/Bus and Taxi)

Policy

A policy is a principle or rule to guide decisions and achieve rational outcomes. A policy is a statement of intent, and is implemented as a procedure or protocol. Policies are generally adopted by the Board of or senior governance body within an organization whereas

procedures or protocols would be developed and adopted by senior executive officers. Policies can assist in both subjective and objective decision making.

Transportation is an example of a domain governed by a variety of public policies, most of which are concerned with the safety of travelers.

Planning

A plan is a product of the process of planning which is an organized method by which things are to be done. In the transport context, a plan is a vision of the desired future condition, a set of objectives to achieve the vision, policies to regulate the transport system, strategies, actions and projects to implement the plan and a financial statement and budget. (GoK, INTP, 2010)

Werner (1985) states that Planning means to choose a set of goals and to identify a set of actions that will lead to realization of those goals. It includes taking inventory of the current situation because it is the current conditions that need to be acted upon to achieve the desired future situation described by goals. In particular planning includes the description of the relationship among the components of that situation. We can intelligently manipulate the current situation to reach desire situation only after understanding the web of interrelationship governing the said components planning always refers to some future scenario. In case of urban planning, the goals topically describe an urban area as it should be and as it should function in several years, Werner notes that like the provision of water, health and recreational places, transportation is one of the prominent objectives that makes up the broad goals of the plan.

Access

Black J. (1981) state that accessibility is the concept, which combines the geographical arrangement of land, use and the transport that serves these lands uses. **Accessibility** is a description of how conveniently land uses are located in relation to each other, and easy or difficult if it is to reach them via the transport network. When many land uses are closely placed, and the transport connectivity is high, we talk of high accessibility. Whereas when

activities are located far apart with poor transport connectivity, the result is poor accessibility. As such accessibility is a function of geographical location and activity sites. Accessibility therefore provides a measure of the performance of the land use transport system. Residents are primarily interested in accessibility to schools, job opportunities, shops, health services, leisure and recreational activities. Similarly retailers are concerned about accessibility to customer while industrialists rely on accessibility to labor markets and to suppliers of material. (Black 1981 and Werner 1985)

Mobility

Refers to the movement of people and goods. This recognizes both automobile and transit modes, but still assumes that movement is an end in itself, rather than a means to an end. It tends to give little consideration to non-motorized modes or land use factors affecting accessibility.

Mobility versus Accessibility

Mobility is defined as the ability to travel faster.

Mobility is improved by making travel faster and more convenient. (WBI, 2014)

Accessibility is defined as the ability to reach desired destinations or activities. Accessibility can be viewed as a combination of *mobility* and *land use patterns*. Accessibility can be impro ved in the following ways:

• Transportation investments that improve mobility

• More compact land use patterns that locate origins and destinations closer together.

People do not travel for its own sake, but to engage in activities, such as employment, educati on, recreation e.t.c. For this reason, accessibility is more important than mobility. (WBI, 2014)

2. LITERATURE REVIEW,

2.1. Introduction

This Chapter reviews literature that focuses on the subject matter by giving broad understanding of the topic. The literatures are reviewed in sections and are relevant to the wider objectives of the research.

Section 2.2 to 2.4 reviews the issues of urbanization, urban development, transportation and transport development. Section 2.5 and 2.6 reviews the literature on urban mobility theories and the public transport in Kenya. Section 2.7 dwells in focus with the urban public transport in Nairobi and the challenges. Disability being the main item in the research is reviewed in section 2.8 with section 2.9 focusing mainly on disability in Kenya and Nairobi in particular. Sections 2.10 and 2.11 discuss the Policy and Legal frameworks of transportation in Kenya and the institutional framework respectively. The conceptual framework of the study is then discussed in section 2.12.

The review the standards Road Passenger vehicle body construction specifications in Kenya is and the international best practice in accessible public transportation for persons with disabilities is dedicated for Chapter 3 of this report due to its special facet on this study report.

Accessible transport is about making transport systems and services easier for people to use. Everybody has limitations to their capabilities. If using a transport service requires them to perform an action that they are not capable of doing, then that service is not available to them. The barriers that may limit access can be physical (climbing steps, walking distances, lifting weights); sensory (reading a destination on a bus, hearing a public announcement); cognitive (identifying which bus to board, or finding the way to the platform or departure gate); and financial (paying the fare). The barriers may also involve having information that a service exists, or knowing how to use it. Other barriers can involve being deterred by operation personnel who are unhelpful or unfriendly, or policies that bar certain groups of travelers, usually on grounds of safety.

Accessibility can be improved by removing the feature that creates a barrier for a particular group of people. Removing steps from a system can make the system accessible to people using wheelchairs; easier for people who can walk but have difficulty with stairs; and assist people with luggage, baby buggies or shopping trolleys. Reducing the height of steps can make a system accessible to people who can walk, but with difficulty, but does not make it accessible to a passenger in a wheelchair. Improving accessibility for people with mobility limitations can make the system easier for everyone to use, provided the improvements are based on the principles of universal design.

Thus it is necessary to consider the types of impairment or disability experienced by particular passengers, and the barriers that the system creates for people with those impairments.

The European Conference of Ministers of Transport comments that "Accessibility is increasingly recognized as a key element of a high-quality, efficient and sustainable transport system. Indeed all of us as users of the transport system benefit from easier access to buses, trams, trains, planes and ships. The economic benefits of better accessibility for transport operators and service providers are also becoming progressively clear." (ECMT, 2006). Such thinking underpins the concept of universal or inclusive design, which is to make systems and products easy to use for as many people as possible. Litman, (2007a) in his argument on Planning and Design for Sustainable Urban Mobility argues that the development of sustainable urban transport systems requires a conceptual leap. The purpose of 'transportation' and 'mobility' is to gain access to destinations, activities, services and goods. Thus, access is the ultimate objective of transportation. As a result, urban planning and design should focus on how to bring people and places together, by creating cities that focus on accessibility, rather than simply increasing the length of urban transport infrastructure or increasing the movement of people or goods.

2.2. Urbanization and Transport Development

The genesis of urbanization can be traced to the Mesopotamia in the valleys of the Euphrates and Tigris Rivers; also it has been in existence for over 5000 years before Christ. It has over the time becomes a notable and inevitable demographical issue in the twenty-first (21st) century; not only in Kenya, but also all over the world. Of great importance is the fact that, major redistribution of population in most African countries is a response to rapid urbanization; and at a time when the economic performance or status of most of these countries is generally staggering or in the state of collapse (Mabogunje, 1991; 2002; Ayeni, 2001). Though, the pace and ability to manage the process of urbanization varies between countries and regions, but virtually most countries in the developing economy have been experiencing urbanization in the past four decades.

Dimitriou, (1992) in his view about transport and the third world cities defined urbanization as the process whereby a settlement's land use and the activity patterns of inhabitants shift from dependence on a rural-based economy to a predominantly urban one. It should however be noted that urbanization forms one of the most powerful realities of the twenty-first century. For instance the UNDP, (1996) viewed it as the real strength behind economic and development of many cities of the world. In other words, urbanization is one of the indicators of rapid economic and social changes or paradigm that most societies are passing through as a reflection of national or city progress. To Johnston, et al (1986) it entails absolute and relative growth of towns and cities within a defined area, usually a country.

Interestingly, discussions on urbanization have witnessed various views on what it entails and consequences in most developing countries (Mabogunje, 1968; Ayeni, 1978 and 2001; Bourne, et al, 1984 and Pacione, 2002). It is however pertinent to ascertain the fact that, in an age of rapid globalization, urbanization erodes primordial identities and loyalties. Similarly, it creates new grouping and factors that promote exclusivity in cities. Based on this fact, transportation planning and city management literature has been increasingly concerned with the implication of the relationship between city livelihoods and level of urbanization on the process of development of individual, the nation and specifically the Third World countries generally.

It is argued in literature that, if development correlate with urbanization as observed in the industrialized countries, then factors responsible for urbanization in all regions ought to be similar if not universal. This implies that, the level of urbanization attained by developed countries before being referred to as industrialized, ought to have been attained by developing countries. Studies have, however, revealed that the situation in developing countries is different and more complicated when examined from the perspective of urban service delivery and city satisfaction (Aprodicio, et al; 2007).

An issue that arises over the disparity of urbanization in developing and developed countries is that, the factors underpinning urbanization process within the global context are not necessarily the same and thus the implications of urbanization are likely to be different.
As a corollary to this premise, if cities are not well planned and basic services are not delivered and managed efficiently to benefit all urban residents, their economic and social transformational roles cannot be optimized and their positive effects and impact on economic and social development will not be realized. To enhance a better understanding of these views; specifically as it relates to effects of urbanization on transport infrastructure planning and management, particularly; public transportation problems, it is pertinent to review general highlight of urbanization.

It is worth noting that, urbanization is one of the most remarkable issues of the twentieth century and a major challenge to scholars and policy makers; particularly in developing countries. This stem on the prevailing urban problems of housing, infrastructure, transportation, environmental sanitation and pollution, etc., that rose to a very high and sometimes unmanageable extent. Ayeni, (2001) posited that, twentieth century was the time when almost all the world came to accept urban problems as a “normal” way of life.
Regardless of this, views about urbanization have constantly been dynamic over the years.
For instance, some portrayed cities as parasitic, unproductive and centres of mass consumption and wastage; while some view cities as centres of great civilizations, job creation and for the promotion of good values and places for efficient and effective provision of services (UNCHS, 1996). In actual fact, city can be viewed as meeting point for people

from diverse cultural, racial and religious backgrounds; a place where people struggle for scarce economic resources as well as political stability or power. Cities remain focal points of country's economy where people come together primarily to exchange goods and interact. They are however, "drivers" of societal development, not simply bricks or mortar; cities are usually places of dreams, nostalgia and imaginations. It should be noted that, the heterogeneity of urban settings for instance Nairobi, partly makes it an overcrowded and attractive location for societal mishaps.

Three concepts of urbanization that forms the bedrock of analytical studies of urban development and management and which provides frameworks for evaluating the role of cities and urban services in the development process of individuals are:

(i) The behavioural View

(ii) The structural Analysis, and

(iii) Demographical interpretations of urbanization.

Wirth, (1938) the pioneer of the concept of urbanization views it as a behavioural process and argued that urbanization is concerned with changes in experience and associated patterns of behaviour that individuals go through over time. Similarly, Chile, (1964) pointed to the fact urbanization is a structural process whereby structural changes take place in the activities of the whole population as well as the economy in which they engaged. This idea focus on the migration of people from rural or agricultural regions into urban or non-agricultural locations as reflection of increasing economic specialization and advancement in technology.

The third concept of urbanization as explained by Lampard, (1955) who sees urbanization as an important demographic process whereby the process of population concentration becomes a way of ordering a population to attain a certain level of subsistence in a given environment. These views give rise to different explanations of urbanization and what cities and central places are. However, they portray urbanization as a complex process that manifests in various dimensions. This fact gave rise to various disciplines to be interested in the concept of urbanization as an important determinant or indicator of sustainability of cities.

The point that can be deduced from the foregoing views is that, urbanization is a process of concentration of the population in large number in an urban centre and transformation of the society involving migration and economic changes. It is however, a settlement process in which a new set of settlement and activities patterns emerge as a result of shifts in sectoral economy and changes in intra-sectoral composition of the economy. It is pertinent to note that, the growth of city population through natural increase alone is not a process of urbanization, however; the increase in the proportion of the population located in urban centres due to these factors of natural increase, migration and area expansion (Oyesiku, 1998). It is of great importance to note that, the advantage of concentration in urban area in relation to urbanization is based on the notion that new activities spring-up urban areas.

Industrial activities and services are localized due to changes in production modalities. This economic rationale in relation to economies of scale and the need to earn a living forces activities to be concentrated in cities. From the foregoing, it is obvious that spatial concentration of people and associated economic changes lead to economic development of cities and individuals. It's the economic change that necessitates economic development and city growth or productivity. It should however be mentioned that, the unguided population increase have resultant effects on every sectors of the county. For instance, the possibility of achieving sustainable livelihoods in urban areas cannot be attained without or in the absence of efficient infrastructural services in which transportation forms the connecting rode. In other words, the rate and unguided urbanization in Nairobi as in other developing cities have eaten deeply the fabric of the city and thus making sustainable livelihoods a dream. (UN-Habitat, 2003)

2.3. Urbanization and Transport in Kenya

Urban mobility problems have increased proportionally and in some cases exponentially, with urbanisation; a trend reflected in the growing size of cities and in the increasing proportion of urbanised population. Since 1950, the world's urban population has more than doubled, to reach nearly 3.16 billion in 2005, about 48.7% of the global population.

Kenya is known to have a long history of urbanization, but the process is not inimical to development of the country, it is the rate that has been too rapid to allow for steady and progressive socio-economic development of the country. Its effect on transport infrastructure and services has led to uncontrolled development in most Kenyan cities and urban poverty. (APEC, 2012)

According to 2009 census, among the 38.6 million populations of the country urban centers accommodates around 11.6 million of which 3.133 million is from Nairobi. Thus urban population constitutes 29.90% of the total population. When the capital city Nairobi is excluded from the population, urbanization stands as 21.79%. The urban centers constitute three cities and forty three municipalities. In addition to that, there are another 238 urban centers comprising town councils and other towns. (LGA, Repealed)

Nairobi City alone accounts to 27.14% of the total urban population according to 2009 census. According to the County Governor Evans Kidero, traffic jams cost the City County approximately Ksh 50 million daily in fuel consumption, manpower time wasted and cancelled business appointments. The county is estimated to lose 37 billion shillings annually in terms of productivity, pollution and fuel. These jams have had an effect on business. Companies are now moving out of the CBD to less congested locations such as Upper Hill, Kilimani, Ngong road, Westlands and Gigiri, citing ease of access as the main reason for moving out. It is thus expected that with this trend of heavy traffic, there will be decreased demand and pricing in potentially prime areas in the CBD which have the highest concentration of new buildings. This will discourage potential tenants as well push old ones out with devastating results for developers.

Over the years, there have been many studies and reports with recommendations relating to the traffic situation in Nairobi conducted from as early as 1973, ten years after independence. These studies commissioned by various government agencies and funded by varied development partners are listed in the following **Table 2.1.**

Table 2.1: Previous Studies and Reports Relating to Nairobi Transport

No.	Title	Agencies/Donors	Year	Purposes	Relevance to the Study
1.	Nairobi Metropolitan Growth Strategy	Nairobi Urban Study Group/ City Council of Nairobi/United Nation	1973	Master plan for land use and transport for 2000	Present land use
2.1	The Nairobi Bypass Construction Project Feasibility Study	Ministry of Transport and Communications / JICA	February 1988	Feasibility study of Southern Bypass to divert through traffic on the A104 and traffic on the other roads to the Bypass and then to solve the traffic congestion in the main streets of Nairobi	Southern Bypass
2.2	The Nairobi Bypass Project, Detailed Design Study	Ministry of Transport and Communications/ JICA	September 1992		
3.	Actions Towards a Better Nairobi, Report And Recommendations of the Nairobi City Convention	Nairobi City Convention/ The Friedrich Naumann Foundation	1993	Plan of all sectors in Nairobi City for improvement	Missing Links etc.
4.	A Road Network Development Master Plan Study	MOPW&H/JICA	May 1995	Master plan for development of road network in Kenya in 2013	Southern Bypass
5.1	Kenya Urban Transport Infrastructure Project (KUTIP) (The project was suspended by World Bank.)	World Bank/ Ministry of Local Government	July 1996	[Staff Appraisal Report] Increase economic efficiency of the urban road network and build sustainable road maintenance capacity for Nairobi and 25 urban centres and 22 secondary towns. Study for a long-term land use and traffic demand for Nairobi	NMT
5.2	KUTIP Nairobi: Long Term Transport Study, Stage I	World Bank/ MOLG	January 1999	Master plan for urban transport in Nairobi under KUTIP (uncompleted)	
5.3.	KUTIP Final Engineering Report for Non-Motorized Transport (NMT)	MOLG/WB	November 2001	NMT study in Nairobi	

No.	Title	Agencies/Donors	Year	Purposes	Relevance to the Study
	Works in Nairobi (under KUTIP)				
6.	Strategic Review; Kenya Road Sector	DFID/EU/KfW/SIDA/ WB	May 2002	Strategic review for road sector institution with KRB	Organisation
7.	Urban Mobility In Three Cities-Scoping Study: Addis Ababa, Dar-es Salaam and Nairobi	World Bank	October 2002	[SSATP Woking Paper No.70] Comparing study for urban transport in three cities	Public Transport
8.	Assessment of the Non-Motorized Transport Program, Kenya and Tanzania	World Bank	Nov 2002	[SSATP Woking Paper No.71] Assessment of pilot projects of NMT undertaken in 1995 to 99 in Kenya and Tanzania	NMT
9.	Kenya Transport Sector Memorandum	World Bank, DFID, EU, KfW, SIDA	January 2003	Review of present transport sector for appropriate infrastructure strategy and policy direction	Organisation
10.	Road Sector Review and Stock Take Conference	Kenya Road Board	May 2003	Workshop report	Organisation
11.	Kenya Road Concession Framework	MRPW/World Bank BSK Group	Novembe r 2003	Concession study for northern corridor road construction including Southern Bypass	Southern Bypass
12.	Recommendations on Integrated National Transport Policy, Moving a Working Nation	The National Transport Policy Committee, Ministry of Transport and Communications	February 2004	Transport policy	Transport Development Policy
13.	Kenya Transportation Policy and Roads Sub-Sector Policy and Strategy	KRB/ EDF, Scott Wilson	March 2004	Coordinating policy papers for GOK and donors To advance the process of policy and strategy formation and implementation for the road sub-sector in Kenya To summarise the core issues, describe the rationales behind the policies, the main requirements for implementation, and the	Transport Development Policy

No.	Title	Agencies/Donors	Year	Purposes	Relevance to the Study
				assumptions	
14.	Northern Corridor Road Transport Improvement Project	Road Department MORPW&H/Ministry of Transport and Communications	April 2004	[Staff Appraisal Report] Increase efficiency of road sections in the Northern Corridor, Roadside amenities and HIV/AIDS Mitigation, Private sector participation in road management and maintenance, road safety improvement, institutional strengthening in the road sectors and TA	Southern Bypass
15.	Master plan Study Report for Urban Transport in the Nairobi Metropolitan Area	Ministry of Roads & Public Works/JICA	2006	Study to come up with a Master plan for Urban Transport.	Urban Transport
16.	Mass Rapid Transit study	Ministry of Transport/ADB.	2009	Study identified the nine corridors and the implementation schedule. BRT from Airport is under design by GOK; funding provided by world bank to implement project. NUTRIP.	BRT from the Airport
17.	PSV Demand Termini capacities and compliance level with TLB Regulations in Nairobi Metropolitan Area.	Ministry of Transport/`	2012	To identify the routes, their capacities and the compliance levels with the regulations.	PSV's.
18.	Harmonization Study by HB GAuff Ingenieure.	Ministry of Transport	2014.	In process of harmonizing MRTS along the Jogoo Road Corridor as well as the greater Nairobi Metropolis.	MRTS

Source: TUDC interim report, 2014

Recently, some implementation of short term strategies has started. According to Nairobi County Governor Evans Kidero; *"Everything is going in order and the integrated security and traffic control system will be one of many solutions toward addressing the city's traffic gridlock. The solution to solving traffic chaos lies in embracing technology as is the practice in developed countries."*

2.4. Growth Rate of Population

Growth rate of population of Kenya and Nairobi County is analyzed for the periods of 1979, 1989, 1999 and 2009. Like many other cities in developing countries, Nairobi has experienced very rapid population growth in the last 30-40 years. **Table 2-2** illustrates this trend in population growth. At a population growth rate of 4.7-4.8% annually, the population of Nairobi grew from about 0.8 million in 1979, to 2.1 million in 1999 and 3.1 million in 2009. This is indeed a very high rate of population growth rate compared to an average of 3.4% annually for cities in developing countries and 1.8% for the world urban growth rate. (Omwenga, 2011)

Table 2.2: Population of Kenya and Nairobi County

Population Classification	***Population, '000***				
	1969	**1979**	**1989**	**1999**	**2009**
Kenya	10, 943	15, 327	21,445	28,673	38,600
Nairobi Province	509	828	1,325	2,397	3,133

Source: Statistical Abstract 2011

Growth rate of population of Kenya during the census period 1989 to 1999 was 3.4% per annum and reduced to 2.9% in the next census period. Same trend is not observed in the Nairobi County where growth rate of population is keeping at the same level of 3.1% per annum. The population projection for the Nairobi city is given in **Table 2-3**. The city population is projected to hit 5 million people in 2020 and 6 million people in 2025.

Table 2.3: Nairobi City Population Projection

Year	***2000***	***2010***	***2020***	***2025***
Population Size	2, 233, 000	3, 363, 000	4, 881, 000	5, 871, 000

Source: Omwenga, 2011

Housing and Demographic Characteristics

Over 50-60% city population live in low income and informal settlements. The monthly household income among Nairobi's urban poor ranges from US$ 65 to US$ 78 with a disposable income of $4 to $17 (Cities Alliance, 2002). The level of income is indeed low considering the per capita poverty line of 1 US$ per day. (Omwenga, 2011)

2.5. Theoretical concepts of Urban Mobility

Rapid urban development occurring across much of the globe implies increased quantity of passengers and freight moving within urban areas. Movements also tend to involve longer distances, but evidence suggests that commuting times have remained relatively similar through the last hundred years, approximately 1.2 hours per day. This means that commuting has gradually shifted to faster transport modes and consequently greater distances could be travelled using the same amount of time. Different transport technologies and infrastructure have been implemented, resulting in a wide variety of urban transport systems around the world. In developed countries, there have been three general eras of urban development, and each is associated with a different form of urban mobility: (J.P Rodriguez et al, 2010)

- The walking/horse- car era (1800-1890)
- The Electric street car or transit era (1890-1920s)
- The automobile era (1930s onwards)

In many areas of the world where urbanization is more recent, the above synthetic phases did not take place. In the majority of cases fast urban growth led to a scramble to provide transport infrastructure, often in an inadequate fashion. Each form of urban mobility, be it walking, the private car or urban transit, has a level of sustainability to fill mobility needs. Motorization and the diffusion of personal mobility has been an ongoing trend linked with substantial declines in the share of public transit in urban mobility.

2.5.1. Types of Urban Mobility

Movements are linked to specific urban activities and their land use. Each type of land use involves the generation and attraction of a particular array of movements. This relationship is complex, but is linked to factors such as recurrence, income, urban form, spatial accumulation, level of development and technology. Urban movements are either obligatory, when they are linked to scheduled activities (such as home-to-work movements) or voluntary, when those generating it are free to decide their own scheduling (Such as leisure). The most common types of urban movements are as in **Table 2.4**

- **Pendular**: These are obligatory movements involving commuting between locations of residence and work. They are highly cyclical since they are predictable and recurring on a regular basis, most of the time a daily occurrence, thus the term pendulum.
- **Professional**: These are movements linked to professional, work-based activities such as meetings and customer services, dominantly taking place during work hours.
- **Personal**: These are voluntary movements linked to the location of commercial activities which includes shopping and recreation.
- **Touristic**: These are important movements for cities having historical and recreational features. They involve interactions between landmarks and amenities such as hotels and restaurants. They tend to be seasonal in nature or occur at specific moments. Major sport events such as the World Cup or the Olympics are important generators of urban movements.
- **Distribution**: These are movements concerned with the distribution of freight to satisfy consumption and manufacturing requirements. They are linked to distribution centers and retail outlets.

Table 2.4: Types of urban movements

Movement type	*Pattern*	*Dominant time*	*Destination*
Pendular	Structured	Morning and afternoon	Localized (employment)
Professional	Varied	Workdays	Localized
Personal	Structured	Evenings	Varied with some foci
Touristic	Seasonal	Day	Highly localized
Distribution	Structured	Night-time	Localized

Source: Rodrigues et al (2010)

The consideration of urban movements involves their generation, the modes and routes used and their destination:

1. **Trip generation**: On average, an urban resident undertakes about three or four trips per day. Moving in an urban area is usually done to satisfy a purpose such as employment, leisure or access to goods and services. Each time a purpose is satisfied, a trip is generated. Important temporal variations of the number of trips by purpose are observed.

2. **Modal split:** Implies which transportation mode is used for urban trips and is the outcome of a model choice. Modal choice depends on a number of factors such as technology, availability, preference, travel time and income.
3. **Trip assignment:** Involves which routes will be used for journeys within the city. For instance, a commuter driving a car most of the time has a fixed route. This route may be modified if there is congestion or if another activity (such as shopping) is linked with that trip: this if often known as trip chaining. Several factors influence trip assignment, the two most important being transport costs and availability.
4. **Trip destination**: Changes in the spatial distribution of economic activities in urban areas have caused important modifications to the destination of movements, notably those related to work. The central city used to be a major destination for movements, but its share has substantially declined in most areas and suburbs now account for the bulk or urban movements.

The share of the automobile in urban trips varies in relation to location, social status, income, quality of public transit and parking availability. Mass transit is often affordable, to several social groups, such as students, the elderly, PWDs and the poor are a captive market. There are important variations in mobility according to age, income, gender and disability. The so-called disability gap in mobility is the outcome of socio-economic differences as access to individual transportation is dominantly a matter of income and physical ability. Consequently, in some instances modal choice is more a modal constraint linked to economic opportunities.

In central locations, there are generally few transport availability problems because private and public transport facilities are present. However, in locations outside the central core that are accessible only by the automobile, a significant share of the population is isolated if they do not own an automobile. Limited public transit and high automobile ownership costs have created a class of spatially constrained (mobility deprived) people. They do not have access to the services in the suburb, but more importantly to the jobs that are increasingly concentrated in those areas.

2.6. Urban Public Road Transport in Kenya

The public transport system in Kenya is basically provided by privately owned and operated vehicles whose ownership structure is atomized. The Matatu vehicles dominate the commuter transport in Kenya, especially in urban areas. The term Matatu is derived from a local Kikuyu vernacular word "*Mang'otore Matatu"*, which literally means "thirty cents' that was the standard charge for every trip made in the 1970's. They started operating as pirates to fulfill demand that could not be met by the then franchised public transport system. On entry informally, they were initially resisted by the public transport operators and the transport regulatory authorities but were eventually formally allowed to operate by a presidential decree in 1973 without formal regulatory provisions put in place to govern their operations. Subsequently, attempts to organize them through various policy formulation and implementation have not been successful.

Over time, the Matatu industry grew rapidly and by 2003, the number of Matatus operating in both urban and rural areas was estimated at 40,000 (Asingo, 2004). They provided employment to nearly 160,000 persons and generated vast revenue for the Government in the form of charges for licenses, duty, VAT and other taxes. In addition, the industry plays a leading role in transportation of both persons and goods in both rural and urban areas.

The Kenya Government continues to seek solutions to what many see as Kenya's chaotic para-transit sector through policies and directives. The latest policy notice aimed at streamlining the sector was a directive to the "matatu" operators to belong to either a Savings and Credit Cooperative Organization (SACCO) or company as a condition to renewal of their operating licenses. Also, a three month time frame was given to the operators owning lower capacity vehicles to move to higher capacity. The questions to be answered are: to what extent and in what ways has the government directive mandating SACCO/company membership brought about greater order in the matatu sector, and what are the emerging problems that need stakeholders' attention?

Unfortunately, the industry's vast growth was accompanied by increasing road traffic accidents that have threatened the safety of Kenyan travelers. The causes of accidents include reckless driving, non-roadworthy vehicles and the poor conditions of the roads. In October 2003, the Ministry of Transport and Communications listed Legal Notice No. 161 that sought to regulate the Public Service Vehicle (PSV) sub-sector. The objectives of the Legal Notice were to: reduce accidents caused by over speeding; enhance the safety of commuters; ensure responsibility, accountability and competency of drivers, conductors; eliminate illegal drivers, conductors and criminals that had infiltrated the industry; facilitate identification of vehicles and restrict their operation to authorized routes (MoTC, Transformation of Road Transport Report, 2004).

As a result of implementation of the provisions of Legal Notice No. 161, cartels have been eliminated or reduced and the new measures have reduced illegal groups and placed management of PSVs in the hands of their owners. New investors are coming into the industry owing to the conducive business environment that has been created. For example, only two companies, Blue Shield Insurance and United Insurance provided insurance cover to Matatus. Following the reforms, two other firms, Africa Merchant Assurance (AMACO) and Lion of Kenya have started insuring PSVs. This encouraged risk adverse investors to venture into the Matatu business and public sector business through lowering the entry barriers and improving administration. New entrants included Express Connection and Citi Hoppa. These new modes of transportation are safer, reliable and are associated with good service quality but have not adapted to international accessibility standards for Persons with disabilities and do not guarantee cheaper fares.

A defining characteristic of these services is that they are typically provided by a large number of individual owners or operators who hire/rent the vehicles on a daily basis and hence have to guarantee the daily income to the owners before generating income for them. The vehicles operate on relatively flexible routes and schedules, and authorities often have very little regulatory control over them.

While some vehicles have relatively low floors and are easy to enter and exit, others are harder to board or alight due to an absence of steps, handrails and narrow doors. Major problems exist around the way they are operated – fiercely competitive operating conditions often leads to overloading and to a refusal to stop for disabled people due to a perception that they will prolong boarding time, and to speeding and unsafe driving habits. However, the informal nature of this mode also means that some drivers are willing to go out of their way to serve passengers with particular needs, especially if they have built up a relationship with them.

It is precisely the informal nature of mini/midibus operations that makes them difficult to improve–vehicles are often second-hand and governments in practice have little control over their specifications.

2.7. Public Transport Condition in Nairobi

Some of the major transport problems and challenges identified in the INTP in the city include –

- inadequate integration of city development planning
- poor integration of the transportation network system,
- inadequate public transport system to meet the rising travel demand,
- long commuter distance and travel time,
- high cost of transport compared to low level of income,
- inadequate development of non-motorized infrastructure network,
- poor safety and high incidence of motor traffic accidents,
- Increased pollution and deterioration of the urban environment.

2.7.1. Inadequate Integration of City Development Planning

The city of Nairobi has not received adequate attention in respect to having a long term plan or master plan. The last master plan for Nairobi was prepared in 1948. Considering the massive growth in the population and spatial size of the city, the development of the city has not been effectively planned and integrated.

In 1973, the city council prepared a city study report. This study report was partially adopted but never led to effective planned development. This means that the city transport system has not been well planned and integrated into the overall city growth and development structure.

Efforts to prepare updated long term plans and/or master plan for the city has not borne fruit. At the moment the city council has made attempts to prepare short term plans for only certain pocket areas of the city.

The result is that today the city development and growth is not integrated with the city transport system. The city experiences transport challenges in respect to poor network, inadequate car parking, congestion, high cost of transport, pollution etc.

2.7.2. Inadequate Public Transport Service

The city population in 2011 is estimated at 3.1 million people. At a travel demand rate of 2.5 trips/person/day (King'ori, 2007), the total travel demand in Nairobi is about 7.5 million trips/person/day. This is very high demand compared to the low supply of transport service available in Nairobi and which serves only the high demand zones.

A look at the transport modal split shows that majority of the trips in the city are on foot – **Table 2.5**. This is because public transport service is expensive and inadequate to meet the demand.

Table 2.5: Transport All Purpose Modal Split in Nairobi

Transport Mode:	Walking	Cycling	Private Car	Matatu/ Mini-bus	Bus	Train	Institution bus	others
Modal Split (%)	47	1.2	15.3	29	3.7	0.4	3.2	0.2

Source: King'ori, 2007

The main public transport service in Nairobi is by mini-bus (matatu) and other private bus operators. The capacity of commuter train service is low and limited to only a few areas. The public transport system is totally inadequate to meet the rising demand. This is evident from

the common heavy congestion and long delays in the public transport system. (Omwenga, 2011)

2.7.3. Long Commuter Distance and Travel Time

The city of Nairobi has experienced rapid urban sprawl. In 1970, the average commuter distance was 0.8km and this increased to 25 km in 1998. The present commuter distance is over 30-40 km. The long commuter distances and heavy traffic congestion on the road has led to long travel time. It takes about 2 hours to cover 30 – 40 km commuting distance. In the 5 – 10 km central area, travel time is about 1 -2 hours long because of the heavy traffic congestion. (Omwenga, 2011). This long travel distance has constrained the choice of travel mode for persons with disability limiting them to travel using only the bus or the Matatu modes.

2.7.4. High Cost of Transport

The cost of transport in the city is very high compared to the average per capita income. In the 0 – 10 km, 10 – 20 km central area, the average bus fare is KES 50 and KES 100 respectively, at peak hour. This cost of public transport is indeed very high considering that the minimum employee wage is KES. 7, 334 (GOK, 2011) per month – about KES. 200 – 300 per day. The story is not any better for the motorists. The cost of motor vehicle fuel in Nairobi is quite high at KES. 116 per litre of petrol (Kenya National Bureau of Statistics, 2011).

2.7.5. Inadequate Infrastructure for Non-Motorized Transport

A large portion of the city population walks to work, to school and other destinations covering distances of about 7–15 km (CCN, 2007). This is because of low income earnings compared to the high cost of transport. Cycling is attractive but only a few people cycle to work or school. This is due to high incidence of road accidents affecting cyclists.

Unfortunately, infrastructure for pedestrians and cyclists is not well developed. There is little provision for footpaths, footbridges, zebra crossings, and cycle tracks. Even where provided, the same are poorly designed, poorly maintained, and are not secure (Omwenga, 2011).

In Kenya, as in many rapidly-developing countries, there is a direct correlation between GDP per capita and private car modal share: as GDP per capita rises, so does the use of motorized vehicles. To prevent this trend from continuing, it will be necessary to change transport policies and make sound investments in NMT facilities. The Kenyan Urban Roads Authority (KURA) has adopted a policy that systematically integrates NMT facilities on all new urban roads, and requires projects to conduct NMT safety audits.

2.7.6. Traffic Accidents and Poor Safety Record

Kenya and Nairobi have a poor road accidents and safety record in the region. Kenya has a high cost of accidents at 5% of the Gross National Product (GNP).

In 2003 it was estimated that 3,000 people were killed annually on Kenyan roads. Pedestrians and passengers were most vulnerable accounting for 80% of the deaths. Currently the rate of death crashes is at 2000 for every 10,000. The pedestrians and children are worst hit (Omwenga, 2011).

2.7.7. Increasing Motor Vehicle Population

Kenya and Nairobi are registering rapid growth in motor vehicle population and ownership. The country had about 600, 000 No. vehicle units in 2000, 950,000 in 2008 but this has risen to about 1.2 million in 2010/11. Nairobi is estimated to accommodate 30% of the national total vehicle population – **Table 2.6**

A large private car ownership compared to smaller public transport traffic is not good for the city. The high use of the car is not an efficient and effective way to meeting the city traffic demand. Indeed high use of the car leads to heavy traffic congestion, high cost of transport, air pollution e.tc (Omwenga, 2011).

Most of the public vehicles are designed to comply with the **Kenya standard KS 372:2011 - Road vehicles - Passenger vehicle body construction - Specification (Third Edition),** which, in many aspects does not guarantee the needs of PWDs.

Table 2.6: Private Car Population Projection for Nairobi

Year	2004	2010	2015	2025
Number of private cars	207,339	327,366	486,207	716,138

Source :(Adopted) Study on Master Plan for Urban Transport in the Nairobi Metropolitan Area, 2006

2.7.8. Inadequate Integrated Transportation Network System

Nairobi is served by road, railway and air transport system. The city has a dense local road network and 3 No. main national/regional highways – Mombasa (A109), Nakuru/Uganda (A104), and Thika road (A2). The city is also served by the railway. The local commuter train service has low capacity and limited to only two routes – Dagoretti and Ruiru. There are 3 No. regional/national lines serving Mombasa, Kisumu/Uganda and Nanyuki The city is served by 2 No. airports – Jomo Kenyatta International airport and Wilson airport. The 3 No. transport systems are however not well integrated. The intermodal interchange system is not well developed.

2.8. Persons with Disabilities (PWDs) in Kenya

Long viewed as merely the result of impairment, disability has many causes. Today, the most common form of disabilities are associated with chronic respiratory diseases, cancer, diabetes, malnutrition, HIV/AIDS, other infectious diseases, and injuries such as those due to road accidents, falls, land mines and violence. The number of people living with disabilities is growing as a result of factors such as population increase, aging, and medical advances that preserve and prolong life. This has in turn increased the demand for health and rehabilitation services.

Problems of disability are largely manifested in social contexts and social relations, rather than in an individual's medical condition. People living and interacting with PWDs tend to treat them differently in relation to their disabilities (KNPWD, 2007)

Box 2.1: Sneak preview of disability statistics in Kenya

KNSPWD found that

• 4.6% of Kenyans experience some form of disability.

• More disabled persons reside in rural than in urban areas.

• 15% of PWDs are likely to be affected by environmental factors on a daily basis and 3% on a weekly basis.

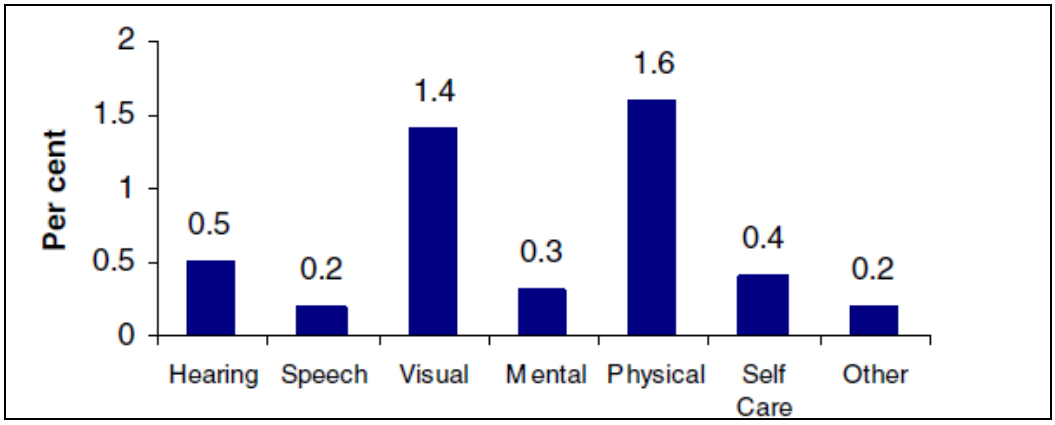
• 65% of PWDs regard the environment as a major problem in their daily lives.

• A third of PWDs work in their family business, but a quarter do not work at all.

• Only about 16% of women with disability aged 12–49 years use some form of family planning.

Source: KNSPWD, 2007

Figure 2.1: Prevalence of Disability by type



Source: KNSPWD, 2007

A disability maybe physical, cognitive, mental, sensory, emotional development or some combination of these. Disabilities make it harder to take part in normal daily activities. Available statistics show that persons with disabilities have limitations in access to education, employment, social and public amenities. This eventually leads to poverty and impoverished conditions as they are less empowered to participate fully in the economic activities.

Going by the 2007 Kenya National Survey for Persons with Disabilities, the most prevalent disability is physical at 30% while 65% of persons with disabilities interviewed regarded the environment as a source of major barriers including poor road and transport systems. One of

the major causes of disabilities and especially physical disabilities in Kenya is road accidents. According to the Global Status Report on Road Safety released on11th June, 2010, approximately 1.7 million people die each year on the world's roads, and over 10 million sustain injuries, and about 70 percent of these in developing countries. The report also revealed that Kenya suffers the highest number of road fatalities in East Africa.

Half of the sustained injuries lead to permanent disabilities like amputation, paraplegia or even quadriplegia. These persons will require mobility aids like wheelchairs, crutches, artificial limbs etc. alongside other forms of support like rehabilitation and awareness creation to change attitude for them to reintegrate into society. Kenya Re is aware that not all these persons who acquire physical disabilities can access these services and is coming in to support fill the gap. Through this envisaged three year project Kenya Re shall be contributing to the Government's Vision 2030 through the Social Pillar, the implementation of the Millennium Development Goals (MDGs), and shall be supporting the 2011-2020 UN declared decade of action for road safety as a result of the shocking road carnage statistics.

The survey indicates that more males than females had mental disabilities (54% and 46%, respectively) and self-care difficulties (55% of males compared with 45% of females). In contrast, more females than males suffered from visual disability, 55% versus 45%, respectively. In Nairobi, 5.1% of the population is having some form of disability. (About 160,000 Persons). **Table 2.7** below shows the distribution of disability by background characteristics in Nairobi city.

Table 2.7: Prevalence of disabilities by background characteristics

Background Characteristics	Type of disability (impairments)								Total	
	None	Hearing	Speech	Visual	Mental	Physical	Self-care	Other	Total	Total disabled
Residence										
Rural	95.5	0.6	0.2	1.2	0.3	1.6	0.4	0.2	100.0	4.5
Urban	95.4	0.3	0.2	1.9	0.3	1.3	0.4	0.3	100.0	4.6
County										
Nairobi	94.9	0.3	0.1	2.7	0.3	1.1	0.3	0.2	100.0	5.1

Source: KNSPWD, 2007

2.8.2. Assistive Devices and Support

Assistive devices and support services consist of equipment and appliances used by PWDs to complement diminished or absence of certain physical functions. Support services are

services that PWDs need or receive for their disability in relation to health, rehabilitation and welfare including but not limited to services from a personal assistant or aide. Such devices and services enhance the ability of a PWD to participate in day-to-day activities.

As summarized in **Table 2.8**, the KNSPWD looked at various categories of devices. These include those related to information (hearing aids, magnifying glasses, Braille) and communication (sign language interpreter, portable writer), as well as to personal mobility (wheelchairs, crutches, walking sticks/ frames, guide). Others are household items (flashing light on doorbell, amplified telephone); personal care and protection (special fasteners, bath and shower seats, toilet seat raiser); handling goods and products (gripping tongs, aids for opening containers); and computer assisted technology (keyboard for the blind).

Some 32% of PWDs use an assistive device or support service (Table 7) .Out of this proportion; one in every five uses an information device while 12% use a personal mobility device. Other devices such as communication aids (0.3%), household items (0.1%), personal care and protection (0.4%), handling products and goods (0.1%), and computer (0.1%) were rarely used. PWDs in urban areas (41%) were more likely to use an assistive device or support service than their rural counterparts (26%). Similarly, they were more exposed to use of information devices (30% for urban verses 11% for rural). Nairobi had the highest (42%) use of assistive devices or support services compared with other provinces (County).

Table 2.8: Number and percentage of PWDs using assistive devices/support services by Background characteristics

	Any assistive/ Supportive Device		Informa- tion device	Communi- cation & Goods device	Personal mobility Device	House- hold items Device	Personal care &Protection Device	Handling Products Device	Computer Assisted Device
	%	No							
Residence									
Rural	25.9	1,891	11.2	0.1	15.1	0.1	0.3	0.1	0.0
Urban	41.2	500	30.3	0.6	11.0	0.3	0.7	0.0	0.0
Province (County)									
Nairobi	42.4	226	35.0	0.6	7.3	0.0	0.7	0.0	0.0

Source: KNSPWD, 2007

2.8.3. Situation of PWDs

People with disabilities confront a range of handicapping situations depending on the extent of their disability. Access to infrastructure and services is a big challenge. In Kenya the government and various organizations have tried to put in place systems to minimize handicapping situations faced by PWDs. Various interventions have proved that it is possible to minimize the degree of handicap and enhance the performance of PWDs, e.g., education policy on integration of PWDs into other learning institutions, and inclusion of service provision to PWDs in the National Health Sector Strategic Plan. (KNSPWD, 2007).

The draft Integrated National Transport Policy (INTP) have broadly mentioned the issue of social inclusion but there is need for a more specific legislation on disability mainstreaming in to the transport systems.

2.8.4. Activity Limitation

Activity limitation refers to difficulties experienced by an individual without any kind of assistance. Such difficulties can be experienced in any of the following domains of disability: sensory, communication, **mobility**, and self-care (e.g., washing one's self), domestic life, interpersonal behavior, major life areas in the community and social life. PWDs may face various challenges in the course of pursuing their daily activities because of activity limitation or restrictions.

2.8.5. Environmental Factors

Environmental factors such as temperature, terrain, **accessibility of transport**, climate, noise, etc., can improve or hinder a person's participation in such activities as working, going to school, taking care of one's home, and being involved with family and friends in social, recreational and civic activities in the community. PWDs were asked how often various environmental factors were a barrier to their own participation in activities that matter to them. **Table 2.9** summarizes the effect of environmental factors on PWDs by background characteristics. The results show that nearly one in five PWDs (18%) is affected on a daily basis by environmental factors and 4.5% are affected on a weekly basis. Sixty-five per cent of PWDs indicated that the environment has been a major problem in their daily lives. The

survey shows that PWDs residing in rural areas were more likely to be affected by the natural environment on a daily basis than their urban counterparts (20% versus 16%, respectively). PWDs aged 55+ were the most likely to be affected by the environmental factors (KNSPWD, 2007).

Table 2.9: Effect of environmental factors on PWDs by background characteristics

	Daily	Weekly	Monthly	More than monthly	Never	N/A	Not specified	Little problem	Big problem	N/A	Missing
Residence											
Rural	20.3	4.5	7.1	15.7	50.1	1.8	0.5	28.8	68.4	2.4	0.4
Urban	16.4	6.7	5.9	11.8	55.9	2.2	1.2	31.5	64.5	2.8	1.3
Province (County)											
Nairobi	16.9	5.6	7.7	9.5	57.9	2.4	0.0	26.0	68.2	2.7	3.1

Source: KNSPWD, 2007

2.8.6. Employment, Income and Social Security

The employed/working persons in this survey comprised those PWDs aged 15 years and above who reported having either held a job or undertaken an activity for pay, profit or family gain during the week prior to the survey. As **Table 2.10** illustrates, a third of the PWDs work on own family business and about a quarter do not work.

About 16% work for pay and one out of ten indicated that they were homemakers. The analysis shows that PWDs who reside in urban areas are more likely to be employed than their rural counterparts. A quarter of them worked for pay compared with only 9% of those in rural areas. Similarly, a third of those in rural areas did not work, compared with only 22% of those in urban areas. But a third (32%) of those who worked on own family business were residing in rural areas versus one-fifth in urban. The largest proportion of PWDs who worked for pay was in Nairobi (32%). Those working were more likely to be males (18%) than females (8%). They were also likely to be better educated: Those with university education were 45%, then middle level education (36%), secondary or "A" level (22%) and post primary vocational education (20%).

Most PWDs are unlikely to have active or viable socio-economic engagements to earn a living. Consequently, they require some assistance in the form of social security grants for the destitute, disability grants or other forms of financial support.

Table 2.10: Activities undertaken by respondents in the last seven days by background characteristics

	Worked for pay	Worked on own family business	Did not work but was employed	Did not work	never been Employed	Homemaker	Other
Residence							
Rural	8.8	32.1	1.7	33.7	6.9	12.6	4.1
Urban	25.4	21.3	4.8	21.8	6.9	13.7	6.1
Province (County)							
Nairobi	31.5	13.9	5.8	22.4	5.5	11.1	9.8

Source: KNSPWD, 2007

2.9. Policy and Legal framework for Disability and Road Public Transportation

2.9.1. Introduction (Overview)

The transport sector is governed by numerous statutes that fall under two broad categories, namely statutes affecting all sectors of the economy and sector-specific legislation as shown in **Table 2.11** below. Many of the sector-specific laws are outdated and require urgent review to facilitate the effective operations of the entities they govern and to enhance harmony in the transport sector.

Table 2.11: Overview of Transport policies in Kenya

DESCRIPTI0N	STATUTES AND REGULATIONS
OVERARCHING STATUTES	▪ The Constitution of Kenya 2010 ▪ The Kenya Police Act ▪ The Administration Police Act ▪ Land Act of 2012 ▪ The State Corporations Act ▪ The Environmental and Management Co-ordination Act 1999 ▪ The Kenya Revenue Authority Act ▪ The Insurance Act ▪ The Exchequer & Audit Act, Cap 412 ▪ Privatization Act ▪ Public Procurement and Disposal Act 2005 ▪ Public Private Partnership Act

DESCRIPTI0N		STATUTES AND REGULATIONS
SECTOR SPECIFIC	ROADS TRANSTORT	▪ The Transport Licensing Act Cap 404 ▪ The Kenya Road Boards Act, Cap 408 ▪ The Road Maintenance Levy Fund Act No.9 of 1993 as amended in 1994 ▪ The Public Roads Toll Act, Cap 407 ▪ The Finance 2005 Act ▪ The Public Roads and Roads of Access Act, Cap 399 ▪ The County Government Act of 2011. ▪ The Kenya Roads Act No.2 of 2007 ▪ The Traffic Act, Cap 403 ▪ The Streets Adoption Act, Cap 406 ▪ The Valuation of Rating Act, Cap 266 ▪ The Rating Act Cap 267 ▪ The Wildlife Conservation & Management Act, Cap 376 ▪ The Agriculture Act, Cap 318 ▪ The Physical Planning Act No.6 of 1996 ▪ National Transport and Safety Authority Act of 2012.

Source: Draft INTP (2010)

2.9.2. United Nations Convention on the rights of Persons with Disabilities (UNCRPD) of 2006

Article 9 of the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) stipulates the right of persons with disabilities to access public facilities which include roads and road facilities. Kenya ratified this Convention on 19 May 2008. The Convention has also made provisions in relation to freedom of movement, liberty and independent living, which serves to demonstrate what needs to be done to ensure that persons with disabilities live in a barrier-free environment. It should be noted that the UNCRPD forms part of the municipal laws of Kenya due to the provisions of Article 2 (6) of the Constitution of Kenya that automatically domesticates all international treaties and conventions to which Kenya is a signatory. The UNCRPD Secretariat has the mandate to coordinate and spearhead the mainstreaming of issues related to disability and the empowerment of persons with disabilities.

Article 9 on Accessibility, states that (1) "to enable persons with disabilities to live independently and participate fully in all aspects of life, state parties shall take appropriate measures to ensure to ensure to persons with disabilities access, on an equal basis with others, to the physical environment, to **transportation,** to information and communication technologies and systems, and to other facilities and services open or provided to the public, both in urban and rural areas. These measures, which shall include the identification and elimination of obstacles and barriers to accessibilities, shall apply to, inter alia:

a) Buildings, roads, transportation and other indoor and outdoor facilities, including schools, housing, medical facilities and workplaces.

The state parties shall also take appropriate measures:

a) To develop, promulgate and monitor the implementation of minimum standards and guidelines for the accessibility of facilities and services open or provided to the public;
b) To ensure that private entities that offer facilities and services which are open or provided to the public take in to account all aspects of accessibilities for persons with disabilities.
c) To provide training for stakeholders on accessibility issues facing persons with disabilities

Article (20) on Personal mobility binds state parties to take effective measures to ensure personal mobility with the greatest possible independence for persons with disabilities, including by:

a) Facilitating the personal mobility of persons with disabilities in the manner and at the time of their choice, and at affordable cost;
b) Facilitating access by persons with disabilities to quality mobility aids, devices, assistive technologies and forms of live assistance and intermediaries, including by making them available at affordable cost;
c) Providing training in mobility skills to persons with disabilities and to specialist staff working with persons with disabilities;
d) Encourage entities that produce mobility aids, devices and assistive technologies to take into account all aspects of mobility for persons with disabilities.

2.9.3. The Constitution of Kenya (2010)

Article 54. (1) On the specific right to persons with disability, the constitution states that a person with any disability is entitled—

a) To be treated with dignity and respect and to be addressed and referred to in a manner that is not demeaning;
b) To access educational institutions and facilities for persons with disabilities that is integrated into society to the extent compatible with the interests of the person;
c) To reasonable access to all places, public transport and information;
d) To use Sign language, Braille or other appropriate means of communication; and
e) To access materials and devices to overcome constraints arising from the person's disability.

Item (c) is of most interest to this study. This means the right to reasonable access to all places, public transport and information is fundament and the state have the responsibility to provide the same.

Further, Article 54 (2) states that, "the State shall ensure the progressive implementation of the principle that at least five percent of the members of the public in elective and appointive bodies are persons with disabilities". In addition, Article 81 (c) calls for fair representation of persons with disabilities in all organs of governance.

2.9.4. The Vision 2030

Vision 2030 Kenya is looking to the future with the aim of consolidating, enhancing and sustaining the gains of the Economic Recovery Strategy for Wealth and Employment Creation 2003-2007" (ERS). The transport sector is recognized as a key pillar and a critical enabler in the achievement of this strategy. It will be important not only in improving the competitiveness of products from Kenya and the region, but also serve as a significant basis upon which the economic, social and political pillars of this long term development strategy will be built. Further, the sector is expected to remain a key component in achieving the Millennium Development Goals (MDGs).

Given this envisaged economic development and subsequent sustained growth, in the context of changing population and land use patterns, a competitive regional and global economy, strategic nation building considerations and new market development, it is apparent that the task of transport sector will be highly complex and demanding.

To enable the transport sector effectively play its role in this scenario, the Ministry of Transport launched the National Transport Policy Committee on 2nd April 2003. Its sole mandate was to formulate an Integrated National Transport Policy. The process was conducted on a consultative basis punctuated with modeling of solutions based on international best practice to bridge the gap between local challenges and planned interventions. Issue of Persons with disabilities with regard to accessibility to public transport therefore is very fundamental in this formulation.

2.9.5. The Integrated National Transport Policy (2010)

The Policy Paper, whose theme is "Transport for Prosperity", identifies a number of challenges inhibiting the transport sector from performing optimally its facilitative role in respect of national and regional economies. According to the Act, these challenges will be addressed through integration of transport infrastructure and operations as well as responding to market needs of transport such as those of PWDs. Other interventions will include the enhancement of transport services and quality, consumer protection, catering for consumers with special needs[3], ensuring fair competition, use and integration of information and communication technologies in transport development and operations.

The act identifies the need to eliminate impediments to development and use of non-motorized and intermediate means of transport in order to enhance transport safety and security, develop and maintain a safe and secure transport system, sustainable utilization of the environment, integration of meteorological information as well as development of the requisite human capacity.

[3] People with special needs include PWDs. The needs of PWDs are critical in this aspect and are the gaps which this research is trying to fill.

2.9.6. National Transport and Safety Authority Act (2012)

This is AN ACT of Parliament to provide for the establishment of the National Transport and Safety Authority; to provide for the powers and functions of the Authority, and for connected purposes. According to the act, the Authority's functions are in section 4. (1) To:

a. Advise and make recommendations to the Cabinet Secretary on matters relating to road transport and safety;
b. Implement policies relating to road transport and safety;
c. Plan, manage and regulate the road transport system in accordance with the provisions of the Act;
d. Ensure the provision of safe, reliable and efficient road transport services; and
e. Administer the Act of Parliament set out in the First Schedule and any other written law.

This is the authority which is is responsible for harmonization of operations of key road transport departments and help in effectively managing the road transport subsector and minimizing loss of lives through road traffic accidents , in the performance of its functions under subsection (1), is stated that they shall:

(c) Regulate public service vehicles;

(d) Advise the Government on national policy with regard to road transport system;

(k) Co-ordinate the activities' of persons and organizations dealing in matters relating to road safety. [*This includes issues of accessibility for PWDs*].

2.9.7. The Roads Act 2007

The responsibility for Roads Infrastructure is vested in the Ministry of transport and Infrastructure after coming into force of the Kenya Roads Act 2007. The responsibility includes both classified and unclassified roads which currently stand at 160,886 Km. With the enactment of the Kenya Roads Act 2007, three new Road Agencies were established namely: the Kenya National Highways Authority (KeNHA) responsible for Class A, B and C roads; Kenya Rural Roads Authority (KeRRA) responsible for Class D, E and other roads and Kenya Urban Roads Authority (KURA) responsible for urban roads. The Kenya Roads Board (KRB) is responsible for financing the maintenance of roads and undertaking technical audits. The critical challenge is to align the operations of the road sub-sector in line with the

constitution, which has transferred the some of the road functions to the county government. A new roads bill 2014 has been drafted for debate in parliament. Both acts do not have specific mention of accessibility or provision of an inclusive or universal design of roads.

2.9.8. The Road Design Manuals

Road design and construction in Kenya are done based on the following manuals
Road Design Manuals Part (I-V)

- Road Design Manual Part I-Geometric design of Rural Roads-1979
- Draft-Road Design Guidelines for Urban Roads-2001
- Road Design Manual Part III-Materials and Pavement Design for New Roads
- Road Design Manual Part IV-Bridge Design-1982
- Road Design Manual Part V-Pavement Rehabilitation and Overlay Design-1988

There also exists manual on Traffic Control Devices namely:

- Part I-Road markings
- Traffic Signs

Standard Specification for Road and Bridge
Other International Standards equal to or superior to Kenyan Standards includes:

- BS 5400 –Design of Bridges 1990
- BS 8110 –Structural use of concrete 1997 part 1-code of practice for design and construction
- BS 5950- Structural use of steel
- Transport and Road Research Laboratory (TRRL) Road Notes
- Highway Capacity Manual 2000

KEBS Standards and Guidelines have been drawn from these manuals. It is worth noting that the there is no design manuals currently existing specifically to guide the design of roads that meets the minimum requirements of travel for PWDs.

2.9.9. Persons with Disability Act 2003.

Act of Parliament No. 14 of 2003, the Persons with Disabilities Act, was enacted to provide for the rights and rehabilitation of persons with disabilities; to achieve equalization of

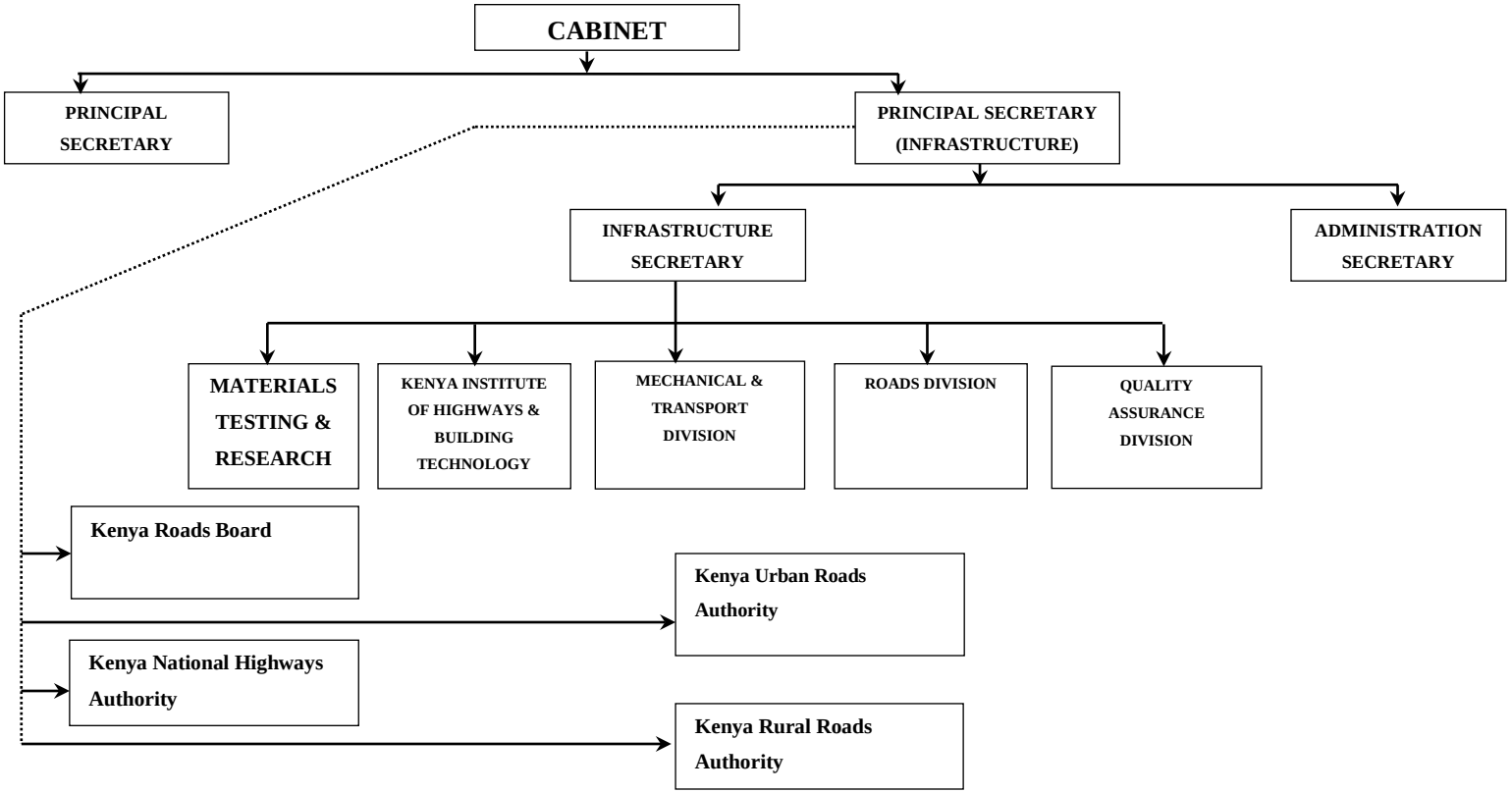
opportunities for persons with disabilities; to establish the National Council for Persons with Disabilities; and for connected purposes. Sections 22, 23 and 24 of the Act provides for compliance and issuance of adjustment orders to any facility that is not disability-friendly. This calls for an accessible roads infrastructure for persons with disabilities

Section 21 on Accessibility and mobility states: "Persons with disabilities are entitled to a barrier- free and disability-friendly environment to enable them to have access to buildings, roads and other social amenities, and assistive devices and other equipment to promote their mobility.

Section 23 on Public service vehicles states: "(1) an operator of a public service vehicle shall adapt it to suit persons with disabilities in such manner as may be specified by the Council and (2) All operators of public service vehicles shall comply with subsection (1) within two years after this section comes into operation.

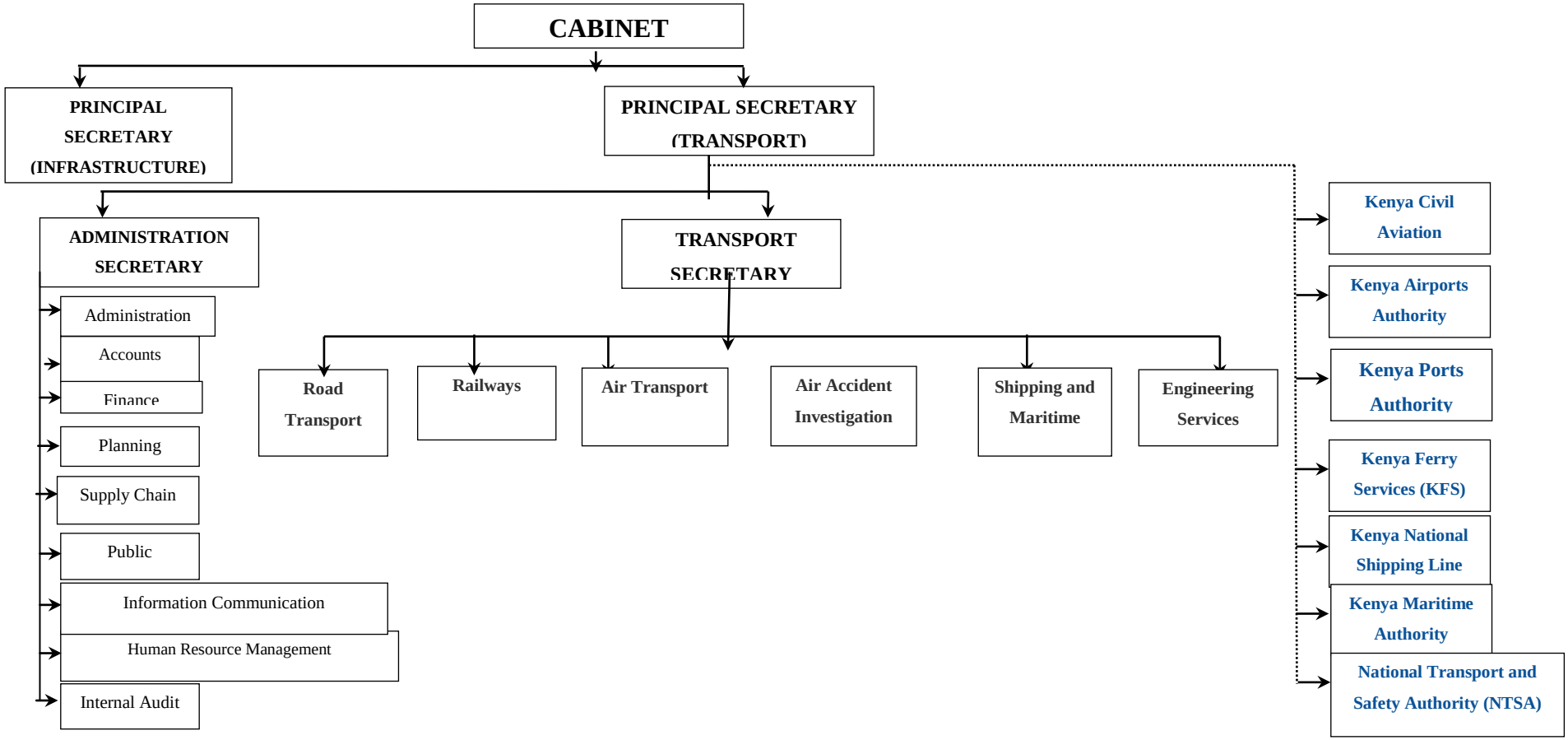
2.10. Institutional framework: MINISTRY OF TRANSPORT & INSFRASTRUCTURE

Figure 2.2: State Department of Infrastructure Organization Chart



Source: adapted from MoTI website

Figure 2.3: State department of Transport Organization Chart



Source: Adapted from MoTI website

2.10.1. Organization of Governments

The organization of the governments of different cities all over the world largely determined how their approaches to urban transport developed. Thus, it would be difficult to replicate one city's transport structures in any of the others. Considering the organization of city government is thus essential when developing an approach to maintaining and regulating urban transport. Coordination is better when there are fewer institutions. Multiple institutions result in fragmentation. When only a few agencies run a public transport system, however, competition may be inadequate, and service quality may suffer. The key is to manage competition through coordination in planning, but competition in the delivery of services.

2.10.2. Key Questions in Setting Up a New Transport Institution

In establishing a new transport institution, some of the important questions that arise involve the specific functions that such an institution should perform.

1) Should its functions be related only to public transport or should they cover all aspects of city transport?
2) Should its functions cover the city only or the region as well?
3) Should public transport be operated by a public entity or contracted out to private operators?
4) How should such an institution be set up and under what authority?
5) How should the institution be financed?
    - With government grants alone
    - Raise its own resources (and be independent of government)
    - Dedicated taxes (assigned solely to the entity).
6) How should the institution acquire its manpower and on what terms?
    - On secondment (temporary transfer) from government agencies or open Recruitment
    - Through contracts or direct hire
    - Salaries aligned with government scale or independent.
7) What is the institution's functional style?

- A lean and professional agency that relies significantly on outsourcing
- An agency that relies on its own manpower and capacity to discharge all functions under its authority.

The method selected will depend on the particular situation of the city in question. A study specific recommendation has also been proposed.

2.11. Conceptual framework

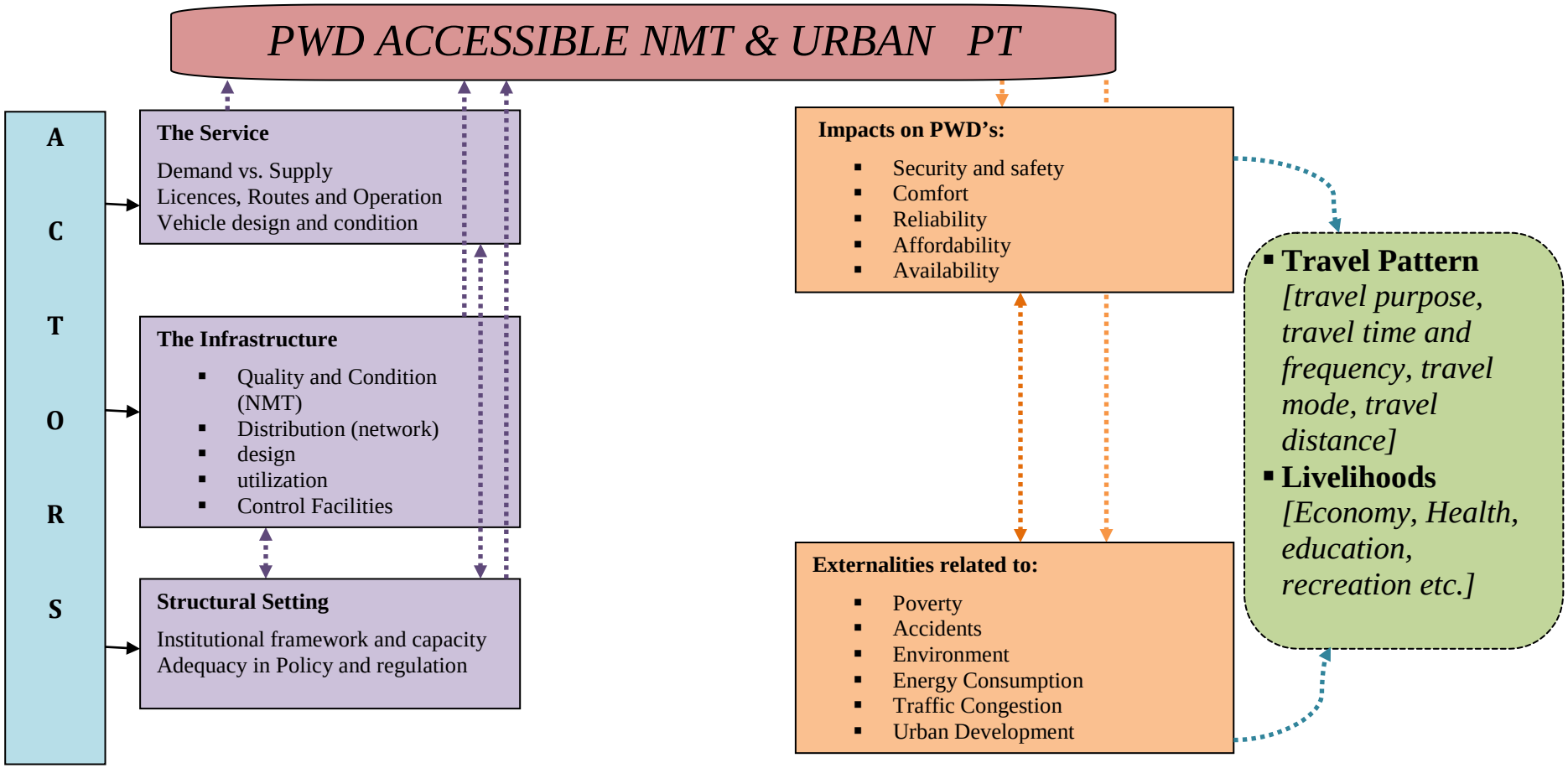
Transportation infrastructure alone is not enough. The government and all stakeholders have to offer a transport chain with all conveniences – transportation must be fast, reliable, safe, and comfortable if the goals are to be achieved, which are to offer customers the best possible service, and MUST accommodate all social groups with varied and different mobility needs.

In conceiving this conceptual framework, the issues of PWDs are central since they are the people who experience these challenges day to day. The overarching goal is to achieve an accessible urban public transport for PWDs. This only happens when the institutional and policy frameworks are in place, infrastructure and other facilities are provided such that they comply with the basic requirements of PWDs and the service parameters are designed to operate optimally for use by PWDs. [*these factors are considered the determining causes*].

The establishment of these policies and frameworks will have an overall impact on the availability reliability, security and safety, comfort and affordability of public transport for PWDs. These effects will be negative when the same is inaccessible. When they are negative, the externalities that are likely to be generated include poverty, increased accident rates, environmental degradation, unsustainable energy use, traffic congestions and poor urban development in general.

All these have a general effect on the travel patterns of PWDs which influences their participation in the economy, health, education, recreation and other related activities of persons with disabilities. Human activities, PWDs included are directly influenced by the level of integration between land use planning and transport planning. **Figure 2.4** is a preview of the conceptual framework.

Figure 2.4 : Conceptual framework of the study



Source: Author (2014)

3. A REVIEW OF INTERNATIONAL BEST PRACTICE IN ACCESSIBLE PUBLIC TRANSPORTATION FOR PERSONS WITH DISABILITIES

3.1. Introduction

This Section reviews the existing standards on Road vehicles –Passenger vehicle body construction specification in Kenya KS 372:2011, Kenya Road design Manuals, and current best practices for accessible public transport in the world. It draws heavily on a number of publications by Kenya bureau of standards (KEBS) and the European Conference of Ministers of Transport (ECMT) (now the International Transport Forum or ITF), plus Overseas Road Note 21 Enhancing the mobility of disabled people: Guidelines for practitioners published by TRL Limited and the UK Department for International Development (DIFD/TRL, 2004). Another useful source of guidance is the World Bank's Bus Rapid Transit Accessibility Guidelines (Rickert, 2006).

3.2. Standards on Road Passenger vehicle body construction specifications in Kenya

In order to keep abreast of the progress, the Kenya bureau of standards (KEBS) came up with the road passenger vehicle design specifications especially the body specifications. Notable stakeholders in the technical committee were:

- Ministry of Roads and Public Works — Mechanical Engineering Department;
- Automobile Association of Kenya;
- Office of the President — Vehicle Inspection Unit;
- Kenya Vehicle Manufacturers Ltd;
- Kenya Industrial Research and Development Institute (KIRDI);
- General Motors (K) Ltd;
- Association of Vehicle Assemblers Ltd. (AVA);
- Kenya Auto Bazaar Association (KABA);
- Kenya Used Motor Parts Importers Association (KUMPIA);
- Kenya Automotive Repairers Association (KARA);
- Mutsimoto Motor Company Ltd;
- Kenya Bus Services Ltd;
- Ministry of Transport;
- Institute of Engineers of Kenya;

- Matatu Owners Association; and
- Kenya Bureau of Standards — Secretariat.

The National Council for Persons with Disabilities (NCPWD) and any other organization dealing with disability issues were notably absent. This can explain why the standards do not meet the basic requirements for persons with disabilities.

The Kenya Standard was prepared by the Road Vehicle Technical Committee under the guidance of the Standards Projects Committee, and it is in accordance with the procedures of the Kenya Bureau of Standards.

The standard was formulated to be of guidance to the rapid growing passenger vehicle transport system, for safety and comfort of passengers and general road safety requirements. The standard was to help harmonize the various sizes of passenger vehicles.

Following the approval of the standard the body building industries were to be given up to 1st July 2011 to implement the use of Q345 material or its equivalent. During the development of this standard, reference was made to the following documents:

1. KS 649: 1989 Specification for automobile windscreens.
2. KS 376: 1999 Specification for flexible polyurethane (polyester) foams.
3. KS 1515:2000 Code of practice for inspection of road vehicles.
4. KS ISO 898 Mechanical properties of fasteners.
5. KS ISO 7165 Firefighting — Portable fire extinguishers.
6. E/ECE/324: 2002 United Nations Agreement concerning the adoption of uniform technical prescriptions for wheeled vehicles, equipment and parts, which can be fitted and/or be used on, wheeled vehicles and the conditions for reciprocal recognition of approvals granted on the basis of these prescriptions.
7. KS 664:1999 Specification for seat belt assemblies for motor vehicles.
8. KS 822:1999 Specification for anchorages for seat belts for automobiles.
9. KS 1017 Specification for approval testing of welders working to approved welding procedures.
10. KS 376: 1999 Specification for flexible polyurethane foams.
11. TZS – 598:1999.

3.2.1. Scope and field of application

The Kenya Standard specifies requirements for passenger vehicles body construction. The standard applies to vehicles with bodies designed and constructed for carriage of persons. According to the document, *"**The standard does not include provisions for persons of reduced mobility."*** In the description section 2.22, Passenger with reduced mobility is described as a special difficulty when using public transport, especially elderly and disabled person.

The standard does not apply to saloon cars, station wagons and other public transport vehicles other than those specified in section 2.1 of the standards.

3.2.2. Vehicle classification

For the purposes of the standard, passenger vehicles are classified into the following five classes:

Class I Micro-buses with a seating capacity of up to 14 passengers;

Class II Mini-buses with a seating capacity of 15 — 25 passengers;

Class III Medium-buses with a seating capacity of 26 — 40 passengers;

Class IV Buses with a seating capacity of over 40 passengers;

Class V Urban buses with a capacity of over 40 seated passengers;

Class VI Double decker buses with a capacity of over 40-seated passengers.

It is noted that each of the above classifications shall be separated into:

- A Urban type;
- B Interurban type.

It is also noted that the carrying capacity shall be as permitted by the Traffic Act.

3.2.3. Conformity of production

Accreditation of body builders

According to the standard, all body builders shall be accredited by Kenya National Accreditation Services (KENAS).

Authorization of vehicle designs

Approvals for vehicle designs shall be authorized by relevant registered engineer(s) to specific vehicle type as registered with KENAS and shall ensure that vehicle bodies are constructed to manufacturer's specifications and safety. Below is a table showing the materials and dimensions of body sections as per the standards.

Table 3.1: Material and dimensions of body sections

Body sections		**Class II, III**	**Class IV, V, VI**
Body cross members		RHS 100 mm x 50 mm x 3 mm	Channel 100 mm x 50 mm x 6 mm
Seat anchorage		Continuous angle iron 40 mm x 40 mm x 4.5 mm	Continuous angle iron 40 mm x 40 mm x 4.5 mm
Floor covering		M.S. chequer plate 3.0 mm or M.S. (flat) plate 2.5 mm with anti-skid covering or marine ply 10.0 mm with floor covering	M.S. chequer plate 3.0 mm or M.S. (flat) plate 2.5 mm with anti-skid covering
Side verticals		RHS 40 mm x 40 mm x 2.0 mm	RHS 60 mm x 40 mm x 2.5 mm or Lip channel 80 mm x 40 mm x 2.5 mm
Side horizontals		RHS 40 mm x 40 mm x 2.0 mm, and shall be diagonally braced.	RHS 60 x 40 mm x 2.5 mm or Lip channel 80 mm x 40 mm x 2.5 mm, and shall be diagonally braced
Window spacing's	min.	940 mm	940 mm
	Max.	1150 mm	1150 mm
Window height	Sliding	600 mm	600 mm
	Fixed	430 mm	430 mm
Sliding window position		Top position for all school buses and either position for other applications (see Figure 2)	Top position for all school buses and either position for other applications (see Figure 2)
Cant rail		Angle iron 40 mm x 40 mm x 3 mm, with strip of 3mm flat bar to form continuous triangular section	Angle iron 60 mm x 40 mm x 3 mm or 80 mm x 40 mm x 3 mm , with strip of 3mm flat bar to form continuous triangular section
Roof sticks		To be formed into even radius and raised to 200 mm over cant rail, and following line of side verticals 40 mm x 40 mm x 2 mm and fit intermediate roof sticks. Weld angle iron to roof sticks for the attachment of roof rack fixings	To be formed into even radius and raised to 200 mm over cant rail, and following line of vertical side rails. 80 mm x 40 mm x 2.0 mm or fit intermediate roof sticks. Weld angle iron to roof sticks for the attachment of roof rack fixings

Body sections	Class II, III	Class IV, V, VI
Roof longitudinal	Material as for roof sticks. Weld in four equally spaced to support the center cladding (48")	Material as for roof sticks. Weld in four equally spaced to support the center cladding (48")
Outer cladding	M.S., galvanized 0.5 mm(for glued skin) and 0.8mm (for welded skin), or aluminum 1 mm	M.S., galvanized 0.5 mm(for glued skin) and 0.8mm (for welded skin), or aluminum 1 mm
Inner cladding	M.S., galvanized 0.5 mm(for glued skin) and 0.8mm (for welded skin),, or aluminum 0.8 mm NOTE Shall be full coverage inside with no sharp edges.	M.S., galvanized 0.5 mm(for glued skin) and 0.8mm (for welded skin),, or aluminum 0.8 mm NOTE: Shall be full coverage inside with no sharp edges.
Front and rear sections	Shall have strong supporting structure as for side frames (braced), for either metal sheeting (18 gauge) or fiberglass	Shall have strong supporting structure as for side frames (braced), for either metal sheeting (18 gauge) or fiberglass

Source: KS 372:2011

3.2.4. Hand-rails and hand-holds

The standard requires that every public service passenger vehicle shall be provided with hand-rails and hand-holds which are of adequate strength and so designed and installed as to present no risk of injury to passengers. Every hand- rail shall provide a length of at least 10 cm to accommodate a hand. The hand-rails shall have a diameter greater than 20 mm and less than 45 mm except for hand-rails on doors and seats.

3.2.5. Emergency exits/entrances

All vehicles shall be provided with an unhindered emergency exit with a clearly marked direction of opening at the back of the vehicle of height not less than 1220 mm and width not less than 457 mm.

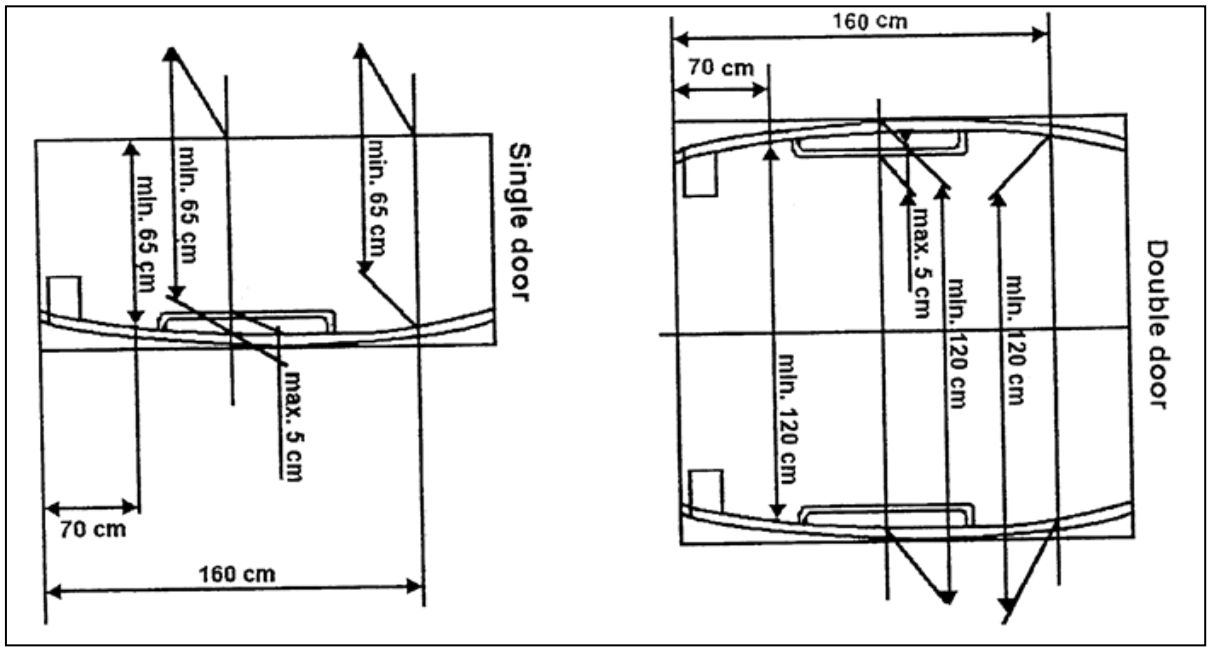
i. Emergency doors

The standard requires the emergency doors to be capable of being easily opened from inside and from outside when the vehicle is stationary. Emergency doors shall not be of the power-operated or the sliding type. It is a condition that the driver should make sure that all emergency doors are securely closed.

ii. Entrance doors

Entrance and exits of the vehicle shall be through service door(s) or double door(s) situated on the left side of the vehicle, whose minimum height for class II, III and IV shall be 1650 mm, and for class V, 1800 mm while the minimum width for single door shall be 450 mm and for double shall be 1200 mm.

Figure 3.1: Entrance Doors



Source: KS 372:2011

iii. Exits

The minimum number of service doors required is as follows:

a) Class V and VI vehicle shall have minimum two double doors;

b) Class III and IV shall have minimum one service doors.

Entrance and service doors shall not be deemed to be an emergency door.

iv. Emergency windows

- Emergency windows shall be rectangular, measuring 700 mm x 500 mm minimum.
- Every hinged emergency window shall open outwards.
- Every emergency window shall be capable of being easily and instantaneously operated from inside and from outside the vehicle by means of a device recognized as satisfactory by the authority, or shall be made of readily breakable safety glass. This shall preclude the possibility of using panes of laminated glass or plastic material.

3.2.6. Ventilation

Every vehicle shall be fitted with a suitable ventilator constructed such that it shall under normal use, not leak rainwater into the vehicle.

3.2.7. Passenger seats (including folding seats and space for seated passengers)

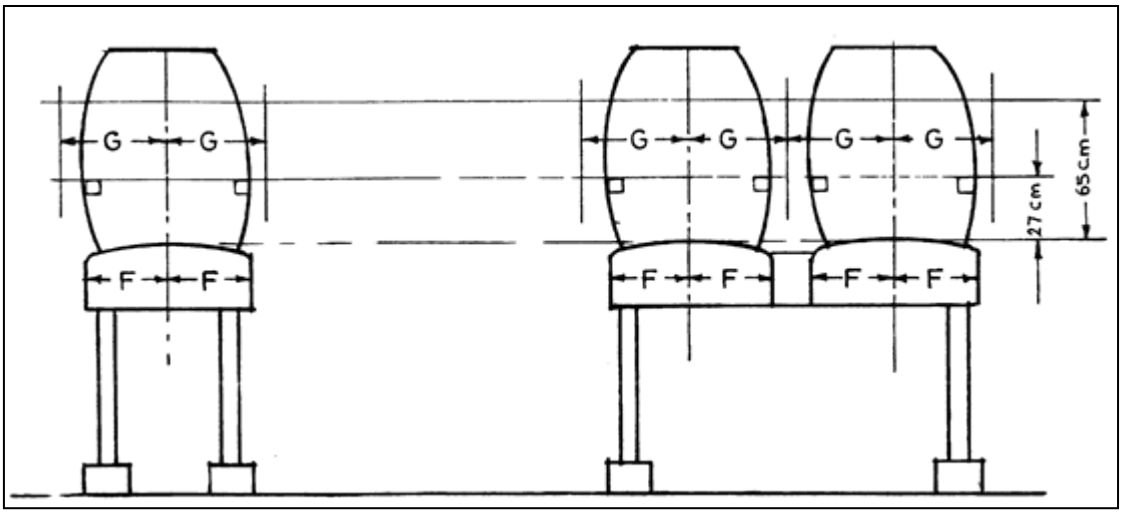
The standard specifies the minimum seat width to be as specified in Table 5.2 and as illustrated in **Figure 3.2**.

Table 3.2: Minimum seat width in mm

	F minimum	G minimum	
		Continuous seats	Individual seats
Class IV and V	200	225	250
Class III	200	225	250
Class II	225	225	250

Source: *KS 372:2011*

Figure 3.2: Width of passenger seats



Source: KS 372:2011

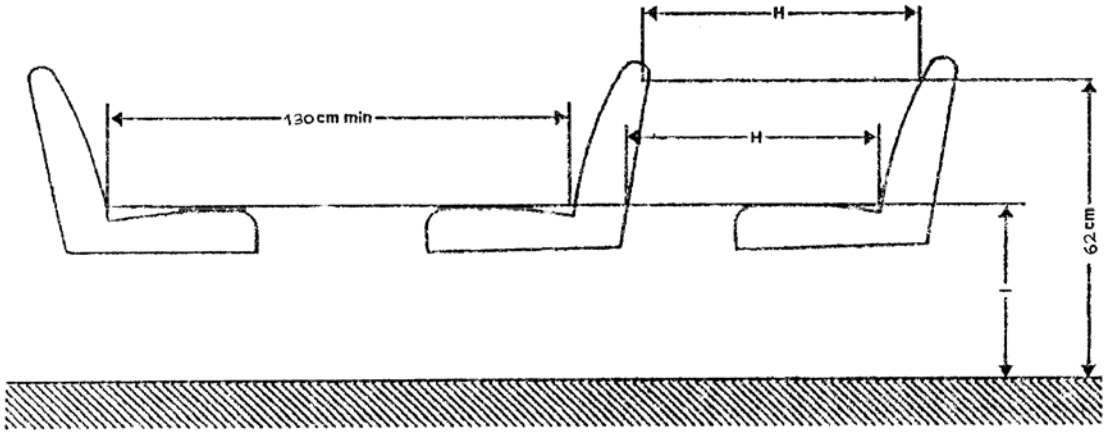
3.2.8. Seat spacing and cushion height

The minimum seat spacing for legroom shall be 660 mm for class V and VI; while for other classes the minimum seat spacing shall be 680 mm, when the seats are arranged one behind the other.

3.2.9. Seat anchorage

The seats shall be firmly bolted on the floor steel framework and not on floor sheets with bolts complying with KS ISO 8984. The general seat construction shall be as illustrated in **Figure 3.3**. The tubes used in the construction of seats shall be round or oval shaped and of minimum 25 mm diameter and minimum 2 mm thickness and of grade A.

Figure 3.3: Seat spacing and cushion height



Source: KS 372:2011

Where

H seat spacing

I Cushion height

3.2.10. Interior lighting

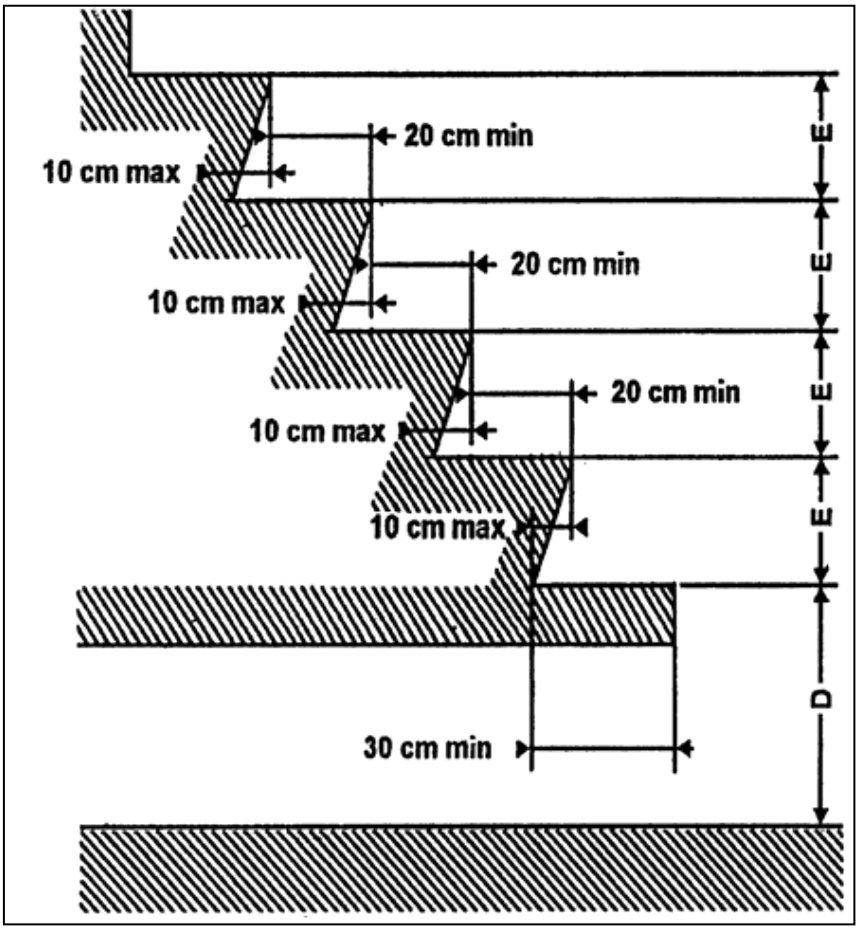
All vehicles shall have interior lights operated by the driver and two bell switches, operated by the passengers to alert the driver to stop. The bell switches shall be on the inside roof one at about 610 mm from the rear emergency door and the other switch at a distance of about 300 mm from the driver's partition.

[4] Mechanical properties of fasteners made of carbon steel and alloy steel.

3.2.11. Height above ground and steps for passengers

The lowest step for entering into the vehicle shall not exceed a height of 460 mm from the ground.

Figure 3.4: Height above ground and steps for passengers



Source: KS 372:2011

D shall be the height above the ground of vehicle unladen. D, for class V shall be maximum 360 mm, while for other classes; D shall be 400 mm maximum. Mechanical suspensions shall solely be maximum 430 mm.

3.2.12. Passenger capacity

The standard requires that there shall be on the vehicle a number (Ps) of seating places other than folding seats, which conform to this standard. If the vehicle is of class V and IV, the number Ps shall be at least equal to the number of square meters of floor available for passengers and crew (So) rounded down to the nearest whole number; the required number may be reduced by 10 % in the case of Class V vehicles (0.9 So).

The total number N of seating and standing places in the vehicle shall be calculated such that both of the following conditions are fulfilled:

$$N \leq P_s + \frac{S_1}{S_{sp}}$$ *And*

$$N \leq \frac{MT-MV-L.V-R.VX}{Q}$$

Where

Ps is number of seating places;

S1 is surface area (m2) available for standing passengers;

MT is technically permissible maximum mass (kg)

MV is unladen mass (kg) as defined in 2.16.1 of the standard

L is specific load of baggage (kg/m2) in the baggage compartment(s);

V is total volume (m3) of the baggage compartments;

R is specific mass of baggage in the roof area (kg/m2);

VX is total surface area (m2) available for baggage to be carried on the roof;

Q is Mass (kg) assumed for the load on each passenger seating and standing place, if any**.**

In the case of Class III, vehicles S1 = 0.

The values of Q, S_{sp}, L and R for every class of vehicle are as follows:

Table 3.3: Values for Q, Ssp, L and R.

Class	**Q (kg)**	**Ssp(m2 /standing Passengers)**	**L (kg/m3)**	**R (kg/m2)**
II	711)	0.150	100	75
III	711)	(No standing	100	75
1) Including 3 kg of hand baggage.				

3.3. International Guidelines and standards for pedestrian footways accessible by PWDs

The most recent accessibility guidelines are contained in Overseas Road Note 21 Enhancing the mobility of disabled people: Guidelines for practitioners (DFID/TRL, 2004). Two older documents, that cover some topics not included in the above-mentioned report, are Designing sidewalks and trails for access Part II: Best practices design guide (Kirschbaum, 2001) and Inclusive Mobility: A Guide to Best Practice (Oxley, 2002). Chapter 5 of enhancing the mobility of disabled people: Guidelines for practitioners defines pedestrian footways as any areas primarily used by pedestrians. They can be adjacent to roadways (also called sidewalks or pavements), or away from the road (also known as footpaths). Providing accessible footways in the right places is a fundamental aspect of promoting mobility for everybody, as almost every trip starts and ends on foot. Furthermore, very poor people with disabilities often have no means of using public transport, and would particularly benefit from having access to a safe and accessible footway on which to travel to undertake livelihood activities. Well designed and maintained footways can benefit people with a variety of disabilities, including users of wheelchairs and tricycles, by providing a safer alternative to having to share the roadway with fast-moving traffic.

In this chapter, sections with the headings 'Basic principles' and 'Best practices' are largely taken from Enhancing the mobility of disabled people: Guidelines for practitioners (DFID/ TRL, 2004), though with amendments by the author drawing on other guidelines and experience of making systems accessible. The basic principles of accessible systems set out in Section 5 of Enhancing the mobility of disabled people: Guidelines for practitioners are as follows:

3.4. Guidelines and standards for footpaths

Basic principles

Safety:	**Accessibility:**
• Level and smooth surface. • Clearly separated from vehicular traffic. • Adequate clear width and height. • No open utility covers, street works. • Good street lighting.	• Remove obstacles, including parked vehicles from the footway. • Gradients not too steep. • Adequate resting places. • Simple layout and adequate cues to visually impaired people.

Reliability: • Footway should provide uninterrupted accessible way between designated points.	**Affordability:** To the provider: • Minimize costs by including access improvements in regular maintenance and new construction. • Maximize impact by upgrading highly used pedestrian areas first.

BEST PRACTICES

Surface quality: Firm, even surfaces are important to people using sticks, crutches or wheelchairs; or people walking with difficulty. The removal of obstacles like potholes, tree roots and storm water drains crossing the walkway will do much to make it safe and usable. Torrential rains in Kenya normally wreak havoc on unpaved surfaces – it is therefore best to pave pedestrian facilities with asphalt or concrete. If brick paving is used care should be taken to lay it evenly. Lower cost surfacing such as compacted crushed rock or unpaved compacted earth may be an option in footways with very low usage, but these are typically not accessible to persons with wheelchairs unless they are kept smooth, compacted or otherwise stabilized. Where grates over storm water drains cannot be kept out of the footway, the gratings should be aligned across the direction of travel to prevent wheelchairs' wheels from falling through.

Cross fall: Enhancing the mobility of disabled people: Guidelines for practitioners (DFID/TRL, 2004) recommends that cross falls should only be provided where absolutely necessary for drainage purposes. For persons using wheelchairs, a uniform cross fall is often more important than a flat surface or a uniform gradient. Where cross falls need to be provided, they should never be steeper than 2.5% (1 in 40). Anything more than this makes it difficult for a wheelchair to steer in a straight line. US ADA Accessibility Guidelines limit cross fall to 2.0% (1 in 50), and recommends that changes of cross fall be assessed over a distance of 0.61m. If the change in cross fall over this length is so severe that one wheel of a wheelchair or one foot of a walker leaves the ground, it may cause the user of the wheelchair or walker to fall.

Width: Footways and paths should ideally be at least 2000mm wide in areas with moderate to high pedestrian traffic. This width will allow two wheelchairs to pass each other comfortably. Where this cannot be achieved, or in areas with light pedestrian traffic, a width of 1500mm is regarded as the

minimum acceptable, giving enough space for a wheelchair user and a walker to pass each other. At obstacles and pinch points, the absolute minimum width should be 1000mm. Where possible, the full path width should be maintained consistently, even behind bus shelters and in front of shop fronts. This clear space should be maintained free from traders and hawkers who will inevitably use the space for marketing foods and other goods and services and from street families using the footway as 'home'. Where possible, Nairobi County governments should seek to find alternative locations for hawkers and street families while enabling all pedestrians to be mobile.

Height Clearances of at least 2100mm should be provided to prevent visually impaired people from hitting overhanging branches or signs. Where this is not possible (for instance, under the stairs to a pedestrian bridge) a physical barrier should be used to warn blind or partially sighted pedestrians.

Simplicity of layout Footways should be designed as straight and simple as possible, with benches, poles, rubbish bins etc. to one side, out of the way. This aids visually impaired people. Changes in slopes and cross falls, for instance when the footway crosses a vehicle driveway, should be gradual and kept to a minimum. Frequent changes make it more difficult for people who are walking, as well as those using wheelchairs.

Tactile guide ways and tactile surfacing: Sometimes visually impaired people need guidance in using a pedestrian area, especially if the footway crosses larger open spaces where the usual guidance given by the edge of the footway or building base is not available, or when pedestrians need guidance around obstacles. A continuous tactile guide way in the direction of pedestrian travel, which has a different texture to the rest of the footway, can provide this guidance. The different texture can be followed by people using a long or guide cane, and can also be detected underfoot by others with low vision. Research has shown that a height of about 5mm for the raised part of the surface is sufficient for almost all visually impaired people to detect, without causing too much discomfort for other pedestrians. Tactile guide ways should however be used sparingly as they can hinder wheelchair users and other pedestrians.

Tactile guide ways can take the form of pre-fabricated guide blocks with raised flat-topped bars which can also be in a contrasting color. In Mexico City and Buenos Aires subway stations, tactile guide ways incorporating grooves cut in the floor have been used, but these are less common.

Where the path leads to a dangerous situation (such as a street crossing) a tactile surface should be used to warn visually impaired pedestrians. This can take several forms, such as pre-cast concrete blistered paving or 'bubble blocks', which are used to warn a pedestrian at a ramped kerb that they are leaving the safety of the footway without crossing a kerb.

Gradient Guidelines from many countries agree that a gradient of 8% (1 in 12, or 1m rise to every 12m in horizontal distance) is the absolute maximum that may be used in pedestrian areas. Anything greater than this causes difficulties for manual wheelchair users and may cause them to topple over. Steeper slopes than 8% can be managed by some wheelchair users, but only over very short distances. In fact, any footway or ramp that is steeper than 5% should provide level areas as resting spots every 10m or so. Changes in slope should be gradual enough that wheelchairs do not become stuck.

To ensure that users of wheelchairs, tricycles, crutches, pushcarts etc. can use the walkway, small ramps should be installed in all places where there are changes in level. **Table 3.4** provides more information on kerb ramps and street crossings

Table 3.4: Gradients for footways and ramps

Gradient of footways or ramps	Recommended use
10% (1 in 10)	Only over very short distances (1000mm or less), such as kerb ramps.
8% (1 in 12)	Maximum slope for general use.
5% (1 in 20)	Preferred slope where possible.

Source: Based on Oxley (2002)

Maintenance: to preserve usability and continuity of the walkway, it is critical that it be kept clear of rubbish, dirt, street works, parked cars and other obstacles. Street works (especially when left unattended) should be guarded by a continuous, rigid barrier (not plastic tape) along the entire perimeter. These can be made at very low cost from timber painted in contrasting colors.

Footbridges and subways: New footbridges and subways should be built with ramps to allow everybody to use them. The guidelines on ramps and handrails in Section 3.2 should be followed.

Rest areas: Elderly and disabled pedestrians need to rest at reasonably frequent intervals. Along frequently used pedestrian ways, seating should be provided at regular intervals, typically every 50m. As with all street furniture, seating should be placed next to the footway without obstructing it, and painted in contrasting colors. Seats can be as simple as wooden benches or perch-type rails to lean against. Seats should be 480mm high and painted to contrast with the surroundings.

Guardrails: Where there is a large drop at the edge of a footway, guardrails could be provided. Guardrails should be at least 1100mm high and painted to contrast clearly with the surroundings.

3.5. Guidelines and standards for street crossings

Street crossings are important elements of the pedestrian environment. Disabled pedestrians are particularly vulnerable because they often move more slowly, or are slower to perceive and react to danger than other pedestrians. Mitchell (2007b) has reviewed the safety of older pedestrians, and the measures that can improve safety. All pedestrians – and disabled pedestrians, children and elderly people in particular – can benefit greatly from well-marked and well-designed crossings. By channelling pedestrians into designated points, crossings make drivers more aware of the presence of pedestrians. Street crossings can be uncontrolled (with no traffic signal) or controlled (with a traffic signal). Signals are usually only warranted if vehicle and pedestrian volumes are high enough, such as on busy roads or near schools and hospitals. In all cases it is crucial to observe best practice to promote safety, accessibility and reliability.

BASIC PRINCIPLES

<table>
<tr>
<td rowspan="3">Safety:
• Crossing clearly marked on the surface of the road.
• Advance warning to vehicles to stop or giving priority to pedestrians.
• Warning to visually impaired pedestrians that they are approaching street crossing.
• Method of informing visually impaired pedestrian when it is safe to cross.
• If signalized, keep traffic stopped long enough to allow slow walkers to cross.
• Good street lighting.
• Traffic calming to reduce vehicle speed.
• Divide two-way roads into two parts using central pedestrian refuges.</td>
<td>Reliability:
•Warnings, information and traffic signals well-maintained and in good working order.</td>
</tr>
<tr>
<td>Accessibility:
• Kerb ramps providing level from footway to road.
• Minimize crossing distance, for instance, by extending kerbs across parking lanes or installing center islands.</td>
</tr>
<tr>
<td>Affordability:
To the provider:
• Minimize costs by installing at least kerb ramps and warning surfaces at newly constructed or upgraded crossings.
• Maximize impacts by prioritizing crossings with high pedestrian volumes.</td>
</tr>
</table>

Source: Based on Oxley (2002)

BEST PRACTICES

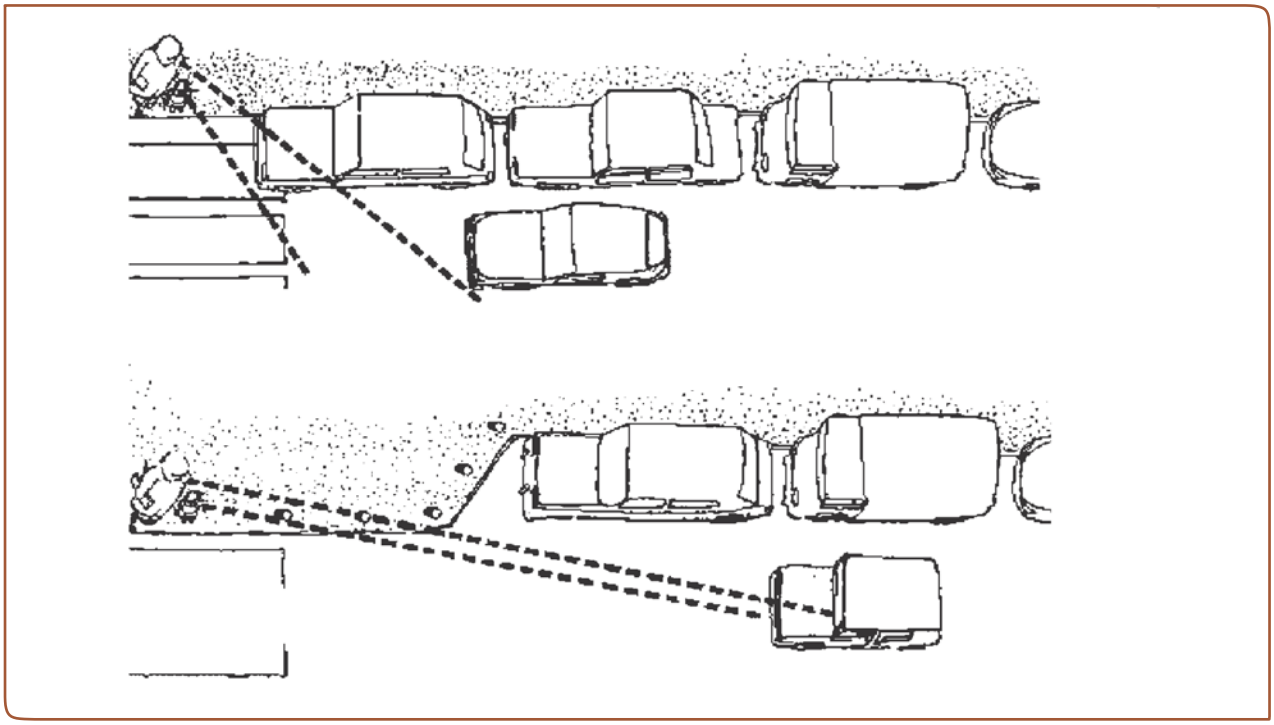
Crossing design: the design of street crossings should aim for simplicity and consistency. The recommended minimum width of a street crossing is 1200mm. Where the pedestrian has to cross many lanes of traffic, center islands are extremely helpful because they reduce the distance the pedestrian has to walk on the road at one time without protection. Central islands convert two-way roads into two separate one-way roads, which are much easier to cross. They can also calm traffic and reduce vehicle speeds. Centre islands should be at least 1500mm wide across the direction of the road to cater for wheelchairs, with a cut through at the surface level of the crossing, at least 2000mm wide along the length of the road.

The safety of a crossing can be significantly improved by extending the footway out across any parking lanes **(Figure 3.5).** This has the triple purpose of reducing the width of roadway to be crossed, slowing vehicular traffic and improving the ability of pedestrians and drivers to see each other. Crossings should be laid out with ample space, especially at the top of the kerbed ramp to allow easy passage for pedestrians who are not crossing the road.

It is important to design crossings following consistent patterns, to enable visually impaired users to

orientate themselves easily. For instance, the traffic signal pole should always be on the left (or the right) of the crossing; and the push button at the same height (about 1000mm above the ground).

Figure 3.5: Extending the footway out across parking lanes at a crossing



Source: DPTAC (1988)

Plate 3.1: Example of extending the footway at a crossing

Source: Based on Oxley (2002)

Kerb ramps: Kerb ramps (also known in some countries as dropped kerbs, beveled kerbs, flush kerbs or kerb cuts) should be used wherever footways cross roads, medians or other raised surfaces. The ramp should have a minimum width of 1200mm. At crossings, the ramp should be as wide as the crossing (minimum 2400mm), especially in new construction where the cost is minimal. Kerb ramps should be free of obstructions such as signposts, bollards and traffic lights. They should also not project into the roadway where they would obstruct traffic. Where possible, the bottom of the ramp should be installed flush with the roadway, as even a small 'lip' of more than 6mm can cause the front wheels of a wheelchair to swivel sideways and bring the wheelchair to an abrupt and dangerous stop.

The landing at the top of the kerb ramp is an important component of the ramp. It provides a level area for persons to bypass the kerb ramp, as well as for wheelchair users to change direction after ascending the ramp. Changing direction across the flared sides of the ramp would be much more difficult. The landing should be at least 1200mm but preferably 1500mm wide.

The maximum gradient should preferably be 8% (1 in 12) on the ramp itself and 9% (1 in 11) on the flared sides. A ramp that is too steep is inaccessible and unsafe, as it cannot be used by wheelchairs and is harder to negotiate by pedestrians. As with footways in general, slope changes between kerb ramp and pavement should be gradual to prevent the front wheels of a wheelchair getting caught. Similarly, the change in slope from the ramp to the gutter and roadway should not be more than 12% over a 600mm length, and preferably not more than 10%.

Kerb ramps should as far as possible be oriented perpendicular to the kerb. Skewed ramps can cause problems for wheelchair users and persons pushing trolleys or carts, as a skewed approach can lift one wheel off the ground, compromising balance and control. It follows that providing two ramps at road junctions is far preferable to only one, if space allows. The single ramp design has the additional drawback of aligning pedestrians in the wrong direction, and could lead visually impaired persons inadvertently into the middle of the junction.

Drainage should be provided near the bottom of kerb ramps, but drainage gratings should not be located in the crossing itself.

Traffic signals: most countries have guidelines on when to install traffic signals at crossings, depending on the prevalent safety and traffic flow conditions. If a traffic signal is used, the red phase should keep traffic stopped for about 12 seconds for a 7.5m crossing to allow most disabled pedestrians to complete their crossing. Signals are available (the'Puffin'crossing in Britain) that use pedestrian detectors to extend the crossing time for slow walkers. Signals that can be activated by the pedestrian using a push button box are useful, particularly at mid-block crossings. A large diameter (up to 50mm) raised button that can be activated by a closed is usable by most people. Traffic signal poles and push buttons should also be color contrasted.

At signalized intersections audible signals can be very useful to visually impaired pedestrians. Audible signals may encourage safer crossing behavior among children. These signals have a bleep which sounds during the first part of the green phase to indicate when it is safe to cross the road. To help visually impaired pedestrians the push button box should be located consistently at crossings.

Tactile warning surfaces Tactile surfaces are important at the edge of street crossings to warn visually impaired pedestrians they are about to step on to the road. It is important that, whatever tactile surfaces are used, they are used consistently and sparingly to avoid confusion within a country. Layouts should also be consistent. Research conducted by TRRL has indicated that flat topped domes are acceptable both to people with ambulant disabilities and to wheelchair users (Department for Transport and the Regions, 2005).

Traffic calming: various methods can be used to increase crossing safety by reducing the speed of vehicles. Traffic calming measures like speed bumps or pinch points can be very effective in Kenya due to their low cost nature. Raising the surface of a crosswalk can be used both to slow down traffic and to provide a level crossing for pedestrians. In Santiago, Chile, for example, raised crossings are used effectively at side streets and junctions to slow down right- turning cars (in right-turning traffic). Raised crossings should be designed with a minimum width of 2400mm (as other crossings), and built at the same level as the footway. The draft Kenya Urban Roads Design Manuals has design criteria for traffic calming.

Pedestrian guardrails: Guardrails may help to improve pedestrian safety at road intersections

in cities in Kenya where poor road user discipline is the cause of many accidents. To be clearly detectable, guardrails should be at least 1100mm high and painted to contrast clearly with the surroundings. Simple galvanized railings are not acceptable unless they have contrasting markings on them.

3.6. Vehicle design and operation

Although design solutions may differ between modes of transport, many of the ergonomic and design requirements for vehicles are the same for buses and minibuses. Section 3.3.1 concentrates on the design and operation of buses, but summarises guidance on the other modes of public transport where it differs from that for buses.

For all forms of public transport, a distinction should be recognised between two different levels of accessibility. The first concerns the design features and operational procedures that improve access to those people with disabilities who can walk, but with difficulty, and can climb at least a few steps. These features and procedures often cost very little to implement and can assist over 90% of people with disabilities. They also assist many non-disabled people who are temporarily handicapped because they are carrying luggage, shopping or children, or are temporarily impaired by an injury.

The second level of accessibility is that which enables a passenger in a wheelchair to board and travel in a public transport vehicle. Depending on how this access is achieved, it may improve ease of use for all passengers, as is the case with low-floor vehicles or level boarding from a platform. But if access depends on the use of special equipment such as a lift, either vehicle-mounted or mobile at a station, the majority of passengers gain no benefit from the improvement.

Provided the design of vehicles is based on universal and inclusive design principles, the features that provide accessibility for people with disabilities will make travelling easier for everybody, and may provide economic benefits through increasing ridership.

3.6.1. Design and operation of buses

Guidance on bus design and operation is available in Overseas Road Note 21 *Enhancing the mobility of disabled people: Guidelines for practitioners* (DFID/TRL, 2004), *Improving transport accessibility for all* (ECMT, 2006), various British Disabled Persons Transport Advisory Committee

(DPTAC) recommended specifications and Research *on the ergonomic capabilities of public transport passengers* (Mitchell, 2007). Another useful source of guidance is the World Bank's *Bus Rapid Transit Accessibility Guidelines* (Rickert, 2006). COST Project 322 *The low floor bus system* gives guidance on low floor buses (COST, 1995).

In this section, reports are largely taken from *Enhancing the mobility of disabled people: Guidelines for practitioners* (DFID/ TRL, 2004), though with amendments by the author drawing on other guidelines and experience of making systems accessible.

Large capacity buses transport significant numbers of passengers in cities on all continents. In Europe, significant gains were made in the accessibility of buses through the use of lower-floor vehicles with low steps, well-designed handrails and other low cost features. This was followed by the development of low-floor vehicles, which provide step-free boarding to wheelchair users and all other passengers. Lower-floor vehicles are gradually being introduced in cities in South America and Asia. Yet, in Kenya, buses with high floors (typically 1m above ground level) remain popular due to their affordability and their suitability to rugged operating conditions. Their entrances (narrow, steep, and with high steps) and internal layout (narrow seat spacing) make them difficult for many passengers, especially for those with less agility. Significant improvements can, however, be made even before addressing the problem of high floor heights, which is ultimately needed.

Another universal design solution is the use of specially designed high-floor buses with boarding platforms. These increasingly popular 'Bus Rapid Transit' systems largely serve concentrated high-volume corridors in cities, but still require conventional boarding solutions along feeder routes off the main corridors. It is therefore likely that the use of conventional buses will continue to predominate in Kenya for at least the foreseeable future.

This section considers both full wheelchair access and incremental improvements to conventional buses to help people with disabilities to board, travel in, and alight from such vehicles more easily, quickly and safely. Improvements are needed in both the design and operation of bus services. Solutions like clear signage, adequate handrails and priority seating can be implemented at low cost and help to retain existing users as well as to attract new ones and boost revenue. To capture the

maximum benefits, improvements to vehicles should be coordinated with improvements to infrastructure.

Table 3.5: Basic Principles of design of vehicles

Safety: • Wheelchair users should be able to travel safely. • Dedicated wheelchair space for wheelchair users to remain seated in their wheelchairs. • Smooth driving and braking to avoid injury. • Ways to request a stop without passengers leaving their seats. • Handrails and stanchions for boarding, alighting and standing passengers.	**Accessibility:** • Easy and unhindered boarding via steps (if any). • Level boarding for wheelchair users into bus. • Step noses and hazards highly visible. • Priority seats near entrance available for disabled passengers. • Easy stowage of mobility aids (wheelchairs, walking sticks). • Clear signage indicating bus route/ destination, fare, and other relevant information. • Bell/light activation to inform driver of request
Reliability: • All advertised accessibility features available and working. • Bus stops in same place every time. • Clear announcement of major stops. • Bus driver and conductor providing helpful service and assistance	**Affordability:** To the provider: • Retrofit existing buses with low-cost features for ambulant passengers. • Introduce wheelchair access route by route to the user: • Concessionary fares could be considered.

Source: Based on Oxley (2002)

ECMT (2006) lists various measures to assist ambulant disabled people on buses:

For people with impaired sight:

- Clear marking of the edge of any steps (contrasting band on leading edge of steps);
- Color contrasted handrails and stanchions;
- Color contrasted bell pushes;
- Audible announcements (of next stop, terminus, etc.);
- Audible announcements at bus stops of service number/destination of next bus;
- Adequate space in the priority seating for guide dog.

For ambulant disabled people:

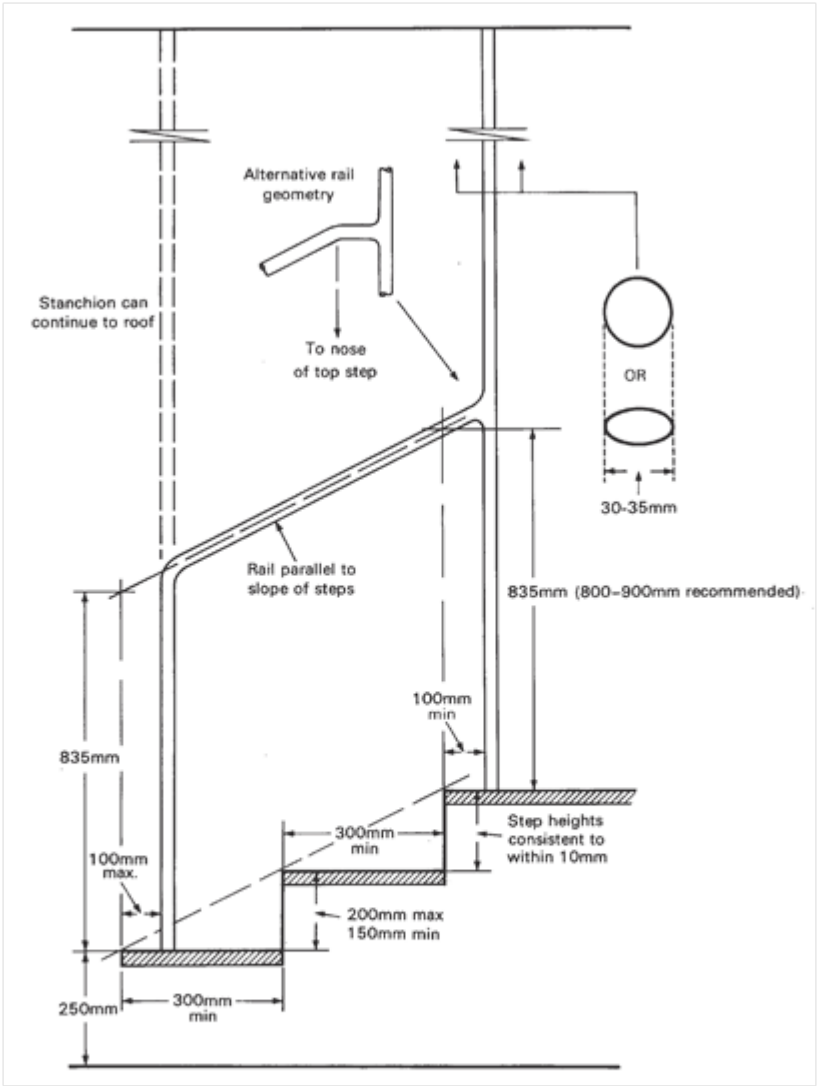
- Any interior steps to be between 120 and 200mm and all of the same height (± 10mm);
- Gangway width to be a minimum of 450mm, and preferably 550mm, up to a height of 900mm above the floor, increasing to a width of 550mm at a height of 1400mm above the floor;
- Stanchions/handrails to be at intervals of no more than 1050mm apart down the length of the bus;
- Bell pushes within reach of a seated passenger (1200 to 1400mm above floor);
- Priority seating with a minimum pitch of 650mm; this gives sufficient space for people with stiff legs to get in and out and sit down easily;
- Compulsory kneeling of low-floor vehicles at all stops, as for example, in Munster.

In general, all surfaces should be non-slip and all entrances and exits should be well lit and have appropriately placed handrails.

i. Best practices – Incremental improvements, but not full wheelchair access

Bus entrance: The height and steepness of steps in high-floor buses are often major barriers to users with disabilities. Entrances can be improved through adequate design of steps and the installation of handrails and grab handles.

Figure 3.6: `Recommended geometry for bus entrance/exit steps and handrail



Source: DPTAC (1988)

Note: *The handrail shown is for the center of a two-stream entrance. Handrails at the sides of entrances should have the sloping rail and the vertical rail near the outside of the bus. The vertical rail should extend to within 200mm vertically from the first step. Handrail centerlines should be 50mm from bulkheads or doors. On a low-floor bus, there should be a vertical rail near the outside of the bus plus a horizontal rail 800 - 900mm above floor level.*

Specifications for steps vary somewhat between countries, and local circumstances dictate what can be achieved, so a useful starting point is to state what is considered 'ideal' for enabling ambulant disabled people to enter and exit buses easily and safely. Working back from there, one can suggest what is adequate in the short to medium term. The UK's *Disabled Persons Transport Advisory Committee (DPTAC)* has advised on'ideal'specifications. But the study acknowledges that many operators cannot meet these standards with existing fleets, so a less-than ideal specifications that may be used during a transition period is included. **Table 3.6** summarizes both the ideal and the transitional specifications for vehicles which are not designed with a low floor. **Figure 3.5** illustrates an entrance that complies with the 'ideal' specification.

Table 3.6: Ideal and transitional specification for bus entrances (no wheelchair access)

	Ideal	***Transitional***
Maximum first step height	250mm	325mm
Maximum height for subsequent steps	200mm	225mm
Maximum number of steps (total)	3	3
Maximum ground to floor height	650mm	775mm
Minimum depth of steps	300mm (280mm on vehicles less than 2.5m wide).	
Step risers	Vertical, smooth, flat, color contrast on nose.	
Minimum ceiling height at door	1.8m above first step.	
Entrance width between handrails	Min 700mm, max 850mm (single stream) min 530mm, Max 850mm (for wider doorways with central handrail). Handrails to start within 100mm from outside edge of first step.	

Source: DPTAC (1996)

In the UK, the Public Service vehicle (PSV) accessibility regulations 2000 require all buses carrying more than 22 passengers to be low-floor. Bus operators, regulators and other stakeholders in Kenya must use their own judgment to select from this range of specifications to suit local conditions.

A low-cost way to lower the distance to the first step without interfering with the need for high clearance of the bus chassis, is to use a foldable step attached to the stairwell. The step is either deployed automatically when the door opens, or manually by the driver. The aisle should be at least 450mm wide and preferably 550mm wide, up to a height of 900mm. The width should be 550mm at a height of 1400mm above the floor.

Handrails and stanchions **:** falling is a major cause of injuries to bus passengers, and fear of falling is a deterrent to bus use among elderly and disabled people, so provision of adequate handrails can be of major assistance. Handrails at the entrance are very important. Handrails are even more necessary when step heights and depths depart from the 'ideal' dimensions of **Table 3.6**. In fact, handrails can to some extent compensate for the adverse effects of inadequate step design. Entrance handrails should extend as far towards the entering passenger as possible, starting from a point within 100mm from the outside edge of the first step. Handrails are needed on both sides of the entrance. Folding doors may need to be strongly-built or stiffened to support handrails.

Sloping handrails (parallel to the slope of the steps) are needed in addition to the vertical rail close to the outside of the entrance. Handrails can be fixed to the inside of the door as long as they do not move excessively when the door is open. If possible, handrails should be provided in a continuous path from the entrance at a height of 800 - 900mm, past the driver, to at least one of the priority seats, to help visually impaired and other disabled passengers reach their seats.

Handrails should be round, 30 to 35mm in diameter, and fixed with a minimum clearance of 45mm to the adjacent surface to allow for good grip. Good grip is also promoted by using a non- slip rather than a polished finish.

Inside the bus, vertical handrails or stanchions at every second row of seats are very helpful to passengers moving around or standing. If there are many standing passengers, stanchions could even be provided at virtually every row. The maximum recommended distance between handrails is 1050mm so people can reach from one stanchion to another. Inward facing seats should have one vertical stanchion to every two seats. Many passengers are not able to use hanging straps and ceiling mounted rails.

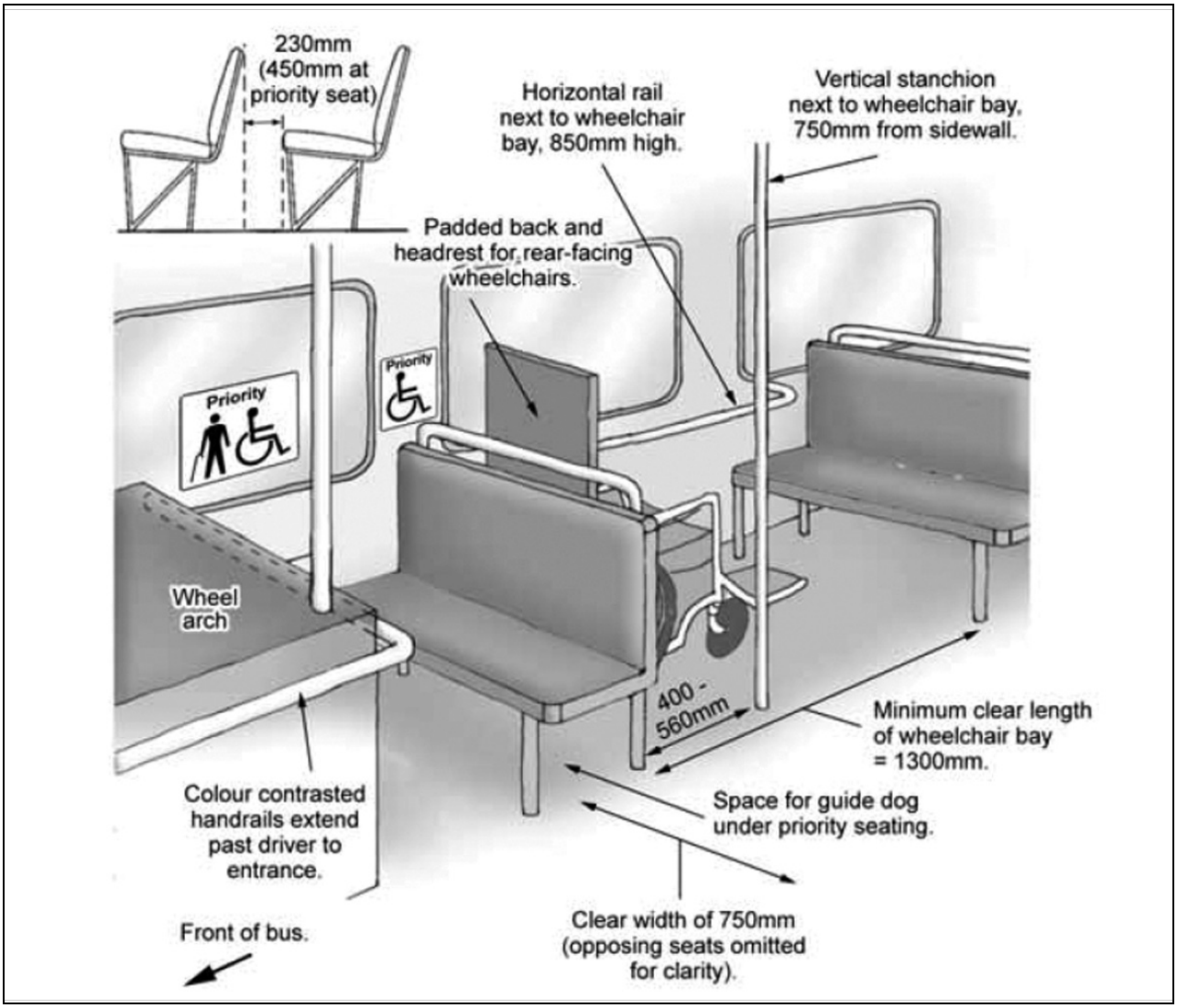
For good visibility, handrails and stanchions should be painted in a color contrasting with the surroundings, such as bright yellow, orange, or bright green, with bright yellow preferred. The same color should also be applied to the edges of any steps, the outlines of information sources, fare boxes and bell pushes.

Seats and floor: the floor of the bus should preferably be flat and level from the entrance at least to the middle of the bus to make it accessible for wheelchair users. Many passengers feel insecure on sloping surfaces, and would also want to avoid internal steps. If no alternative exists, steps of 150mm to 200mm high or slopes of up to 1:30 (over short distances) are recommended.

To allow the highest number of passengers to travel whilst seated, seats should be at least 450mm wide (per passenger), between 430mm and 460mm high above the floor, and allow at least 230mm standing space **(Figure 3.7).**Well-spaced seats will help speed up boarding and alighting as passengers can move to and from their seats quickly. If these dimensions cannot be provided throughout the bus, they should at least apply to the first few rows of seats. Handholds on the top of seats are also very useful to help passengers to get up from the seat. It is best practice to reserve two or more seats for elderly and disabled passengers, as many find it impossible or dangerous to stand in a moving vehicle. These seats should have 450mm leg room if possible.

Priority seats Priority seats are especially important in overcrowded buses. These seats should be as close as possible to both the driver and to the entrance/exit, to improve communication with the driver and to minimize the distance walked in the bus. It is best practice in two-entrance buses to allow disabled passengers to board and alight through the front door, even if all other passengers must board through a rear door. Clear signage should identify priority seats. Seats installed on top of the wheel arches are not suitable for most disabled people as they are usually raised further from the floor and subject to higher acceleration forces (discomfort). Priority seats should be either forward or rearward facing, with leg room extended to 450mm, and adequate space should be available under them for a guide dog to lie down if needed.

Figure 3.7: Recommended layout and interior dimensions for buses



Source: Based on DPTAC (1996), DETR (2000) and COST 322

Note: *DPTAC, and some other guidelines, give 1300mm as the length of the wheelchair bay. This is sufficient. COST 322 gives 1500mm from backrest.*

Aisles The aisle should be wide enough for all passengers to move freely: a minimum unobstructed width of 450mm is recommended. Directly behind the driver (at least up to the priority seating and wheelchair bay, if there is one) this should be increased to 800mm to assist with passenger circulation.

Bell pushes in buses that stop on request only, bell pushes are needed to signal a request for the next stop, positioned so that they can be reached by seated passengers (1200mm - 1400mm above the floor). This makes it not only much easier for speech and hearing impaired people to use the bus, but also safer for all passengers – and disabled passengers in particular – by not having to leave their seat while the bus is moving. Bell pushes that can be pressed with the palm of the hand are preferable as they assist people with arthritis and rheumatism. However, mechanical systems that are activated by pulling on a cord can also be used if other options are not available. Bell pushes should be available throughout the bus, not more than 1500mm above the floor for standing passengers, but should at least be installed next to priority seats. To reduce anxiety and aid hearing impaired passengers, many bell systems light up a 'STOPPING' sign in the front of the bus when the bus has been requested to stop.

Signage and information: Clearly legible destination and route number displays on the outside of the bus are essential for passengers to identify their bus, and helpful for all passengers especially at night. Both the route number (if used) and the destination are most important on the front of the bus (to help identify an approaching vehicle), but displaying the route number on the side (to confirm the information) and the back (to identify it to passengers approaching from that direction, and to confirm whether a bus was missed) is helpful.

Signage should be printed using lower case letters at least 200mm high (for route numbers) or 125mm high (for destinations). White or bright yellow letters against a black background are most clearly visible, especially for visually impaired passengers. Signs should be illuminated at night. Signage is best mounted above the windscreen where it is not hidden by other traffic, but cheaper options such as printed signs fastened to the inside of the windscreen are also possible provided they remain clearly legible.

Driver operation: *Drivers* and conductors can greatly increase the usability of bus services to older and disabled passengers by observing some simple operational guidelines. Accessible design features will not help much if passengers are first required to jump on board a moving vehicle or to cross lanes of moving traffic before boarding. Reliability and predictability of the service is very important to many disabled people including visually and intellectually impaired people. Predictability can be enhanced by consistently stopping the vehicle close to the kerb and next to the

bus pole at stops. Drivers should call out major stops, transfer points, or the end of the line, sometime before arriving at the stop. This greatly assists visually impaired passengers, for whom the need to identify the correct stop at which to alight is a major barrier. The practice also benefits occasional users and tourists. If no amplification system is available, the announcement should at least be audible in the front of the bus (where prioritized seating should be provided).

Driving behavior is also very important: a well-driven bus with smooth acceleration and deceleration (i.e. without sudden jerks and hard braking) improves safety and comfort for all passengers. The driver should also wait until all passengers (and specifically frail, older and disabled passengers) are seated before starting to move from a bus stop.

Fare policy Many governments have the practice of subsidizing bus travel for disabled people by charging them at reduced fares or no fare at all. While this is undoubtedly helpful to overcome affordability barriers among the poorest of disabled users, the issue of concessionary fare policies should be considered with caution to ensure it does not substitute for other physical or operational improvements to the bus service that could be more cost-effective.

ii. Best practices – Full wheelchair access

ECMT (2006) lists measures to assist wheelchair users on buses as:

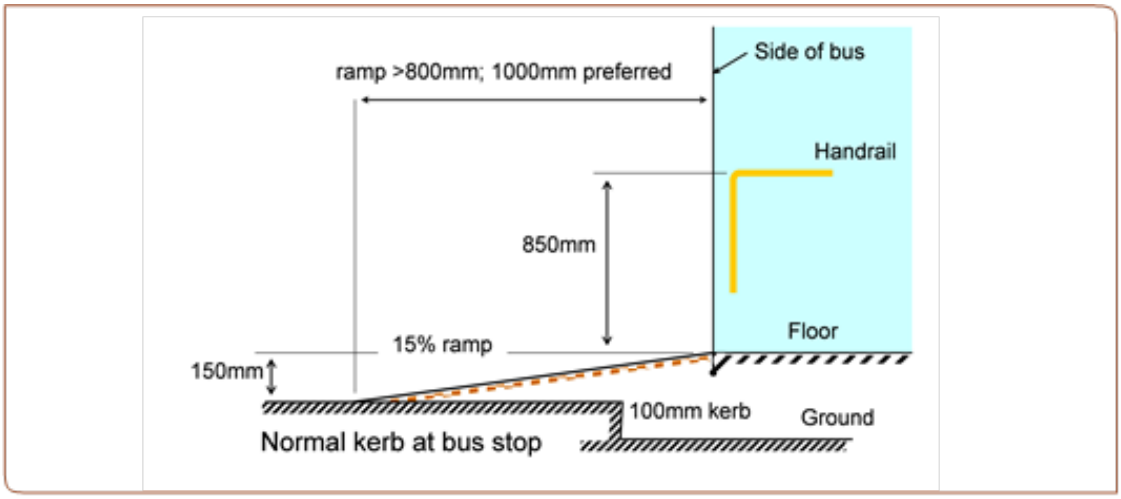
- Minimum gangway width from entrance to wheelchair space of 750mm, preferably 800mm or more;
- A wheelchair space clearly marked as such, with a flat surface without obstacles and with minimum dimensions of 1500mm x 750mm as well as space to maneuver;
- It is safer for the wheelchair passenger to sit with his or her back to the direction of travel; there should be a back rest (300mm wide and from 480 to 1400mm in height) against which the wheelchair can rest, a clear space of 300mm behind the backrest for the large wheels of a manual wheelchair, a horizontal rail at a height of 850 - 1000mm to one side of the space and a bell push within easy reach. On the gangway side there should be a device (for example a stanchion or a movable armrest) to prevent the wheelchair swinging into the guide way;
- The general consensus is that on low-floor buses in urban areas, there is no need for the wheelchair and occupant to be secured against fore and aft accelerations. (This comment

relates to ECMT countries. Poor driver training or bad geography can create problems, and some wheelchair users always need securement due to lack of body strength.)

Boarding for wheelchair users: The best way to allow wheelchair users to board buses is through universal design: the use of low-floor buses with boarding ramps, or high-floor buses with raised boarding platforms (such as those used in many bus rapid transit systems). These options also benefit the operator by speeding up boarding and alighting. Achieving universal access requires a systems approach that pays attention to multiple vehicle, infrastructure and operations related aspects. On low-floor buses, the most reliable and lowest cost boarding ramps are those hinged along the outer edge of the floor at the doorway, that lie flat on the floor when not in use (**Figure 3.8**). These are deployed manually, which requires the driver or conductor to go to the doorway to deploy the ramp.

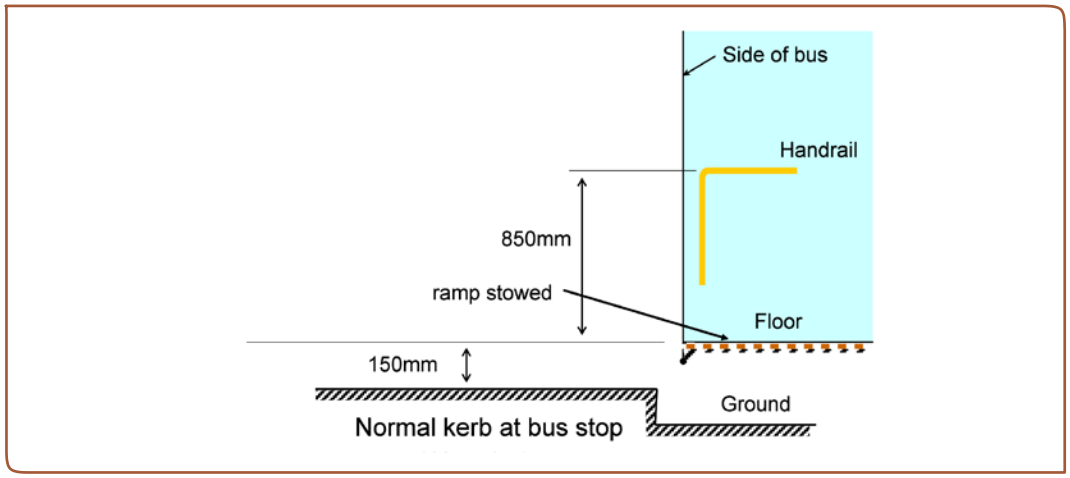
Other options for overcoming the height difference between the ground and the bus floor include the use of mechanical lifts (deployed either in the main doorway or from a separate doorway), and level boarding from small roadside platforms, using a removable bridge piece to cover the gap. Both of these options are only deployed when needed by a disabled person. Wheelchair lifts are the more expensive option, both to acquire and to maintain, and thus may be less affordable for widespread use in bus fleets. But lift-equipped high-floor vehicles, especially if these vehicles are used on routes that are specially designed to serve persons with disabilities, have been shown to be an effective means of creating accessible transport for some disabled users. They are also appropriate for high-floor long-distance coaches (over the road buses).

Figure 3.8: Low-floor bus entrance, ramp deployed to pavement



Source: DPTAC (1988)

Figure 3.9: Low-floor bus entrance, ramp stowed for ambulant passengers



Source: DPTAC (1988)

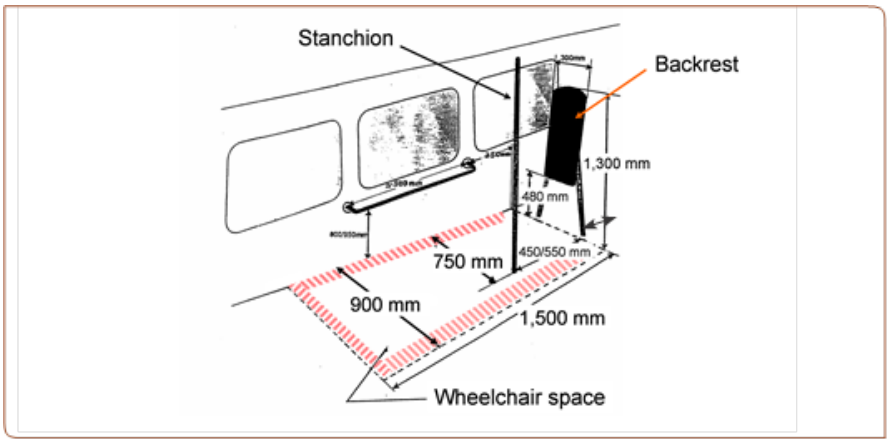
Where wheelchair lifts are used they must have a safe working load of 300kg and be at least 750mm wide and 1250mm long when deployed. Guardrails are needed along the sides and roll stops at least 100mm high are needed to provide security for a passenger using a wheelchair.

Wheelchair space: if wheelchair users can enter the bus without leaving their chair, there should also be a space inside the bus for them to travel in their wheelchair. The number of wheelchair bays required will depend on the demand for them; in Europe and North America up to two spaces are provided in city buses. Doorways should be 850mm wide to allow a wheelchair through. A clear width of 750mm from the doorway to the wheelchair bay should be provided, passing between the wheel arches if necessary. Wheelchair users can travel either facing forward or backwards, but not sideways, as a side-facing wheelchair can tip over more easily in case of sudden braking. The recommended dimensions for a wheelchair space are shown in **Figure 3.9**. The length of the space of 1500mm is important; a number of guidelines recommend a length of 1300mm, which is not sufficient.

Rearward facing wheelchair spaces should be located such that a user can back against a head and back restraint that can support the passenger in the event of an accident. A vertical pole or folding armrest on the aisle side of the wheelchair space prevents the chair moving sideways on corners, and a horizontal handrail on the side of the vehicle helps wheelchair users to steady themselves. A lap seatbelt can be used instead of the vertical pole or folding armrest. The backrest should be no wider than 300mm, and should have a clear distance of 300mm behind it at floor level, to allow the large

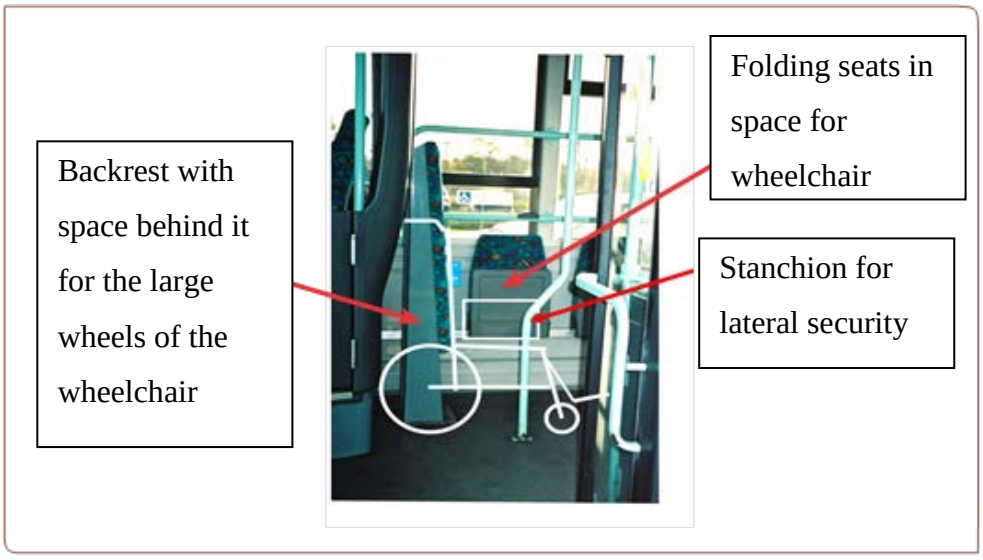
wheels of a manual wheelchair to fit either side of the backrest and not encounter any obstruction when the passenger in a wheelchair is positioned firmly against the backrest **(see Figure 3.10).**

Figure 3.10: Figure 4.5: Cost 322 recommendation for a wheelchair space



Source: *DPTAC (1988)*

Figure 3.11: Backrest for passenger in a wheelchair



Source: Airport bus, Belfast, Northern Ireland

Rearward facing wheelchairs are not usually secured to the floor with extra tie-downs. This practice is limited to larger buses in fixed route service in urban areas and depends also on an assurance that they are driven safely by well-trained drivers. In buses that travel at higher speeds, forward facing wheelchair spaces should be used, and should be anchored to the vehicle using tie-downs for safety. Wheelchair tie-downs should also be used for all wheelchairs in minibuses.

Experience has shown that providing a wheelchair space does not decrease the capacity of the bus, as the space can be used by standing passengers if no wheelchair user is present. Alternatively, side-facing hinged seats can be installed that can be folded away when the space is needed by a wheelchair user. The wheelchair space should be clearly marked as such and give wheelchair users priority.

3.6.2. Design and operation of mini- and midi-buses

The only way improvements can be made to the accessibility of vehicles – either through government-sponsored renewal of fleets, or incrementally as vehicles are slowly replaced – is government establishing stronger regulation and formalization of the industry, both in terms of vehicle standards and of operating practices. Only then will it be possible to address accessibility issues in small vehicles. The guidelines in this section are likely to be useful in situations where progress is being made with formalizing the industry so that providing a better service becomes a priority for operators.

Table 3.7: Basic principles for design of mini and midi buses

Safety: • Unobstructed space for wheelchair users to travel in their chairs (if possible). • Wheelchairs should be restrained where possible. • Smooth driving and braking to avoid injury. • No hazards or sharp edges that could injure passengers. • Single width ramp preferred to help wheelchair	***Accessibility:*** • Easy and unhindered boarding via steps. • Boarding devices should be available in wheelchair spaces are available. • Handrails and steps highly visible. • Priority seats near entrance available for disabled passengers. • Easy stowage of mobility aids (wheelchairs, walking sticks).
Reliability: • Drivers consistently stop to pick up disabled passengers. • Drivers and helpers providing helpful service and assistance. • Clear announcement of stops requested by passengers.	***Affordability:*** *To the provider:* • Include low-cost access features as requirements in concession agreements (where relevant). • To the user: • Prohibit extra charges for carrying wheelchairs and other aids.

Source: Based on Oxley (2002)

i. BEST PRACTICES

Vehicle entrance/exit: to provide easy entrance for ambulant passengers, the entrance to all vehicles (regardless of their size) should follow best practice guidelines. These include:

- Door width at least 800mm between handrails;
- Steps at least 400mm wide, 280mm deep; the first step no more than 250mm above ground level, other steps 200mm high;
- Handrails provided on both sides of the entrance, reachable from ground level all the way to the inside of the vehicle;
- Step edges (noses), handrails and top of door opening painted in a bright contrasting color.

If wheelchairs are being accommodated these dimensions should be increased in accordance with the guidelines given for buses. **(As set out in section 3.4)**

Seating:-Seating should provide sufficient space for people with walking difficulties to maneuvers easily. Standing space of at least 230mm (300mm for priority seats), and seats about 450mm wide are required to achieve this (see Figure 4.2). If these dimensions can be achieved in only one place (such as the seats directly behind the driver), a sign should indicate that these are priority seats for older and disabled passengers.

Access for wheelchair users:-Wheelchair access into existing minibuses is problematic due to the narrow doors, low roof heights and the limited internal maneuvering space typical of these small vehicles. The high costs of converting vehicles are therefore likely to limit wheelchair access to special programs using specially designed and subsidized vehicles.

Midi-buses with floor heights not exceeding 500mm may however be large enough to provide direct access for wheelchair users via a short ramp. The South African Federal Council on Disability has, for instance, recommended that new midi-buses to be used in taxi services provide portable ramps at a gradient of 1:4, but this steepness requires an assistant to push the wheelchair user into the vehicle (SAFCD, 2001). The 2m-long ramp has to be stowed safely inside the vehicle. Since these vehicles are custom-designed for public transport services, sufficient interior space can be provided for a wheelchair user, in combination with a foldable seat. The wheelchair space dimensions given for buses can be modified in consultation with local users to ensure the

majority can use it.

A passenger lift can also be fitted to a separate entrance to facilitate boarding. The lift should have a load bearing capacity of 300kg and a platform size of at least 750mm wide and 1250mm long. Color contrasted handrails on both sides and a 100mm sill should be available.

Even if floor space or height constraints preclude the provision of wheelchair access, it may still be possible for a passenger to transfer to a regular seat with help. Vehicles should at least have space for a folded wheelchair to be stowed safely.

Signage Clear and legible signage is important for all passengers to identify the correct vehicle to board or hail. Route numbers or destinations should be prominently displayed on vehicles. The use of color coding to indicate different routes or different origin and destination points has worked well in South Africa and helps not only some low-vision passengers but also people who are illiterate or unfamiliar with the system.

Communication: - Communication inside the vehicle between passengers and drivers/assistants is critical, as the vehicle typically only stops when requested or hailed by a waiting passenger. The small size of the vehicle usually aids easy communication between passenger and driver. But for visually impaired people it is difficult to identify when they are approaching their desired location, while hearing and speech impaired people find it hard to communicate their desire to stop. These problems may be partly addressed by installing a bell push centrally in the vehicle, and by training drivers to proactively ask visually impaired people for their destination when they enter the vehicle, and to announce when they are nearing the destination.

Operating practices Authorities can combat unfair discrimination and reduce cost for disabled people by prohibiting minibus drivers from charging extra for the carriage of wheelchairs, walking frames or other equipment needed for personal mobility. It is important for drivers to be courteous and aware of the needs of people with disabilities – more so perhaps than with formal systems, because operating practices are less formalized and therefore depend more on the judgment and attitude of the driver. This can be achieved by instilling greater awareness through training (see section 5.5), monitoring, incentives and contracting

arrangements. An effective enforcement mechanism may be to advertise a telephone number for passengers to lodge complaints or compliments, with effective feedback to drivers through incentives or criticisms.

3.7. Specialized transport services

Specialized services refer to transport services that are specifically tailored to the needs of passengers with disabilities. Specialized services usually use vehicles that provide full access to wheelchair users through mechanical lifts or ramps, and differ from regular public transport in the way they are operated. Services range from door-to-door services that exclusively serve disabled people, to 'Service Routes' (which serve the general public but are specifically routed to travel close to the origins and destinations of elderly and disabled people). Accessible (metered) taxis, although not a specialized service, are also used to provide kerb-to-kerb services for disabled people. The use of specialized transport services acknowledges that regular public transport cannot serve the needs of all disabled people: for example, many are unable to walk to, board, or travel independently in public transport vehicles due to the severity of their impairments. On a per passenger basis, specialized transport services are usually more expensive to provide than accessible regular public transport, and such services are often funded publicly to complement conventional public transport.

ECMT (2006) comments that "it is possible that the role of specialized services will diminish as more of the mainstream services become fully accessible, but it is probable that in some areas and some circumstances they will remain as a useful means of providing a better level of service to disabled passengers than can be achieved by conventional means. Certainly there is evidence that these services improve the mobility of many disabled people."

This is to be encouraged, both on grounds of equality of opportunity and of cost, since special services are almost always much more expensive to operate per passenger carried than mainstream transport. However, for some disabled people on some occasions – and for more severely disabled people – most of the time, the extra care that can be provided by special services will remain essential. The variety of special services is almost infinite, but they can be categorized to some extent.

3.7.1. Demand-responsive: individual transport

This is the group of services that provide transport for an individual (plus companion) door-to- door. They fall into two categories; voluntary car schemes and accessible taxi schemes.

Voluntary car schemes, in which the passenger is carried in a volunteer's own car, are quite widely used for taking people to out-patient treatment at hospitals. The volunteer will usually be paid a mileage allowance to cover running costs of the vehicle, while the service is free to the user. Such services can be very useful in rural areas where conventional modes of transport, accessible or otherwise, may be thin on the ground. These services, since they rely on the cars owned by volunteers are not appropriate for wheelchair users who cannot transfer from their chair to a car seat, though quite a lot of wheelchair users can transfer and so use ordinary cars. Some community transport services also provide a car service with a vehicle adapted to carry a passenger in his wheelchair.

Accessible taxis can, of course, be used by any disabled person provided they can afford the fare. For many disabled people, the fares are more than they can afford. To help overcome this problem various schemes have been introduced to make taxis available to disabled people at a heavily subsidized rate.

This type of service is frequently found in Scandinavian countries, especially Sweden, and in the UK. To be fully effective, the service should be provided by fully accessible taxis. In the UK this is normally done with accessible purpose built ("London") cabs, elsewhere multi-purpose vehicles or minibus taxis are used. It is important that the taxi driver has had disability awareness training.

Providing a service of this kind can be expensive for the funding authority (County and/or National government) so it is important to try and ensure that the people using it really do need it. Some form of eligibility criteria should be used and even then it is very likely that it will be necessary to impose an upper limit on the number of trips any one individual can make in a given time.

There is evidence to suggest that an accessible taxi-based service for disabled people can be more cost-effective than a shared-ride demand-responsive minibus service. In planning and developing

these types of service, it would be prudent to consider all the forms and systems; the most effective, in terms of use of resources and delivery of a good level of service to the individual, may be found by a combination of services rather than just one.

3.7.2. Demand-responsive: shared transport

Often known as Dial-a-ride or Dial-a-bus, this service also provides door-to-door service, using minibuses which should be equipped to carry passengers in wheelchairs. They are booked in the same way as taxis – by telephone or possibly by regular ("standing") order – and the theory is that the control office for the service will be able to organize the requests for trips in such a way that more than one individual is carried at the same time. This shared ride concept, if it could be achieved, would reduce the cost per passenger carried, in theory to less than the cost of an equivalent taxi journey.

In practice this often does not happen, with the result that the cost per passenger trip is higher than the equivalent taxi trip. However, taxi drivers cannot be expected to exercise the level of special care and assistance needed by some disabled people. Dial-a-ride drivers will not only assist passengers from their door to the vehicle, but may also help them to finish dressing. They may, for example in Copenhagen, carry special equipment to enable a wheelchair passenger to negotiate a flight of stairs. It is this level of necessary extra care which, as accessible taxis become more commonplace, should be used to determine whether Dial-a-ride is appropriate, and if so who should be eligible to use it.

3.7.3. Community transport and shared transport services

This is the category of services, again usually using lift-equipped minibuses, which provide collective transport for disabled people. They will provide a service from an individual's home to a facility such as a day center or luncheon club or to an accessible town center for shopping. The essential difference between these services and the ones described above is that they do not cater for individual requests for a journey, but take individuals to a collective or joint activity.

Community transport services are usually funded, at least in part, by local government and are available for use by a wide range of people, not just disabled or elderly. It is their general availability which distinguishes them from the host of transport services provided by disability associations for the use of their own members.

Although these services are specific in the sense that they are provided by and for the members of a specific association, they nevertheless represent a transport resource which may not always be used in the most effective way. When considering the planning and provision of special services, it is always sensible to include these "disability association" services in the planning process.

3.7.4. Hybrid services

Between the special services, of the types described above, and mainstream public transport services, there is scope for services which, while not being exclusively designed for disabled people, nonetheless offer a level of service beyond that normally associated with conventional public transport.

Probably the most widely-known example of this is the Swedish 'Service Route' system, but there are other examples such as London Transport's Mobility Bus. These services are designed to overcome the problems older and disabled people have in using accessible mainstream bus services, which are walking to and from bus stops, waiting at a stop, moving quickly to board and pay a fare, moving quickly to alight and possibly having to stand during a journey. The attributes of the Service Route class of service can be summarized as:

Use a fully accessible bus, usually medium-size;

- Time tabling of the service which allows more time at stops than on a conventional service;
- Routing of the service to serve places where there will be numbers of disabled passengers – residential homes, clinics, day centers, etc. This reduces walking distances to and from stops, at the expense of a more tortuous route and a slower journey;
- Flexible pick-up/set down points – hail stop where appropriate and possibly a degree of route diversion;
- Well trained drivers (and other staff).

It is possible that the role of this kind of service will diminish as more of the mainstream services become fully accessible, but it is probable that in some areas and circumstances they will remain as a useful means of providing a better level of service to disabled passengers than can be achieved by

conventional means. Certainly there is evidence that these services improve the mobility of many disabled people.

Another aspect of special services is their integration into mainstream transport. The Mobinet system in the Dutch town of Vorst is an example, using wheelchair accessible minivans as shuttles to regular public transport services. Door-to-door service is available to anyone who wants it, but people who are not disabled pay a premium fare for it.

The emphasis in this section is more on the operation and planning of specialized services.

Table 3.8: Basic principles for planning and operation of specialized transport services

Safety: •Vehicle design and features are safe to avoid injury. •Lifting equipment and ramps designed and operated safely to avoid injury. •Vehicles driven smoothly and considerately.	**Accessibility:** •Easy and unhindered boarding via steps (if any). •Level boarding for wheelchair users into vehicles. •Hand grips and steps highly visible. •Easy stowage of mobility aids (wheelchairs, guide dogs, walkers). •Signage identifying vehicles and specialized service. •Call-in telephone service for reservations or queries (if any) with text telephone/ TDD •Alternatives to telephonic booking for non-telephone owners.
Reliability: •All advertised accessibility features available and working. •Driver/staff provide helpful service and special assistance where needed.	**Affordability:** •Affordable fare for targeted passengers with disabilities.

Source: Based on Oxley (2002)

i. Best practices – Door-to-door services

Choice of vehicle: Current door-to-door services typically use small vehicles (mini- or midi-buses) as they are cheaper to operate (especially if a ramp can be used for wheelchair access rather than mechanical lift). Small buses may also be better able to negotiate narrow lanes and poorly maintained roads in residential areas where regular public transport vehicles do not operate. In some parts of the world volunteer drivers carry disabled passengers in their own car. Such services can be very useful in low density areas where conventional public transport is scarce, but since regular

private vehicles are used they can only serve ambulant passengers and wheelchair users who are able to transfer to a car seat.

Choice of operator: Many door-to-door services in the United States are contracted out to private operators, many of whom are taxi companies using regular taxis and wheelchair accessible taxis or vans to provide the service in urban areas. Contracting out of the service typically results in lower costs to the subsidizing agency, as taxi operators frequently achieve very low profit margins but nonetheless provide an efficient service (TRB, 1998a). The use of taxis especially in urban areas takes advantage of the inherent efficiency of the taxi system in high demand areas using vehicles with lower capital costs and operating costs than other vehicle types that could provide such a service.

Trip reservation: Reservations for door-to-door services are typically made by telephone, between two days and a few hours in advance of the trip. This gives the operator enough time to assign each trip to a vehicle. Telephone reservation does, however, require passengers to have access to a telephone. If access is a concern it becomes more important to work with social service organizations and social workers in the area to ensure reservations can be made through alternative means.

Eligibility: Passengers are usually required to pre-register for using door-to-door services in order to make sure that only eligible people use it. Best practice in eligibility certification uses face-to-face contact with potential users to determine if they are eligible for specialized services (for instance if they are functionally unable to use regular public transport) (TRB, 1998b). This is considered a better approach than simply screening people on the basis of the type of their disability.

Vehicle scheduling Thought needs to be given to good scheduling of vehicles, to ensure vehicles carry as many passengers as possible on each trip, without making passengers wait too long. If stops are ‘clustered’ in the same neighborhood or corridor rather than scattered over a large area, more passengers will be carried at a lower cost per trip, making the service more cost effective. Although software is available for automating the scheduling exercise, simple manual scheduling techniques undertaken by a person well familiar with the area, have been shown to be adequate for systems with less than about 25 vehicles.

ii. Best practices – Service Routes

Service Routes are designed to overcome the problems older and disabled people have in using accessible mainstream bus services, which are walking to and from bus stops, waiting at a stop, moving quickly to board and pay a fare, moving quickly to alight and possibly having to stand during a journey.

Choice of vehicle Service: Routes are usually operated by medium- or full-size vehicles with higher capacities than door-to-door services. Vehicles are fully accessible, almost always low-floor.

Route planning and schedule Service Routes operate along fixed routes which are specifically chosen to connect origins and destinations frequently used by older and disabled passengers. Thus routes may run past retirement homes, home-care facilities, medical facilities, social service facilities, and shopping areas. They maximize access to various destinations by minimizing walking distances to and from bus stops. Typically, this comes at the cost of increased travel time as routes are more circuitous.

Service Routes also often have more flexible pick-up/alighting points, including stop-on-demand (instead of only at designated bus stops) and possible route deviation. With route deviation services it is possible to deviate slightly from the core route on request. The timetable usually allows more time at stops than on conventional services. Staff is specially trained to take account of the needs of elderly and disabled passengers. Both service routes and door-to-door services can be used to provide a feeder service to accessible bus routes or railroad stations.

iii. Best practices – General

Fares Door-to-door services typically charge between one and two times the fare for an equivalent trip by public transport. As with other accessible services, specialized services should be priced to ensure that disabled people, many of whom have very low incomes, can afford to use them. This often requires subsidies from government, as the services are more expensive to provide than general use-services. The eligibility process can be used to ensure that subsidies are targeted at those who really need them because they cannot access any other transport services.

Operating rules: Restricted capacity usually forces Dial-a-ride services to limit eligibility for the service to people with disabilities. However, if extra capacity exists the service can be marketed to other potential passengers to become more cost effective whilst providing a service in an increasingly integrated setting. A premium fare could be charged to non-disabled passengers to increase revenues and ensure the sustainability of the service. Service Routes are usually not limited by capacity in this way, and are available to any passenger on a 'turn up and go' basis.

Training: Drivers and assistants on door-to-door services and Service Routes should be trained to provide a high quality service to disabled passengers. Assistance should be given during boarding and alighting and in ensuring that wheelchairs are secure and that their occupants are safe to travel.

4. METHODOLOGY

"It's Common sense to take a method and try it. If it fails, admit it frankly and try another, but above all, try something.-Franklin D. Roosevelt (1882 - .1945)"

4.1. Introduction

This research focuses on how the lack of understanding of disability in Nairobi Society affects the creation of a non-responsive public transport environment and how disabled people experience and overcome their socio-spatial barriers.

This study has used multiple methods, whereby the participatory approach, qualitative interviews and surveys complement one another in providing research data. The participatory approach was adopted in order to pave the way to disability research which empowers its subjects. French and Swain (1997) distinguish participatory and emancipatory research which they note has both distinctive qualities and overlaps. The participatory approach has its roots in the qualitative approach which views research subjects as research participants. The emancipatory approach, which this study has employed in its research strategy, has roots in the Disability Movement. Disabled people take part in agenda setting and in research strategies of which the findings will effectively shape their lives. In so doing, disabled participants must play a role at all stages of the research process (Kitchin, 2000:38; Oliver, 1992:102). Furthermore, the role of the researchers themselves should include engagement in the process of emancipation, rather than merely exploring

Additionally, researcher, with the knowledge and skills has simply acted as a facilitator, as Oliver (1997:17) notes:

{...researchers have to learn how to put their knowledge and skills at the disposal of their research subjects, for them to use in whatever ways they choose. disabled people's lives from *'sympathetic side-lines'* (Stone and Priestley, 1996:703).

4.2. Analytical framework for Disability studies

Oliver (1996) points out that the majority of research concerning the lives of Persons with disabilities is carried out using the interpretative approach, which does not include the personal experiences of disabled people. To some extent, there has been an absence of articulation about the views of disabled people. Many disabled participants appear as *'passive objects for interviews and*

observations designed by researchers with no experience or sensitivity to the day-to-day reality of disability' (ibid: 139).

In order to understand the relationship between socio-cultural elements and perceptions of disability, Anderson (2005:255) suggests locating *'the site at which ideas of normalcy and deviance are taken for granted and where representations of truth change'*. Furthermore, accessibility to public transport must inevitably include the human rights issues of disabled people. To understand rights in accessing the public transportation, it is crucial to consider what viewpoint we adopt about people with impairments. Neo-Marxist thinkers (such as Mike Oliver) view disability as a social construct determined by economic capacity: disabled individuals face a disadvantage in terms of capital, because they are labelled as under- or non-productive (Kitchin, 1998:348). In this sense, it is important to include the notions of power underpinning access for the disabled individual and collective groups. Furthermore, employing the concept of human rights, which views people a shaving, rights to movement and mobility can be a way to eliminate social segregation. This *is* useful in approaching the *knowledge* and explanations of inclusive spaces for *disabled people.*

Additionally, research about the *spatial* requirements of people with disability needs a deeper qualitative base in socio-cultural and political economic understanding. For Freund (2001), it is misleading to determine the requirements of the population with impairment by *'head counting'*, in other words, using a quantitative-based perspective.

As Crow (1992) contends, although disabled people have been oppressed by external barriers, their experiences from a subjective viewpoint are an integral part of their everyday reality. Having acknowledged and integrated the experience of impairment, the study has subsequently acknowledged the capacity of both individuals, and disabled people collectively, to work against disability.

In Kenya, the actors who have been charged with addressing inaccessibility problems such as policy makers, authorities, designers and builders, are often without any personal experience of disability. This is problematical because it may lead to removing disabled people's lived experience from research agendas (GoK, 2013). Disabled people's spatial requirements are frequently set aside or perceived as a mere source of information in solution strategies or research projects. The role of the

disabled person is often cast as that of the passive recipient, such as in the process of policy implementation or in designs to overcome physical barriers. Consequently, 'more and more disabled people are refusing to participate in research over which they have no control and which they regard as likely to further their oppression' (Oliver, 1990b:9).

Therefore, it is a requirement that the research method should include participants' spatial experience. For instance, by including in-depth interviews, researchers and participants are able to articulate and listen to one another's points of view about disability. By participating with research informants, Singal (2010:422) adds that this method provides the opportunity to focus on 'listening to research participants, who are the real experts in knowing their situations'. The lived experience approach is helpful in deepening understanding of the key social attributes, such as opinions about inaccessible spaces, about the practices of state authorities, and about disabled people. Such variables require knowledge from people with direct experience. This empirical approach is, however, a considerable challenge in a context where the data sources are inadequate or absent, or difficult to access, and/ or deliberately distorted for the purposes of competitive advantage (Healey and Barrett, 1990:99).

4.3. Research planning and design

Having reviewed relevant literature, it is appropriate here to highlight the modality necessary for successful accomplishment of the aim and objective of this study. Again it is important to bear in mind that the focus of this study is to examine the effect of prevailing access challenges in public transport on the livelihood of PWDs. This study has bridged the areas of urban transport planning and development to analyze the implications of access challenges in public transport has on PWD’s travel pattern and general livelihoods. Both theory and reality or practice will be given necessary considerations in this study.

The research method advanced for this thesis involved a logical plan of activities and process of research that addressed credibility of the study findings. The questionnaires, field observations and in-depth interviews formed major research instruments. Data for the study was obtained through primary and secondary sources. Secondary data was obtained from various extensive literature-published and unpublished materials, technical reports and thesis and journal articles. Digitized maps were also be used for description of spatial characteristics of the study area.

4.3.1. Pilot study

A pilot study that explored the possibility of research participants and agendas was conducted in this research project within the Nairobi Central Business District. The CBD was strategic as the central activity node of the city with a lager network of public transport infrastructure and service vehicles.

On the pilot, Five (5 No) research assistants who eventually carried out the final data collection and the study collected data from Twelve (12 No.) Persons with Disabilities, Six were those with physical disability while the other six were those with visual impairment. There were three key lessons intended from it and which were achieved:

- it was useful in framing the research protocol;
- in developing and fine tuning the questions for interview; and
- In determining the number of research participants.

The pilot study also provided an opportunity to test out questions and determined whether they need modification. Conducting the interview with a variety of participants at the beginning is always helpful to provide the interviewer with insights on how the questions can be improved (Teijlingen and Hundley, 2001:2). As hopeful (1997:52) notes, the flexible nature of a qualitative research strategy helps us to exclude some questions the research has found unproductive. For this research, the pilot study helped to develop the approach taken for the observation data collection method and multiple-choice questionnaire design. In addition, it was possible to manage the time spent on important issues during the interviews. It was crucial to give an estimate of the likely duration of the interview, when requesting permission and cooperation from research participants since it was important to inform the prospective participants that the interview will last for a given range of time.

4.3.2. Study Area

The study was conducted in Nairobi City. The study area was chosen specifically to capture the diverse range of challenges faced by persons with disabilities in accessing public transport from different parts of the city as opposed to focusing the study to a particular section of the city. This being the largest city in Kenya, the challenges can be assumed to represent the challenges faced by all PWDs in urban areas in Kenya and a proper policy for the country developed to address public transport access in urban areas in Kenya.

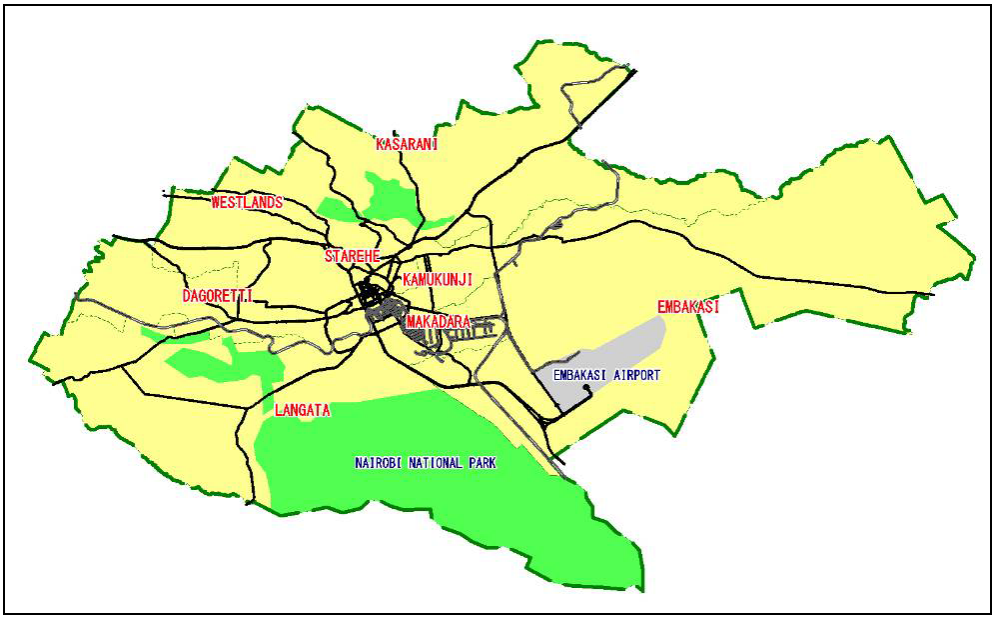
Nairobi City is the capital and largest city of Kenya. The city and its surrounding area also form the Nairobi County. The name "Nairobi" comes from the Maasai phrase *Enkare Nyirobi*, which translates to "the place of cool waters". However, it is popularly known as the "Green City in the Sun" and is surrounded by several expanding villa suburbs. The study area is located 1 ° 16'South and, 36 ° 48' east, 140 kilometers (87 miles) south of the Equator in the highlands of the central southern part of the country, Kenya. The city is at altitude 1,680 meters (5,512 feet) above sea level. It has an area of 689 sq km (266 sq mi).Nairobi is Kenya's principal economic, administrative, and cultural center and is one of the largest and fastest growing cities in Africa.

Located in an area once frequented by the pastoral Masaai, Nairobi was founded in the late 1890s as a British railroad camp on the Mombasa-to-Uganda railroad. From 1899 to 1905 it served as a British provincial capital. In 1905 the city became the capital of the British East Africa Protectorate (called Kenya Colony from 1920 to 1963). In 1963 Nairobi became the capital of independent Kenya and annexed neighboring areas for future growth.

Nairobi is one of the most important economic centers in East and Central African Regions. Nairobi city accounts for 50 % of formal employment in Kenya and generates over 50 % of GDP. The VISION 2030, which shows long term national development strategy of Kenya, aims at becoming a middle income country by 2030. Nairobi city plays an important role not only as a political center but also as a model for economic development and social development. Urban development plan of Nairobi city, on the other hand, has not been updated since 1973 and the direction of urban development is not clearly defined.

Map 1, Map 2 and Map 3 shows the boundaries of Nairobi City County in different perspectives.

Map 4.1 Nairobi City with division boundaries

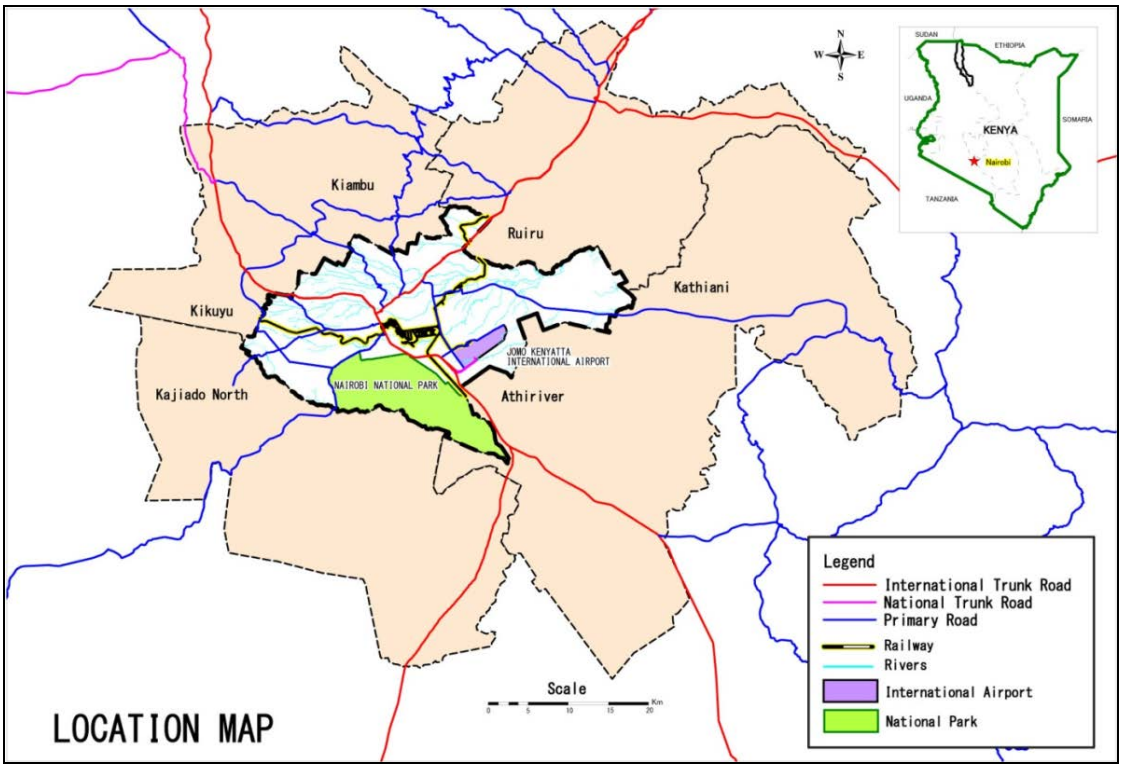


Source: Author (2014)

Nairobi enjoys a warm tropical highland climate. The average daily temperatures range from 29º C in the dry season to 24º C during the rest of the year. The mean annual temperature is 17^0C and mean daily maximum and minimum are 23^0C and 12^0C respectively. The average annual rainfall is 875mm, with variation range 500-1500mm. Generally the weather is travel friendly apart from the seasons when rains are constant and can make it very difficult for the PWDs on wheelchairs to move.

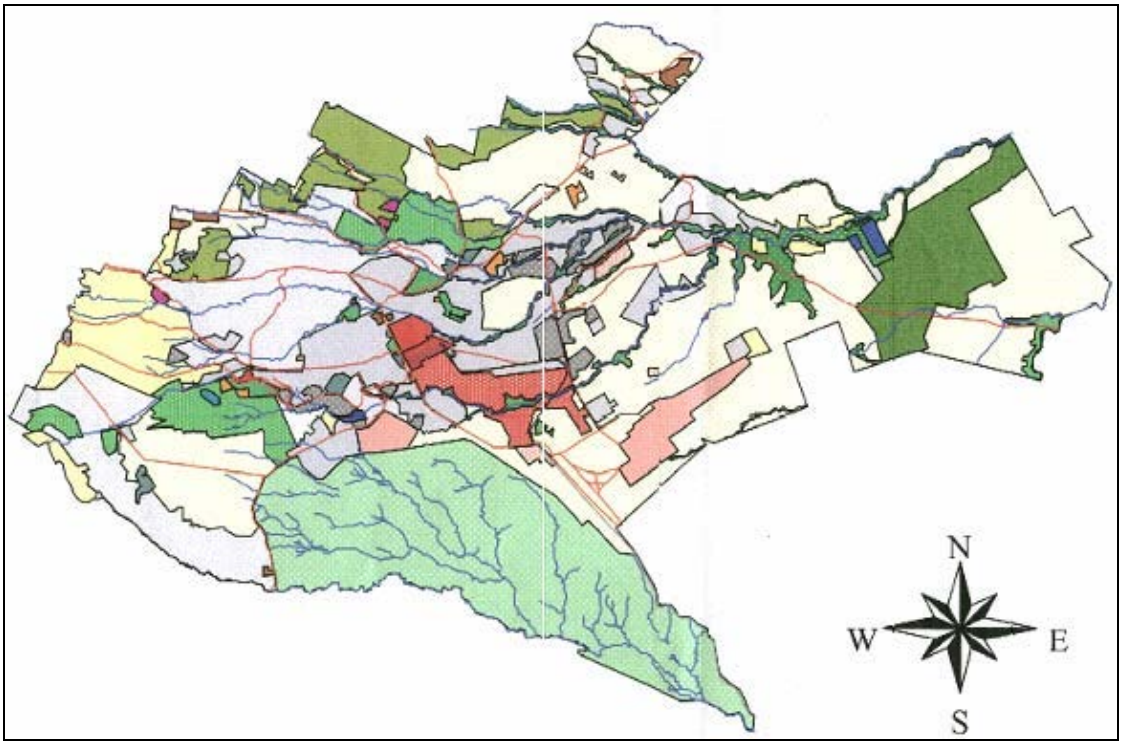
On the other hand, however, the transportation situation in most parts of Nairobi leaves much to be desired. Many residents depends on road based public transport system, which are old and poorly designed, inadequate, overcrowded, unreliable and slow (Chitere, 2006). Local buses commonly called “Matatus” and the influx of motorcycles- “Boda boda” are not only viewed as death traps for millions of users, but they constitute Notable Avenues through which criminal activities are perpetuated in the city. Nairobi still faces numerous challenges, despite its economic importance to the country as a whole.

Map 4.2: Location Map of Study area



Source: Adapted from the draft IUDMP report 2013

MAP 4.3: Land Use Map of Nairobi



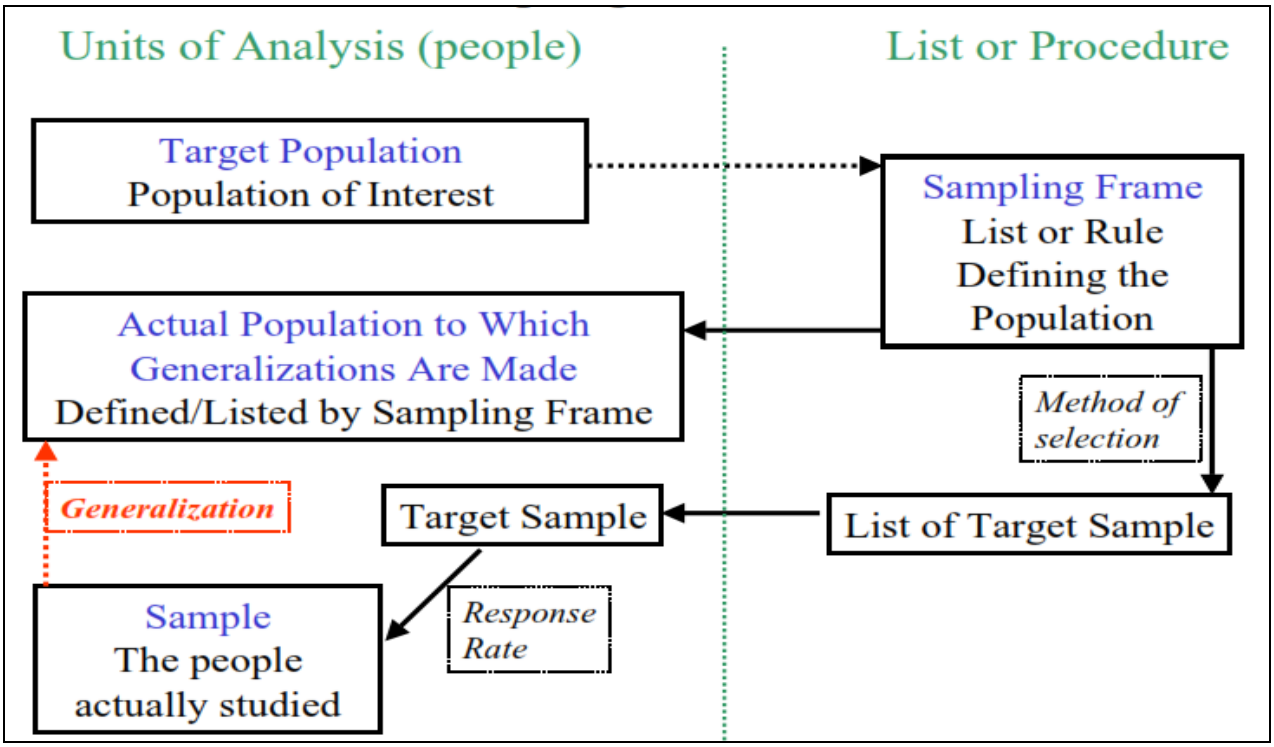
Source: *Adapted from the draft IUDMP report 2013*

4.3.3. Units of Analysis

The units of analysis for this study cut across access and public transport system in Nairobi, Kenya. The basic tenet of this study is to explore the implications of increasing mobility and access challenges in public transport on the travel patterns of PWDs in the study area. It aims at the need for reduced challenges and improves public transport services for users, specifically for PWDs. Therefore the units of analysis are Nairobi City and Public transport users (PWDs) and operators.

4.3.4. Research Population, Sample and Sampling

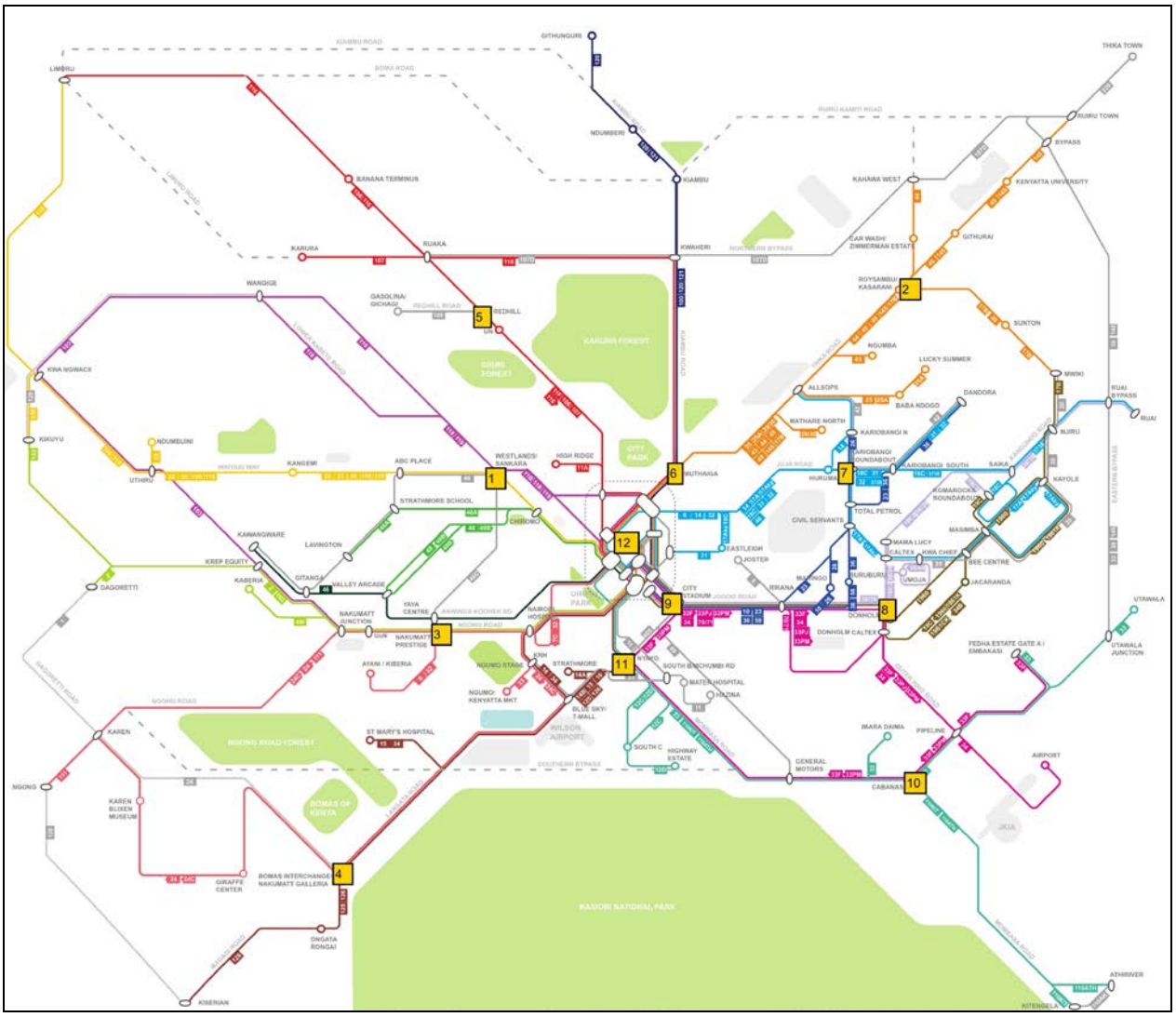
Figure 4.1: General Sampling Process



Source: adapted from William M.K. Trochim, (2002).

According to the 2009 national population and housing census report, Nairobi city has a population of approximately 3.1 million inhabitants. According to the Kenya National Survey for Persons with Disability (KNSPWD 2007) report, about 5.1% of Nairobi residents experience some form of disability, which is about 153,000 PWDs. The combined population of the physically disabled and the visually disabled is about 98,000 in Nairobi from the last KNSPWD survey. Towards getting a representative sample; stratified random sampling techniques was used. To achieve this, first the research explored the different Matatu/bus routes in Nairobi as shown in the maps below.

MAP 4.4: Map Showing Bus/Matatu Routes within Nairobi



Source: Adapted from civic design data Lab (http://www.digitalmatatus.com)

The major road transport network is characterized by Radial Concentric type with the main Radial roads from Central Business District (CBD) and urban arterials, collectors and ring roads. There exist major activity nodes along these roads and at the major junctions forming the best options for data collection. The area was also stratified into high, middle and low income density catchment to capture the diverse income categories of Nairobi residents. This was done based on the existing zoning status of the residents and population densities. Among these that have been identified are;

Table 4.1: Sampling units by Activity nodes in Nairobi City

S/No.	*Activity Node*	*Location*	*Zoning status /Resident Population Density*
1	Westlands	Waiyaki way/Chiromo Road/ Rapta road/ Ring road westlands junction	Mixed use medium density area mostly dominated by both high and middle income class
2	Roysambu area	Thika road/ Kasarani-Mwiki road/ Kamiti road junction	Mixed use high density area dominated by middle and low income class
3	Adams Arcade/Prestige plaza area	Ngong road/ring road Kilimani junction	Mixed use medium and high density area dominated by the high, middle and low income class).
4	Galleria Mall/Bomas of Kenya junction	Langata road/ Magadi road/ Forest edge road junction	Mixed use low density area dominated by the high, middle class inhabitants
5	Gigiri/ UN complex area	Limuru Road/Red hill road junction	Mixed use low density area dominated by the high, middle class inhabitants
6	Muthaiga Police station	Thika Road/Kiambu Road/ Muthaiga road junction	Mixed use low density area dominated by the high, middle and low class inhabitants
7	Kariobangi Round about	Juja road/ Outer-ring road junction	Mixed use high density area dominated by middle and low income class
8	Donholm/ Tena area	Jogoo road/ Outer-ring road/ Manyanja road junction	Mixed use high density area dominated by middle and low income class
9	City stadium	Jogoo Road/ Ladhies Road/ Lusaka Road junction	Mixed used high density area dominated by middle and low income class
10	City Cabanas area	Mombasa Road/ North airport road junction	Mixed use medium density area dominated by high, middle and low income class
11	Nyayo stadium area	Mombasa road/ Langata Road/ Lusaka road junction	Mixed use high density area dominated by high, middle and low income class
12	Central Business District	Haille selasie/Tom Mboya/ Uhuru Highway/University way bound	Mixed use planned densely populated area dominated by all income class

Source: Author (2014)

Stratified random sampling techniques were used to sample 100 PWDs users of public transport – (respondents) in to the different categories of disabilities as follows;

Table 4.2: Sampling by Prevalence type of disability

S/No.	*Prevalence Type*	*% of prevalence in Nairobi (KNSPWD)*	*Relative Sample*	*% of Sample*
1	Physical	1.6%	56	56%
2	Visual (Blind)	1.4%	44	44%
	TOTAL		**100**	**100%**

Source: Author (2014)

Apart from limited time frame, the chosen sample size is based on empirical fact that random selection of small sample from larger population always gives a true representation of the area (Black, 1993; Babbie, 1998 and Bailey, 1982).

Table 4.3: Sample Size for % Precision Levels where Confidence Level Is 95% and P=.5.

Size of Population	***Sample Size (n) for Precision (e) of:***			
	±3%	±5%	±7%	±10%
500	a	222	145	83
600	a	240	152	86
700	a	255	158	88
800	a	267	163	89
900	a	277	166	90
1,000	a	286	169	91
2,000	714	333	185	95
3,000	811	353	191	97
4,000	870	364	194	98
5,000	909	370	196	98
6,000	938	375	197	98
7,000	959	378	198	99
8,000	976	381	199	99
9,000	989	383	200	99
10,000	1,000	385	200	99
15,000	1,034	390	201	99
20,000	1,053	392	204	100
25,000	1,064	394	204	100
50,000	1,087	397	204	100
100,000	1,099	398	204	100
>100,000	1,111	400	204	100
a = Assumption of normal population is poor (Yamane, 1967). The entire population should be sampled.				

Source: Glenn D. Israel (June 2013)

The study adopted a confidence level of 90%; the representative sample for this kind of research can be estimated at 100 PWDs. This is for populations that are large. Cochran (1963:75) developed the Equation below to yield a representative sample for proportions.

$$n_0 = \frac{Z^2 pq}{e^2}$$

Which is valid where n_0 is the sample size, Z is the abscissa of the normal curve that cuts off an area a at the tails (1 – a equals the desired confidence level, e.g., 95%), e is the desired level of precision, p is the estimated proportion of an attribute that is present in the population, and q is 1-p.

The value for Z is found in statistical tables which contain the area under the normal curve.

Six students of Urban and Regional Planning of my University were trained on the subject matter and recruited as research assistants for administration of questionnaires. Invariably, the sampling frame was the list of all PWD users of public transport of the chosen areas and the non-PWD respondents were also used for clarifications of some findings and to ensure reliability and validity of the data set.

Apart from the questionnaires, In-depth interviews were carried out to Key informants identified in several categories as follows:

Table 4.4: Number and Categories of Key Informants interviewed

S/No	*Organization Category*	*No. of KII*	*Reasons*
1	National Government	2	1) Ministry of Gender, Sports, Culture and Social Services in which the policy issues dealing with Persons with Disabilities are domicile 2) Ministry of Transport and Infrastructure in which the Policy issues dealing with transport are domicile
2	County Government of Nairobi	1	The responsibility of Urban management and provision of urban transport infrastructure relies with the county government.
3	Government agencies	6	1. National Coordinating Agency for Population and Development is responsible for the collection and analysis of population data for special groups of people such as PWDs 2. National Council for People with Disabilities is the agency responsible for the registration and advocacy for the mainstreaming of PWDs

			issues. 3. National Transport Safety and Authority is the regulatory authority for Public Service Vehicles. 4. Kenya Urban Roads Authority is responsible for the provision and management of urban roads 5. Kenya National Highways Authority is responsible for the provision and management of national trunk roads some of which are the major urban arterials and collectors. 6. Kenya Bureau of Standards is responsible for the development of standards for design of vehicle bodies.
5	Civil Society (NGOs /FBOs / CBOs)	22	These are the most influential group with regard to championing for policy change and mainstreaming of PWDs with regard to areas where inclusion is lacking. 1) Action Network for the Disabled (AND) 2) Association of the Physically Disabled in Kenya (APDK) 3) Blind and Low Vision Network 4) Disability leadership and resource Centre 5) Kenya Society for the Blind 6) Kenya Program of Disabled Person 7) The Kenya Media Network on Disability – KEMNOD 8) United Disabled Persons of Kenya (UDPK) 9) Women Challenged to Challenge
6	Private Sector	3	These are the major stakeholders especially the provision of transport services. Public transport service in Kenya is largely provided by the private sector and operated by the same sector. 1) Matatu Owners Association (MOA 2) Matatu welfare association (MWA)

Source: Author (2014)

4.4. Data collection Methods and Instruments

Based on related studies and notion that, Persons with disabilities are a sensitive group of respondents and that operators of public transport are notable stakeholders, information was obtained from operators of public transport through an informal interview. Information elicited for include; their socio-economic variables, operational pattern, response to PWD users of public transport and perceptions on challenges in the service and the need for disability sensitive transport policy. It should be noted that, administration of the questionnaires was done by hand delivery (On the spot

collection of questionnaire). The language used for the survey will be combination of the Kiswahili and English.

4.4.1. Secondary Data

Secondary data for this study was based on extensive literature review. The review of academic papers relevant to the focus of the study helps to brighten the arguments of this study. Based on lack of enough literature and studies on this area, records of specific challenges in public transport are not readily available. Thus, academic papers and books addressing this issue, particularly from developed countries, and containing valuable data was used.

4.4.2. In-depth and Informal Interviews

Informal Interviews was conducted on operators of public transport and users in the study area. It should be mentioned that, the interview was conducted when researcher is on trip. This method is effective since most of the participants are not likely to reserve time for a formal interview.

In-depth interviews were conducted to representatives of Institutions directly relevant to the study. This will provide much more detailed information than what is available through other data collection methods, such as surveys. Since it involves institutions, It provide a more relaxed atmosphere in which to collect information as respondents may feel more comfortable having a conversation with the researcher about their program as opposed to filling out a survey

4.4.3. Field Observation

Field observations of traffic and travel environment and behaviour in the study area will be meticulously and observed during peak and off-peak periods. A digital camera will be used to take relevant pictures of traffic situation, travel environment etc. at strategic and hidden locations to avoid brutalization of the author and with due regard to the ethical considerations of this research. Field notes will be used to document relevant cases on field to avoid loss of valuable field experience.

4.4.4. The Questionnaire Instrument

Questionnaires for each group of respondents were divided into three sections, the first section will seek information about socio-economic variables (general characteristics), while the second section will probe into travel characteristics, safety and challenges in public transport. Specifically, information to be sought will include travel characteristics, purpose of trip, mode of travel, trip

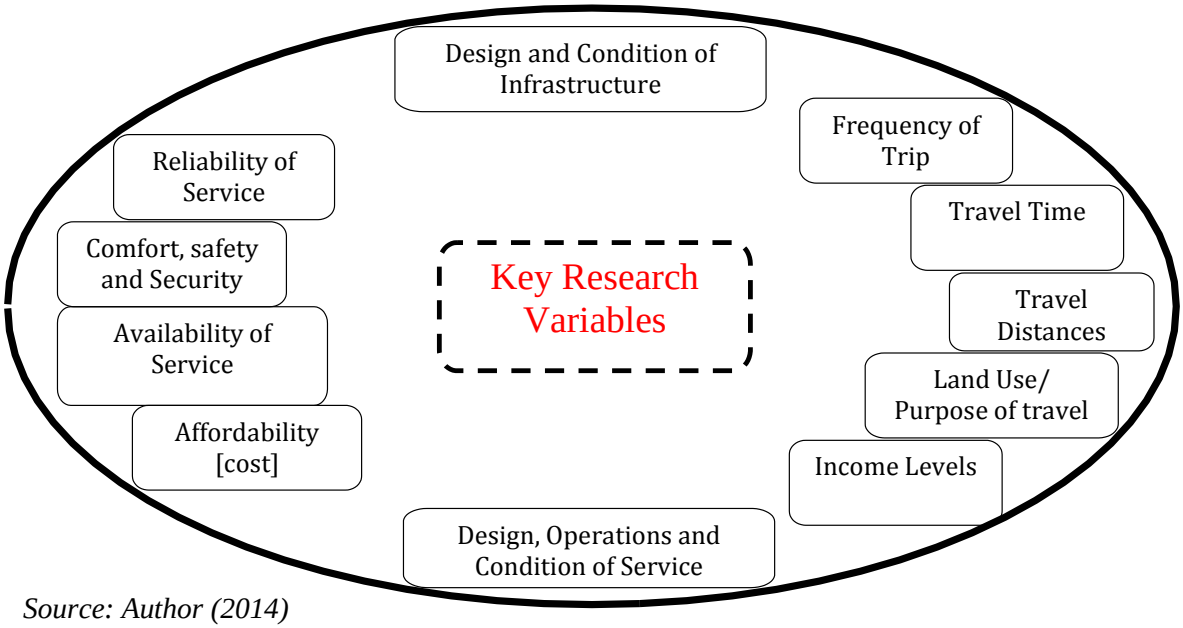
frequency, specific challenge incident and intensity, cost of travel and travel difficulties, travel time, modes, suggestions on the means to improve the service, respondents was asked to recount and record at least one incident of bad public transport service that leads to harassment or assaults that they witnessed or be a victim, etc. The last part of the questionnaire, will probe into perceptions about factors responsible for the existing situation, which are the most vulnerable groups involved? What aspect of public transport service needs to be addressed or improved? Who the notable stakeholders to be involved are and what should be their roles? Above all, respondents were asked to make their intention known about the use of public transport in future if safety or mobility issues are improved.

The Questionnaire instrument was administered through online survey, Post and interviews conducted by the researcher and his assistants.

4.5. Data Input, Quality and Integrity

Data input was majorly done through the normal Microsoft office platforms, SPSS platform and GIS/CAD platforms

Figure 4.2: Key Research Variables Based on Reviewed Literature and Theories



Source: Author (2014)

4.5.1. Reliability and validity

Reliability of the research instrument was conducted using test-re-test method. Questions in the research instrument was pre-coded, pre-tested and modified in consonance to identify shortcomings during pre-test. This was done by administration or collection of data at different locations and time of travel. Recruitment of research assistance for simultaneous data collection and observations will facilitate the cross-checking and enhance the reliability of the outcome or judgment.

Validity of this study was done by triangulation of collected data and research methodology or techniques used. This will involve the use of an array of methods or techniques for data collection and analysis. For instance, field observations, administration of questionnaire using appropriate sample size and sampling techniques. Also, to have a reasonable validity level of the study instrument, analytical techniques used will include both descriptive and parametric techniques.

4.6. Data Analysis and Presentation

Again it needs to be bear in mind that, the major tenet of this study is to explore the challenges faced by PWDs in public transport in Nairobi, Kenya. In doing this, data collected was analysed using simple descriptive statistics such as, frequency distribution, cross tabulation, percentages and ratios. In addition, more advanced analysis such as use of measures of relationships e.g. Cross-tabulation was carried out to enable the study to draw valuable inferences from the data. The cross-tabulation analysis was used to establish the relationship between the modal share between the types of disability and the trip purpose.

To identify the most significant factors that determines and explains the travel patterns, a regression analysis was used. Finally for the stakeholders to be involved and their expected roles towards reducing the challenges in public transport, the content analysis was used.

4.7. Ethical Consideration

All research studies present a number of ethical and moral dilemmas which must be identified and addressed prior to carrying out any research study in order to protect all participants from potential harm.

4.7.1. Beneficence and Non-maleficence:

The proposed study's findings should benefit and cause no harm to the participants and society. Privacy and confidentiality was maintained at all times, all findings were portrayed in a confidential manner; no personal or identifiable information was recorded or printed in the study. Audio taped interviews was transcribed verbatim, thus no names was recorded during the interviewing process. Once transcribed the data was stored in password protected folders with restricted access and stored on an external hard drive which only the researcher had access to.

4.7.2. Autonomy:

The study respected the human right of free choice and ensured informed consent is completed before carrying out any interviews.

4.7.3. Justice

All findings and results presented was that of actual facts stated in the interviews. All participants' experiences and perceptions were portrayed as they have done so in the interviews, no false information or accusations was included in the final report. Ethical issues may arise at any point during any study regardless of the scrupulous planning, therefore it is important that possible ethical issues are identified, prevented, and reviewed as best as possible prior to, during and after the study.

4.8. Data Need Analysis

Table 4.5: Variables and Indicators and Data sources

S/No.	Questions	variables	Indicators	data sources
1	***What is the current Non-motorized and Public Transport travel environment of Persons with Disabilities with respect to safety, accessibility, reliability and affordability?***	NMT facilities Affordability [cost] Reliability of service Availability of service Comfort, Safety and security	Number of people satisfied with the conditions of NMT and level of PT service	academic literature users and operators of public transport and transport management authorities and Primary data
2	***What challenges do PWDs face while travelling on non-motorized transport facilities and using public transport services?***	Affordability [cost] Reliability of service Availability of service Comfort, Safety and security	passengers waiting time at bus stop, condition of walking distance, interchanges between routes and services, journey times, infrastructure, comfort and quality of ride, modal choice, modal split, change in demand and supply of public transport	users of public transport, direct observation, literature review, interviews and Primary data
3	***What are the factors that generate or propel the accessibility challenges to PWDs when using NMT and PT?***	Travel environment transport policy, operational pattern and management approach Travel pattern, travel time, travel condition, travel purpose, travel distance	passengers waiting time at bus stop, condition of walking distance, interchanges between routes and services, journey times, infrastructure, comfort and quality of ride, modal choice, modal split, change in demand and supply of public transport	users of public transport, direct observation, literature review Primary data
4	***How does challenges in accessing NMT and PT affect PWD's travel pattern?***	Relation between travel pattern and travel environment	Shorter travel time, vibrant travel pattern,	Users, operators of public transport, field observations, review academic literature.
5	***What are some of the international best practices or standard guidelines to guide the stakeholders in addressing the challenges of PWDs access to NMT and PT?***	Disability sensitive transport policy Standards on vehicle bodies Road design manuals Vehicle design standards	Quality of Infrastructure design standards and vehicle design standards. Level of Policy design and implementation	users and operators of public transport review of literatures Stakeholder and Policy Makers

Source: Author (2014)

5. FINDINGS OF THE STUDY

5.1. Introduction

This section focuses on objective information from personal interviews and information about the PWD public transport users. Much of the data collected for this project derive from interviews and key informant interviews, most of these conversations took place between March 2014 and May 2014. Especially key to our findings were the in-depth interviews with 100 individuals from the disability community and few others from the public vehicle operators, based in different locations across Nairobi.

The chapter has the analysis of data collected. It examined the socio-economic, demographical characteristics and travel environment of respondents. It explored types of challenges and further examined the relationship between access to public transport and travel characteristics of respondents (socio-economic). Also, it elucidates the implications of accessibility and challenges of lack of accessibility in public transport on the livelihood of respondents. Above all, most significant factors that influence the travel patterns for PWDs were identified, while what can or need to be done and who is to be involved were also explained.

5.2. Socio-economic background of the respondents and their relation to NMT and PT access

5.2.1. Introduction

Many people with disabilities do not have equal access to health care, education, and employment opportunities, they do not receive the disability-related services that they require, and experience exclusion from everyday life activities. Following the entry into force of the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD), disability is increasingly understood as a human rights issue. Disability is also an important development issue with an increasing body of evidence showing that persons with disabilities experience worse socioeconomic outcomes and poverty than persons without disabilities. (WHO, 2011)

Despite the magnitude of the issue, both awareness of and scientific information on disability issues are lacking. There are few documents providing a compilation and analysis of the ways countries have developed policies and responses to address the needs of people with disabilities.

In response to this situation, the study has attempted to investigate the relationship between the socio-economic variables of persons with disabilities and accessibility to NMT and PT based on the data collected from the respondents.

5.2.2. Distribution of Respondents by Gender and disability type

According to the World Bank report on mainstreaming Gender in Road Transport published in March 2010, traditional transport planning models have not considered women's specific travel patterns. However, there is evidence that women and men have different trip patterns and mobility constraints, resulting in gender differences in mode of transport used as well as travel patterns in relation to trip purpose, frequency and distance of travel. These differences stem from differences in the social and economic roles of men and women, with their respective household and caretaking responsibilities. Social factors such as status, residential location and type of livelihood also play a role.

For women, transport provides access to various resources and opportunities, such as employment, childcare, education, health and political processes. Whether in urban, peri-urban or rural areas, from the PWDs interviewed, women tend to make more complex and more trips than men. Also, according to the World Bank report, walking remains the predominant mode of travel for many women in developing countries as other transport modes are often not available because they are too expensive or located too inconveniently and far away. Cultural acceptance, personal safety and the avoidance of

harassment are also major concerns for women in relation to accessing and using transport. (WB, 2010). Of all the respondents interviewed, 56% were physically disabled while 44% were visually disabled as shown in **Table 5.1 below.**

Table 5.1: Distribution of respondent by Gender and disability type

			Type of disability		***Total***
			Physical	**Visual**	
Gender of respondent	*Male*	Count	44	21	65
		% within Gender of respondent	*67.7%*	*32.3%*	*100.0%*
		% within Type of disability	*78.6%*	*47.7%*	*65.0%*
		% of Total	**44.0%**	**21.0%**	**65.0%**
	Female	Count	12	23	35
		% within Gender of respondent	*34.3%*	*65.7%*	*100.0%*
		% within Type of disability	*21.4%*	*52.3%*	*35.0%*
		% of Total	**12.0%**	**23.0%**	**35.0%**
Total		Count	56	44	100
		% within Gender of respondent	*56.0%*	*44.0%*	*100.0%*
		% within Type of disability	*100.0%*	*100.0%*	*100.0%*
		% of Total	**56.0%**	**44.0%**	**100.0%**

Source: Field Survey (2014)

Of the male respondents, 68% were physically impaired while 32% were visually impaired, on the other hand, of the female respondents; about 66% were visually impaired while about 34% were physically impaired. These demographic proportions were purposively identified in this research but fairly randomly sampled based on availability of the respondents at the locations where the survey was carried. The samples reflected closely the distribution of PWDs by gender and type of disability in Nairobi at about 1.4% to 1.6% of the population between n the visually and physically impaired. (KNSPWD, 2007)

5.2.3. Distribution of respondents by Age and Type of disability

Age of travellers is always an important factor while evaluating urban mobility and travel patterns since it more often informs the travel purpose and modes of travel. On the distribution by age groups, the largest majority [about 38%] of respondents was aged between 21 to 30 years with an equal distribution of 50% for both physically and visually impaired. There were also a considerable proportion of about 30% who were aged between 31-40 years, implying that most trips made are likely for work purpose since the age range of between (21 to 40) constitute the working majority, as

shown in the **Table 5.2** below. The age of travelers is an important factor in transport studies since it helps in the understanding of travel patterns in terms of travel purpose and frequency.

Table 5.2: Distribution of respondents by Age and Type of disability

			Type of disability		**Total**
			Physical	**Visual**	
Age of respondents	*10-20 years*	Count	3	1	4
		% within Age of respondent	*75.0%*	*25.0%*	*100.0%*
		% of Total	**3.0%**	**1.0%**	**4.0%**
	21-30 years	Count	19	19	38
		% within Age of respondent	*50.0%*	*50.0%*	*100.0%*
		% of Total	**19.0%**	**19.0%**	**38.0%**
	31-40 years	Count	15	15	30
		% within Age of respondent	*50.0%*	*50.0%*	*100.0%*
		% of Total	**15.0%**	**15.0%**	**30.0%**
	41-50 years	Count	10	9	19
		% within Age of respondent	*52.6%*	*47.4%*	*100.0%*
		% of Total	**10.0%**	**9.0%**	**19.0%**
	51-60 years	Count	6	0	6
		% within Age of respondent	*100.0%*	*.0%*	*100.0%*
		% of Total	**6.0%**	**.0%**	**6.0%**
	60 and above	Count	2	0	2
		% within Age of respondent	*100.0%*	*.0%*	*100.0%*
		% of Total	**2.0%**	**.0%**	**2.0%**
	N/A	Count	1	0	1
		% within Age of respondent	*100.0%*	*.0%*	*100.0%*
		% of Total	**1.0%**	**.0%**	**1.0%**
Total		*Count*	*56*	*44*	*100*
		% within Age of respondent	*56.0%*	*44.0%*	*100.0%*
		% of Total	**56.0%**	**44.0%**	**100.0%**

Source: Field Survey (2014)

5.2.4. Level of Education and Employment of PWDs

The level of education, employment and income of PWDs is vital when analyzing urban transport since they have direct relations to other factors such a travel time, mode, purpose and frequency.

The employed/working persons in this research comprised those PWDs aged 15 years and above who reported having either held a job or undertaken an activity for pay, profit or family gain during the

week prior to the survey. As **Table 5.3** illustrates, 27% of the PWDs work in informal sector [mostly family business] and about 20% were jobless and largely went out and about to practice begging. This confirms the contention that in low- income countries disabled people are more likely to be poor than is the rest of the population. Case studies in a number of countries show that higher disability rates are associated with higher illiteracy, poor nutritional status, lower inoculation and immunization coverage, higher unemployment rates, and lower occupational mobility, among other characteristics, all largely as a result of lack of transport access and mobility challenges (Elwan, 1999).

A survey in 2007 done in Kenya by NCPD reported that a third of the PWDs work on own family business and about a quarter do not work. Most PWDs are unlikely to have active or viable socio-economic engagements to earn a living. Consequently, they require some assistance in the form of social security grants for the destitute, disability grants or other forms of financial support (KNSPWD, 2007).

Table 5.3: Respondents by employment sector

Employment sector			
	Frequency	**Percent (%)**	**Cumulative Percentage (%)**
Agriculture/Forestry	1	1	1
Public administration	2	2	3
Education	3	3	6
Health and social work	2	2	8
Service industry	5	5	13
Private household	2	2	25
Student	10	10	35
Jobless	20	20	55
Mining/Quarrying	1	1	56
Manufacturing	1	1	57
Wholesale, retail trade	7	8	65
Informal sector	27	27	92
Hotel & restaurant	5	5	97
Transport storage & communication	3	3	100
Total	100	100	

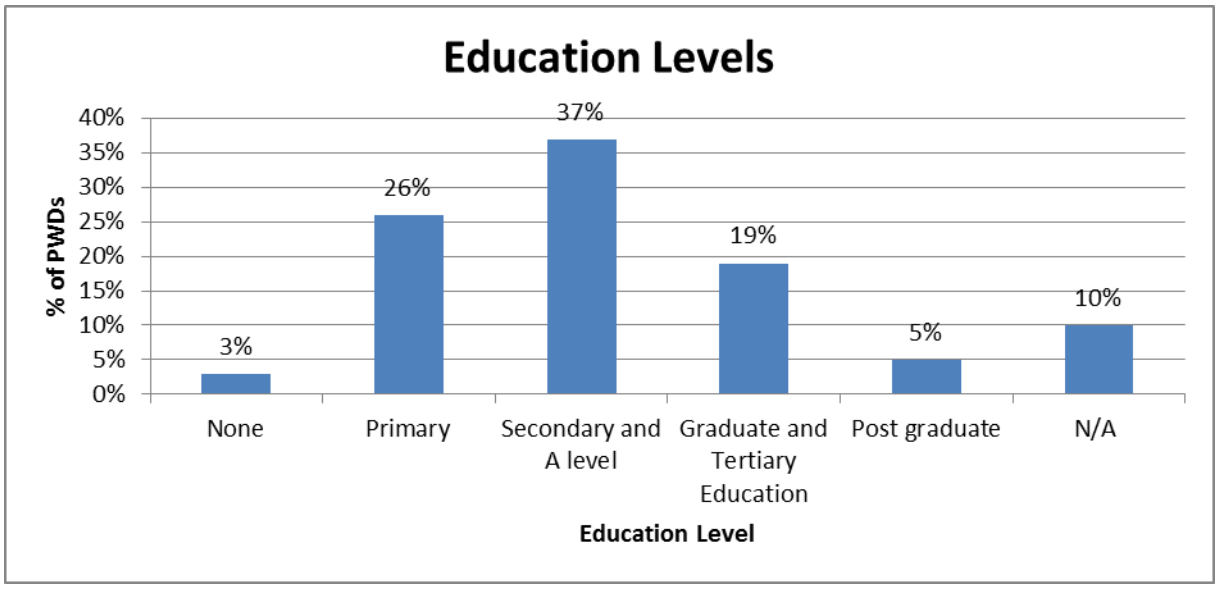
Source: Field Survey (2014)

From the analysis of findings, there were a combined 43% who were employed in different sectors of the economy. About 19% of the PWDs held graduate degrees and 5% held post-graduate degrees. According to the KNSPWD survey, the largest proportion of PWDs who worked for pay was in Nairobi (32%) and the survey concluded that they were also likely to be better educated: Those with university education were 45%, then middle level education (36%), secondary or "A" level (22%) and post primary vocational education (20%). There were also a significant 10% of the respondents who

did not indicate their level of education while a further 3% indicated they did not have any education at all. **Figure 5.1** shows the level of education of PWDs interviewed.

Most PWDs who are educated were likely to be employed, and most of them who are employed are likely to be mobile than their counterparts who are not employed. However, due to insufficient public transport and Non-motorized transport systems in Nairobi, it is highly likely that the occupational mobility of PWDs will be much less than their able counterparts, which in turn is likely to limit their choices and opportunities for employment.

Figure 5.1: Education Level of Respondents



Source: Field Survey (2014)

5.2.5. Income Levels of PWDs and Public transport affordability

Of the majority proportion of those who were earning some money, the modal income range of PWDs interviewed were between KES.5000 to KESs.10000 with over 60% earning less than 15,000 per month as shown in **Tables 5.5**. Compared to the Economic Survey of 2013, this is much less than the total average annual wage payment by both the public and private sectors of about KES. 432,802.9 Per annum in 2012. [About KES 36,066.9/Month] (KNBS 2013).

Table 5.4: Income Range of Respondents

Monthly income (KES)	Frequency	Percent (%)	Cumulative Percentage (%)
Under 1,999	3	3	3
2000 - 4,999	8	8	11
5,000 - 9,999	36	36	47
10,000 -14,999	13	13	60
15,000 - 19,999	9	9	69
20,000 - 29,999	8	8	77

Monthly income (KES)	Frequency	Percent (%)	Cumulative Percentage (%)
30,000 - 39,999	9	9	86
40,000 - 49,999	5	5	91
50,000 - 99,999	3	3	94
100,000 and over	3	3	97
Confidential	3	3	100
Total	100	100	

Source: Field Survey (2014)

With respect to the fares payable per distance traveled, it was noted that in the 6 – 10 km where about 40% of the respondents traveled from, the average bus fare is between KES. 50 to 100 according to about 43% proportion of PWDs who were interviewed. While in the 10 to 20 km periphery areas where about 33% of the respondents traveled from, the average fares were between KES. 100 to 150 at peak hour. Considering that the majority modal PWDs employee wage is between KESs. 5999.00 To KES. 10,000.00 Per month – i.e. about KES. 200 – 300 per day. The cost of transport in the city is very high compared to the daily income. This is manifest with the latest report from UN-Habitat indicating that majority of the urban poor spend at least 30% of their earning on public transport (UN-HABITAT, 2010).

Table 5.5: Percentage Travel Fares compared to Travel Distances

Trip Distance			***Trip Cost at Peak Hours***		
Distance (Km)	**Frequency**	**Percentage**	**Amount (KES)**	**Frequency**	**Percentage**
0 to 5	25	25%	**10 to 49**	31	31%
6 to 10	40	40%	**50 to 99**	43	43%
11 to 15	23	23%	**100 to 149**	18	18%
15 to 20	10	10%	**150 to 199**	6	6%
20 and above	2	2%	**200 to 249**	1	1%
			250 to 300	1	1%

Source: Field Survey (2014)

This therefore presents a major challenge taking in to account the fact that majority of PWDs is heavily reliant on public transport. There is evidence that the majority of the disabled are not able to afford the transport services on regular basis. This is because the fare system is not even favorable to majority of the able and employed people; the charges fluctuate extremely and rise excessively especially during the peak hours.

5.3. TRAVEL ENVIRONMENT OF PWDs:

5.3.1. Introduction

Accessibility for PWDs to Infrastructure was one of the key aspects in this research; it is also a very significant concern in the assessment of the travel environment of PWDs. Several aspects can be reviewed with respect to accessibility. In this case, accessibility was reviewed with respect to the infrastructure design and current condition. A critical review of the infrastructure facilities design and construction was done through observation based on the international best practice. PWDs were also asked to give their opinion on the functionality of the PT and NMT facilities.

5.3.2. Non-Motorised Transport (NMT) Travel Environment

a) Pedestrian Footpaths and Sidewalks

On the pedestrian footpaths, the ratings were particularly negative with about 39% of the respondents indicating that they are dissatisfied with the condition and design of the same. From the observations, it was noted that the existing footpaths are either poorly designed of poorly maintained to such a level that they are not usable by PWDs. On the plate 5.1 below, on the left is an example of a poorly designed section of a sidewalk along the Mai-mahiu road, with an off drain cutting across the alignment, rendering it unusable by PWDs on wheel chair and white sticks according to the PWDs who were interviewed along the Site Savers international and Kenya school of the blind which is right opposite, while on the right is an example of a poorly designed and maintained section of a sidewalk along 5th Ngong avenue fronting KURA offices, with part of the drain cover left open and poor surfacing material rendering it unsafe for use by both visually and physically impaired pedestrians. The footpaths should be of level and smooth surface. The best practice of designing a safe footpath includes that which is clearly separated from vehicular traffic, adequate clear width and height and no open utility covers, and street works.

Where the footpaths exist, they are also inaccessible with most of them being used as parking for taxi and motorcycles. Barriers should be installed to protect the pedestrians from accidental risks posed by motorized traffic.

Plate 5.1: Sections of the poorly designed and maintained footpaths in Nairobi City

Source: Field Survey (2014)

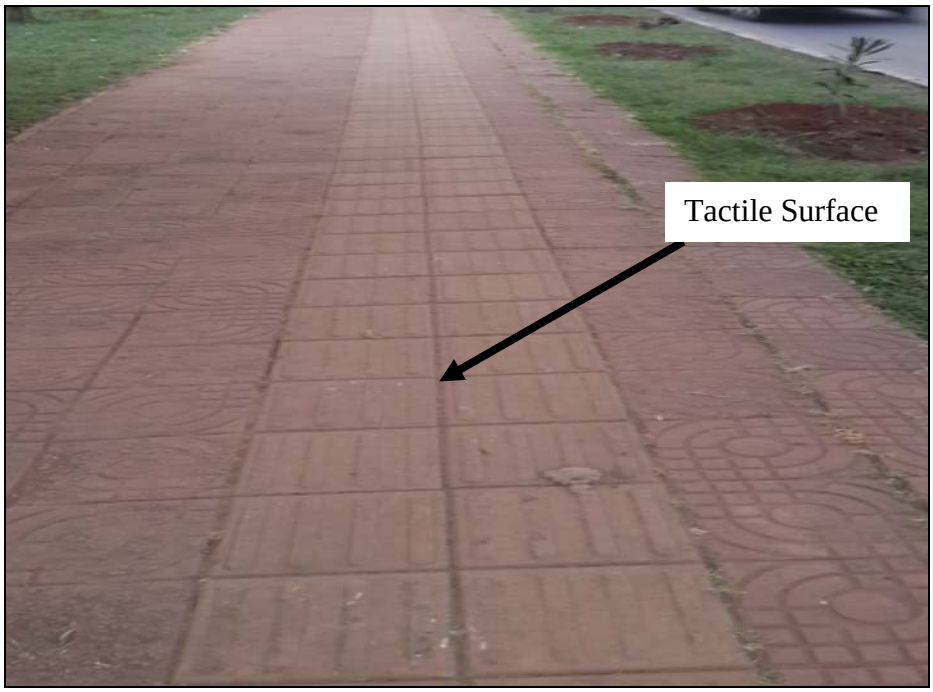
There is also an indication that the PWDs are significantly aware of the requirements. Some positive workmanship on the NMT facilities improvement projects were also realized with the best example being the design and construction of the Nairobi western Ring roads NMT facilities done using the JICA standards as shown in the **Plate 5.2** below. According to KURA official interviewed, the Authority has planned within their five year strategic plan that a total of 200km of NMT will be done by 2017. There was however no clear commitment or assurance that the design of these NMT facilities will be based on the international based practices for access by PWDs. It is the hope of all that the same can be designed to the international best practice guidelines for accessible transport by PWDS as mentioned earlier in chapter 5.

Plate 5.2: A section of the Kilimani Ring Road footpath accessible by PWDS on wheelchair

Source: Field Survey (2014)

As noted above, some improvements have been realized in Nairobi. This also includes the sidewalk facility along the Uhuru highway which is designed by a tactile surface accessible by Persons with visual impairments as shown in the **plate 5.3** below

Plate 5.3: A tactile surface footpath along Uhuru highway accessible by PWDs.



Source: Field Survey (2014)

Competition for the small available road infrastructure was also evident with PWDs on tri-cycles riding along the main carriage. This exposes them to serious dangers of possible accidents and compromises their ability to travel safely as shown in the **Plate 5.4** below. On the plate on the right, it can be noted that a motor cycle [motorized transport] is using the NMT compromising the safety of pedestrians while a tri-cycle [NMT mode] is forced to use the main carriage, while on the right, A tricycle user is sandwiched between two vehicle exposing him to serious dangers of possible accident. This conflict of space is due to unsuitable designs, construction and maintenance of the sidewalks and cycle tracks usable by PWDs.

Plate 5.4: A PWD on a Tri-cycle forced to use the main carriage for motorized traffic along Ladhies road [Left] and Mombasa road [Right], Nairobi City.

Source: Field Survey (2014)

b) Foot Over Bridges [FOBs]

The ratings for the foot over bridges (FOBs) in Nairobi were also low by the PWDS with about 33% of the respondents registering their dissatisfaction with their design and condition. Most people interviewed clearly indicated that they are not accessible by PWDs. This was especially for those that do not include a ramp in their design and construction. An example is the FOB across valley road on **plate 5.8** below.

Plate 5.8: A foot bridge over valley road

Source: Field Survey (2014)

About 16% of the respondents interviewed were satisfied by the functionality of the FOBs. This was especially true for those who were interviewed on the FOBs along Thika Road at Kasarani, Muthaiga and Pangani areas, which were observed to be well designed with ramps and gradients favorable for PWDs access. Some of the FOBs sampled also were not properly lit and maintained and were left exposed for criminal activities according to some of the person's interviewed [examples include the FoBs across Jogoo road at City stadium, across Haile Selassie avenue at Muthurua market and the one across Mombasa road at Nyayo stadium]. This discouraged pedestrians from using them including the non-disabled persons. Insecurity was also mentioned by the respondents as a major factor hindering their use. Some of The FOBs has been designed with a ramp accessible to PWDs as shown on **Plate 5.5** below

Plate 5.5: A PWD using a section of the Foot Over Bridge to cross the Thika Superhighway.

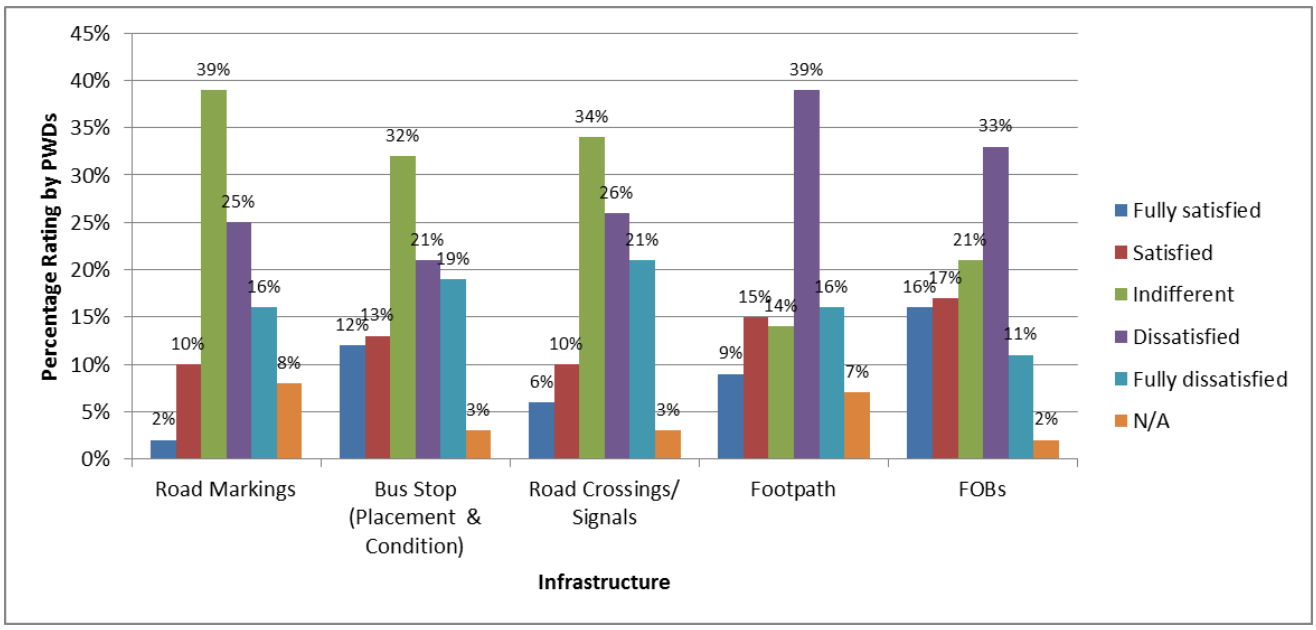
Source: Field Survey (2014)

The recommendation by best practice is to have ramps with minimum gradients of 4% to allow non-ambulant travelers on wheelchair to comfortably move over. Surfacing should also be designed with proper material which can accommodate both those on foot and wheelchair.

5.4. Opinion of PWDs on NMT and Public transport infrastructure

It was necessary to gather the opinion of PWDs on some of the NMT infrastructure provided in order to understand the level of understanding of the requirements, but indifference in view of infrastructure by the PWDs was noticeable; this was especially true for the cases of road markings where about 39% of the respondents did not seem to care much about the significance or seemed not to understand what the standard requirements are. The same was affirmative for both the bus stops placements and conditions rated at about 32% and the road crossings and signals at 34% view of indifference. This indifference is understandable and can be attributed to the fact that most of the respondents are not experts in evaluating infrastructure design standards.

Figure 5.2: Satisfaction Levels of PWDs with different aspects of Infrastructure facilities



Source: Author (2014)

It was however notable that a significant proportion of the respondents averaging about 24% registered their dissatisfaction with the several aspects of Road infrastructure [Crossings, road markings, road signals, bus stop placement and bus stop conditions]. **Fig. 5.2** above shows this analysis.

From the discussions held with key informants from implementation agencies like KURA and MoTI, Inclusion of PWDs accessible PT infrastructure at design stage still remains a subjective matter to the implementing agencies. This is because the country has not reviewed the detailed road design manuals to include the issues of accessibility by PWDs. However, in 2013, the Ministry of Roads published of the guidelines on mainstreaming cross-cutting issues in the roads sub-sector which highlighted broad policy statements, this is more so since there exist no particularly detailed standard on the design of

these facilities in Kenya inclusive of PWDs' requirements. The best practice requires that road crossings are integrated with the aspects with crossing clearly marked on the surface of the road, installing signals with advance warning to vehicles to stop or giving priority to pedestrians, Warning to visually impaired pedestrians that they are approaching street crossing, Method of informing visually impaired pedestrian when it is safe to cross, If signalized, traffic should be stopped long enough to allow slow walkers to cross, good street lighting, traffic calming to reduce vehicle speed and to divide two-way roads into two parts using central pedestrian refuges.

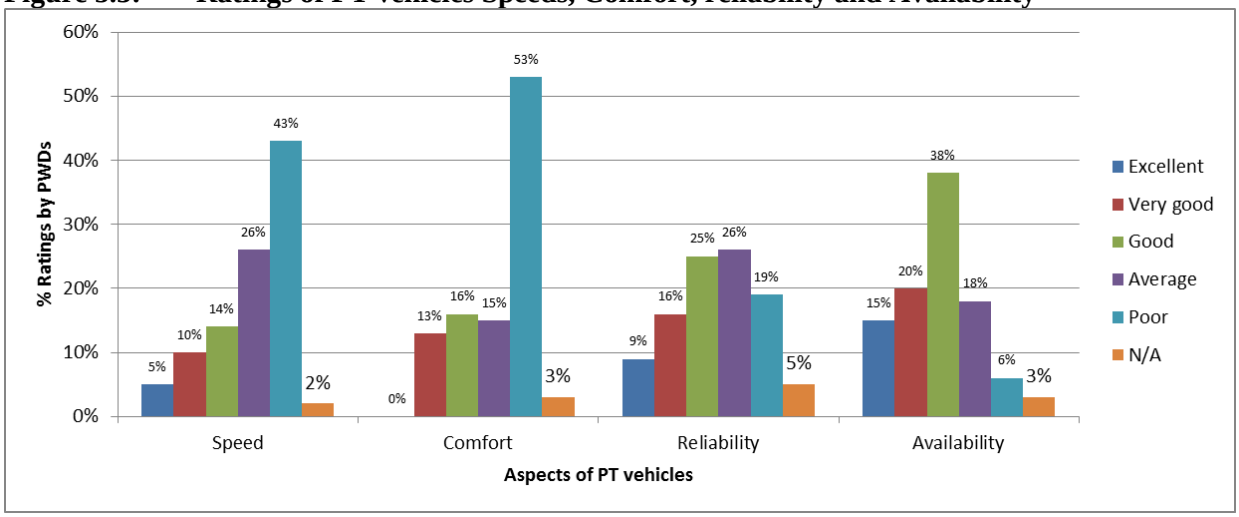
5.4.1. Public transport service

This section analyses the views on several aspects of public transport service in order to further the understanding of the travel environment for PWDs. The analysis is based on the speeds, comfort, reliability and availability of public transport vehicles as rated by the PWDs themselves.

a) Speeds, Comfort, Reliability and Availability of Public Transport vehicles

The opinion of PWDs was also sought on the operations and condition of public transport service vehicles. The speeds of public transport vehicles were rated poorly by about 43% of the persons' interviewed. Most PWDs indicated that they do not like the speeds of PT vehicles especially Matatus, the most common reason was because the operators especially along the Thika superhighway drove faster beyond the required 80Km/hr. although this could not be corroborated through practical measurements of speeds, the study observed fast hand some of the scenarios where the buses and matatus were driven beyond the 80Km/hr. while aboard. The trend was also reflected in their opinion of the comfort of PT vehicles. As shown on the **Figure 5.3** below, about 53% of the PWDs interviewed rated the comfort of PT vehicles as poor; this can be associated to the vehicle interior and body designs standards which do not meet the international best practice for use by PWDs as described in section 3.4 of this report. Of all the vehicles the study managed to review, none of them matched the requirements of PT for PWDs. It was noted that it was not easy boarding via steps and none of the buses or matatus had ramps to aid PWDs entry. The Step noses and hazards were invisible in all the matatus and buses reviewed. From the requirements of best practices, it was expected that priority seats near entrance should be available for disabled passengers but this was not the case with the crew arguing that there was no need since there are very few PWDs to warrant such a prioritization.

Figure 5.3: Ratings of PT vehicles Speeds, Comfort, reliability and Availability



Source: Field Survey (2014)

About 26% of the PWDs interviewed thought the public transport vehicles schedule and routing were averagely reliable while 25% of them indicated the same as good confirming that most of the PWDs were satisfied with the availability and reliability of their operations. Only 19% of the PWDs interviewed rated the reliability of PT vehicles as poor. According to the PWDs interviewed, Matatus or buses to some extent operate within some specific time fame or schedule but majorly on demand and supply dynamics which largely meet most of the travelers' needs. However, this makes it sometimes very difficult for the travelers to plan their journeys. The same was again reflected on the ratings for availability where about 38% of interviewees indicated that the PT vehicles are available to them whenever required while only 6% rated the availability of PT vehicles as poor.

Plate 5.6: Typical Vehicle body design with Kenyan standards for Bus

Source: Author 2014

Plate 5.7: Midi-bus [left] and Matatu (Minibus) [right]

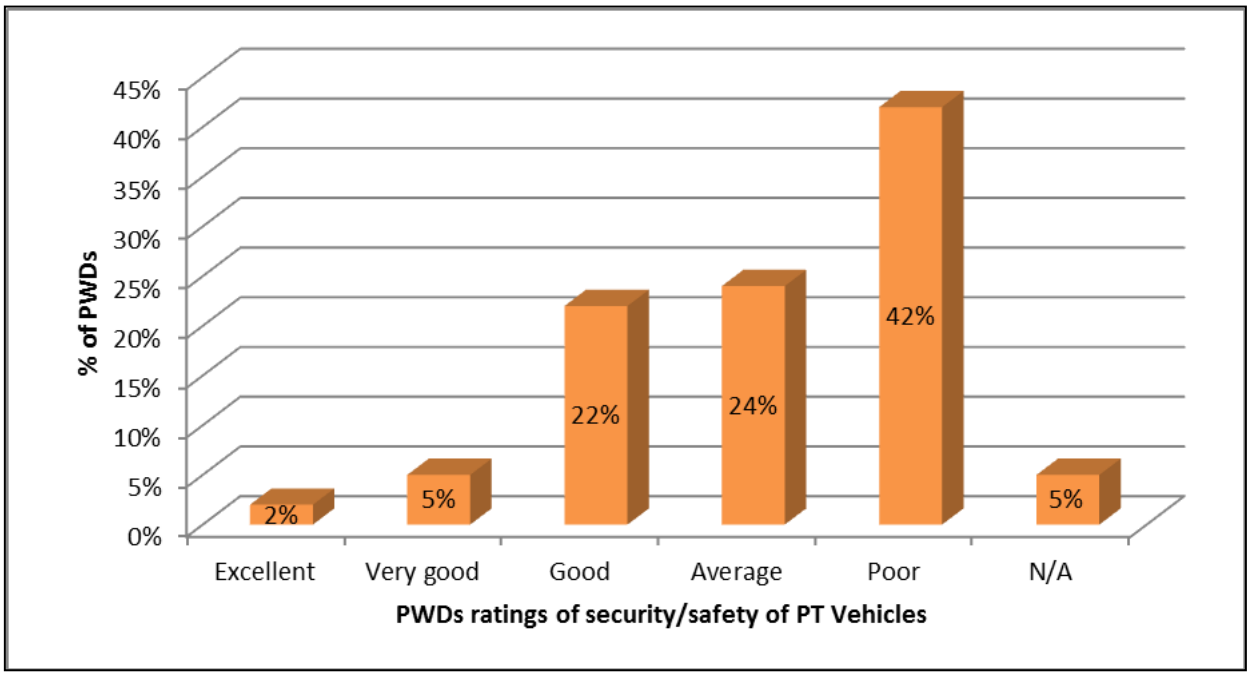
Source: (Field Survey, 2014)

It was noted from observations that the vehicles do not have easy stowage of mobility aids (wheelchairs, walking sticks) within the buses and matatus, and with the national transport and safety authority (operation of public service vehicles) regulations, 2013, which banned the use of carriers on buses and matatus; it has made the situation even worse for PWDs.

b) Security and safety of PT vehicles

Majority, about 42% of PWDs interviewed rated the security and safety of the PT vehicles as Poor with 24% terming it as average. [**Figure 5.4** shows this analysis].

Figure 5.4: Percentage rating of Safety and Security of Public Transport vehicles by PWDs



Source: Field Survey (2014)

A dedicated wheelchair space for wheelchair users to remain seated in their wheelchairs should be provided for safety purposes, this was evidently lacking in all the PT vehicles inspected by the study. PWDs also indicated that there were several incidence of rough driving and braking that can cause injury to PWDs. Another observations was that there seem to have no ways to request a stop without passengers leaving their seats which should be a saftey feature in any public bus/minibus. Handrails and stanchions for boarding and alighting were not to the standard required by PWDs best practice.

Another observation was that buses and matatus do not seem to wait at the bus stops for passengers, but rather pick and drop passengers at undesignated places; this makes it extremely difficult for PWDs to access PT since this is normally done in much hurry. There were no clear announcement of major stops with bus drivers and conductors not providing helpful service and assistance to PWDs. Thus, the PWDs find themselves at the mercy of a profit-seeking crew, most of who may be ruthless and see PWDs as a nuisance or wasting their time. The risky boarding system used at the city bus and matatu stages makes it very hard, if not almost impossible for these groups of people to use public transport facilities

Plate 5.8: Typical Interior design of a matatu (left) and of a bus (Right) both providing PT services within Nairobi City

Source: Field Survey.(2013)

It is important to note that wheelchair users should be able to travel safely. Security and safety in public transport vehicles are very important features and aspects that need to be improved if accessibility is to be achieved.

5.4.2. Comparative Analysis of NMT and PT Travel Environment

In this section, the research explores the travelling patterns and behaviour of PWDs with a comparative analysis of the non-motorized and public transport environments.

a) Trip Frequency and Purpose for PWDs

In understanding accessibility, the travel destination or purpose of travel is a vital factor, the travel frequency and purpose therefore can indicate the level of accessibility. There were nine (9 No.) trip purposes indicated in the survey tool from which the research sought to investigate trip purposes. According to Rodriguez et al, 2010, the nine trip purposes can be isolated in to five major urban movement type's namely professional, pendulum, personal, touristic and distributive. Of all these trip purposes, the professional and pendulum kind of trips i.e. [those going to work, personal business, to school, home, and begging] constituted the largest proportion at 88% of the respondents in total, while those travelling for personal reasons e.g. to social places, for medical and spiritual purposes constituted 12% of the respondents. Those travelling to their work places constitute the largest number at 48% followed by those to school and those who travel to attend to personal businesses both at 13%. The least travelling purpose are of those travelling for social reasons at only 1% implying that the travelling environment of PWDs may not be conducive to motivate these kind of travel purpose. **Table 5.7** and **Figure 5.2** show the results of this analysis.

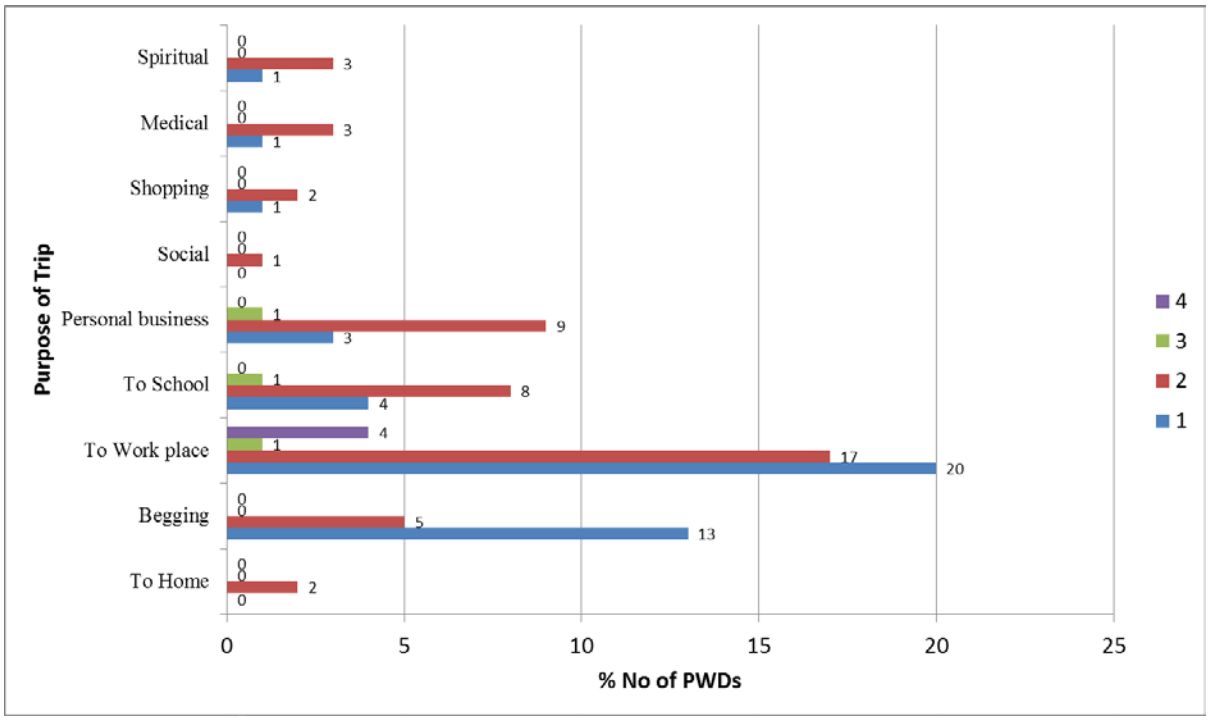
Table 5.6: Trip frequency per day

Trip purpose * Total number of trips a day Cross tabulation							
			Total number of trips a day				**Total**
			1	**2**	**3**	**4**	
Trip purpose	To Home	Count	0	2	0	0	**2**
		% within Trip purpose	.0%	100.0%	.0%	.0%	**100.0%**
		% of Total	.0%	2.0%	.0%	.0%	**2.0%**
	Begging	Count	13	5	0	0	**18**
		% within Trip purpose	72.2%	27.8%	.0%	.0%	**100.0%**
		% of Total	13.0%	5.0%	.0%	.0%	**18.0%**
	To Work place	Count	20	17	1	4	**42**
		% within Trip purpose	47.6%	40.5%	2.4%	9.5%	**100.0%**
		% of Total	20.0%	17.0%	1.0%	4.0%	**42.0%**
	To School	Count	4	8	1	0	**13**
		% within Trip purpose	30.8%	61.5%	7.7%	.0%	**100.0%**
		% of Total	4.0%	8.0%	1.0%	.0%	**13.0%**
	Personal	Count	3	9	1	0	**13**

	business	% within Trip purpose	23.1%	69.2%	7.7%	.0%	**100.0%**
		% of Total	3.0%	9.0%	1.0%	.0%	**13.0%**
	Social	Count	0	1	0	0	**1**
		% within Trip purpose	.0%	100.0%	.0%	.0%	**100.0%**
		% of Total	.0%	1.0%	.0%	.0%	**1.0%**
	Shopping	Count	1	2	0	0	**3**
		% within Trip purpose	33.3%	66.7%	.0%	.0%	**100.0%**
		% of Total	1.0%	2.0%	.0%	.0%	**3.0%**
	Medical	Count	1	3	0	0	**4**
		% within Trip purpose	25.0%	75.0%	.0%	.0%	**100.0%**
		% of Total	1.0%	3.0%	.0%	.0%	**4.0%**
	Spiritual	Count	1	3	0	0	**4**
		% within Trip purpose	25.0%	75.0%	.0%	.0%	**100.0%**
		% of Total	1.0%	3.0%	.0%	.0%	**4.0%**
Total		Count	43	50	3	4	**100**
		% within Trip purpose	43.0%	50.0%	3.0%	4.0%	**100.0%**
		% of Total	**43.0%**	**50.0%**	**3.0%**	**4.0%**	**100.0%**

Source: Field Survey (2014)

Figure 5.5: Frequency of trips of PWDs by Trip Purpose/Destination at morning peak



Source: Field Survey (2014)

On the frequency of trips, an average of 43% of the respondent's travel once a day while 50% indicated that they travel two times daily to different destinations and purposes. Of those who travel once daily, about 48% travels to their work place, while about 41% of PWDs who went to their work

places travelled twice daily. A proportion of about 18% travelled to their begging points of all who were interviewed. Of this category, about 43% travelled once a day. This shows that most people begging on the streets are likely to be persons with disabilities, confirming the argument that there exist unbalanced environmental opportunities between them and the rest of the able population. As noted by WHO, Environmental factors such as temperature, terrain, accessibility of transport, climate, noise, etc., can improve or hinder a PWDs participation in such activities as working, going to school, taking care of one's home, and being involved with family and friends in social, recreational and civic activities in the community. (WHO, 2011). This is evident in the low number of PWDs participating or travelling for personal movements.

b) Trip Frequency and Type of disability

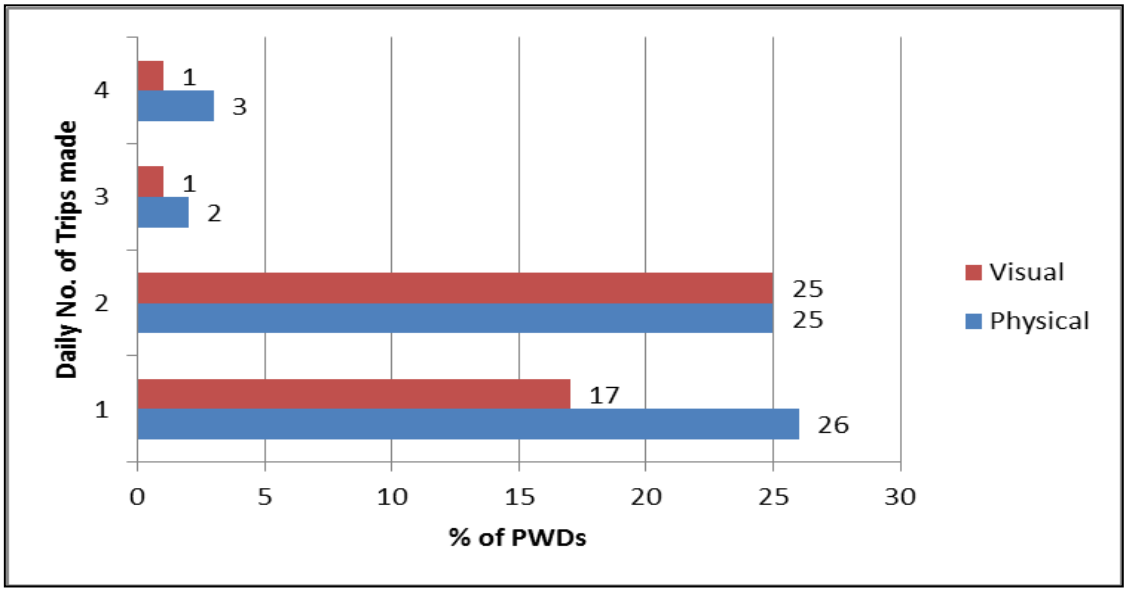
In order to inform planning for another vital analysis was the correlation between the types of disability and the frequency of trips made as shown in the **Table 5.8** and **figure 5.3** below. Of the 56% of the physically impaired travelers interviewed, 46% of them travelled once daily while 45% of them travelled twice daily. From the 50% of PWDs who travelled twice daily, an equal proportion of about 25% were physically and visually impaired. Of the 44% of the visually impaired who were interviewed, about 57% majority travelled twice daily which could be indicative that majority of them travel from home to their usual destinations and back. It was also recognized that of the physically disabled, those who made trips once a day [26%] were more than the 25% who made two trips a day compared to the visually disabled who only 17% made single trips compared to the 25% of them who made two trips a day. It is therefore emerging in the study that there is no significant difference in the number of trips made by the different types of disability.

Table 5.7: Crosstab of Type of disability by Trip frequency

Type of disability * Total number of trips a day Cross tabulation							
			Total number of trips a day				**Total**
			1	**2**	**3**	**4**	
Type of disability	**Physical**	Count	26	25	2	3	56
		% within Type of disability	46.4%	44.6%	3.6%	5.4%	100.0%
		% of Total	26.0%	25.0%	2.0%	3.0%	56.0%
	Visual	Count	17	25	1	1	44
		% within Type of disability	38.6%	56.8%	2.3%	2.3%	100.0%
		% of Total	17.0%	25.0%	1.0%	1.0%	44.0%
Total		Count	43	50	3	4	100
		% within Type of disability	43.0%	50.0%	3.0%	4.0%	100.0%
		% of Total	43.0%	50.0%	3.0%	4.0%	100.0%

Source: Field Survey (2014)

Figure 5.6: Chart showing % No. of Trips made by Disability type

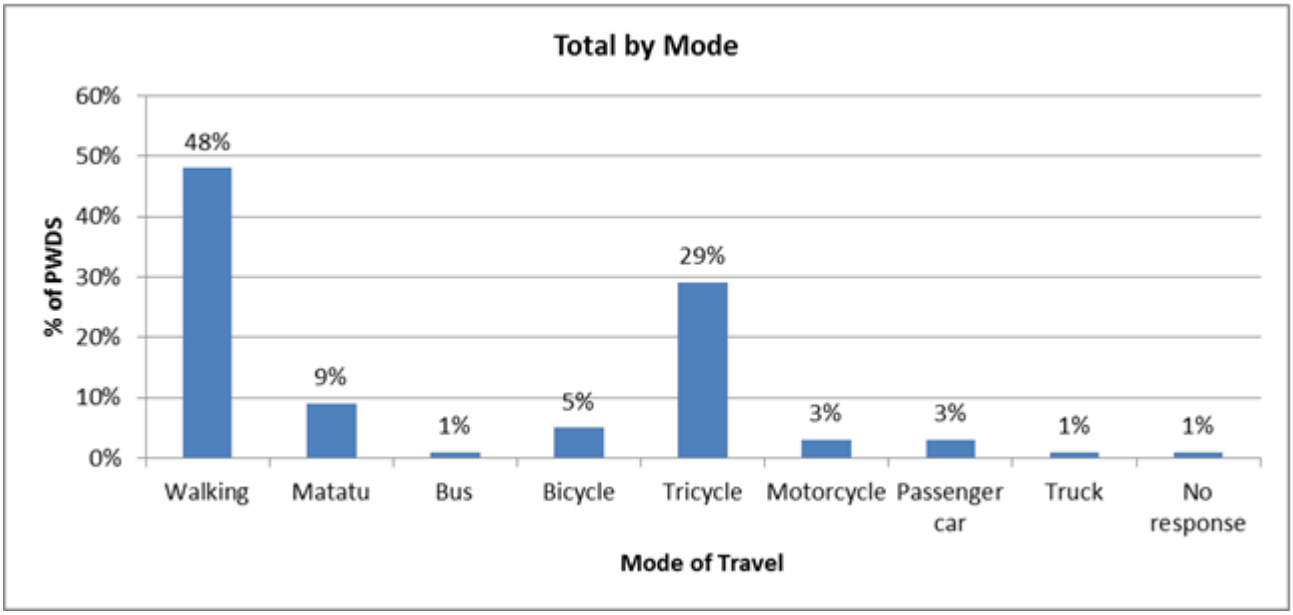


Source: Field Survey (2014)

c) Travel Modes

From the analysis on **Figure 5.7** and **Table 5.9** below, An average of 48% of Persons with Disabilities travel by walking in Nairobi City with a large number of about 31% being visually impaired compared to the 17% proportion that were physically impaired.

Figure 5.7: Travel Modes in Nairobi for PWDs



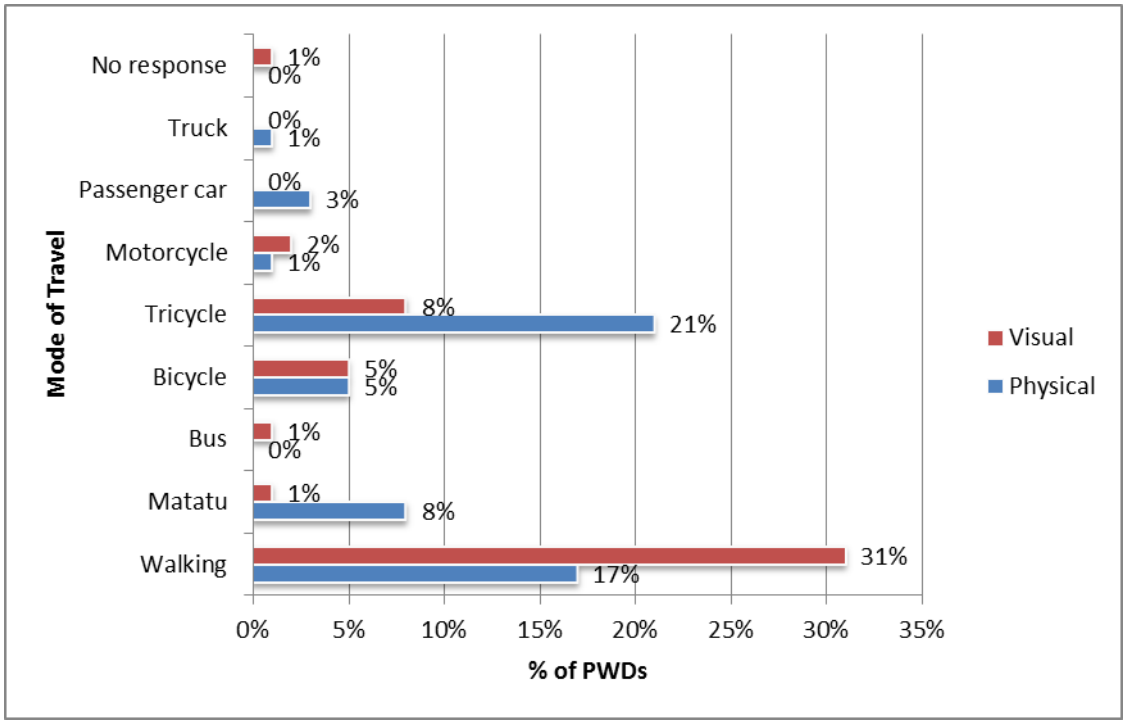
Source: Field Survey (2014)

Of the significant 29% who use Tricycle, majority of 72% were physically impaired while 28% were visually impaired. It's worth noting that only 9% of PWDs interviewed used matatu mode of which

89% of them were physically impaired. In general, these findings indicate the low usage of public transport services compared to the NMT modes by PWDs. This can be attributed to the poor design of the public transport vehicles which hinder the ease of use by PWDs leaving with limited choices.

i. Modal Share by Type of Disability

Figure 5.8: Percentage Modes of Travel by type of disability



Source: Field Survey (2014)

There are however several challenges that were observed on the NMT facilities as explained on the section 5.4 above. This is despite the fact that most PWDs use the NMT facilities more frequently as shown. **Plate 5.7** below shows physically impaired pedestrian without any mobility assistive device facing some of the most common challenges of inaccessibility to the NMT facilities. It can be noted that the Pedestrian is forced to crawl along the service road since the paved foot path has been encroached upon by parked vehicles.

Plate 5.9: A PWD experiencing mobility challenge along the newly constructed section on the Eastern bypass.

Source: Field Survey (2014)

Table 5.8: Cross-tabulation of Travel Mode by Type of Disability

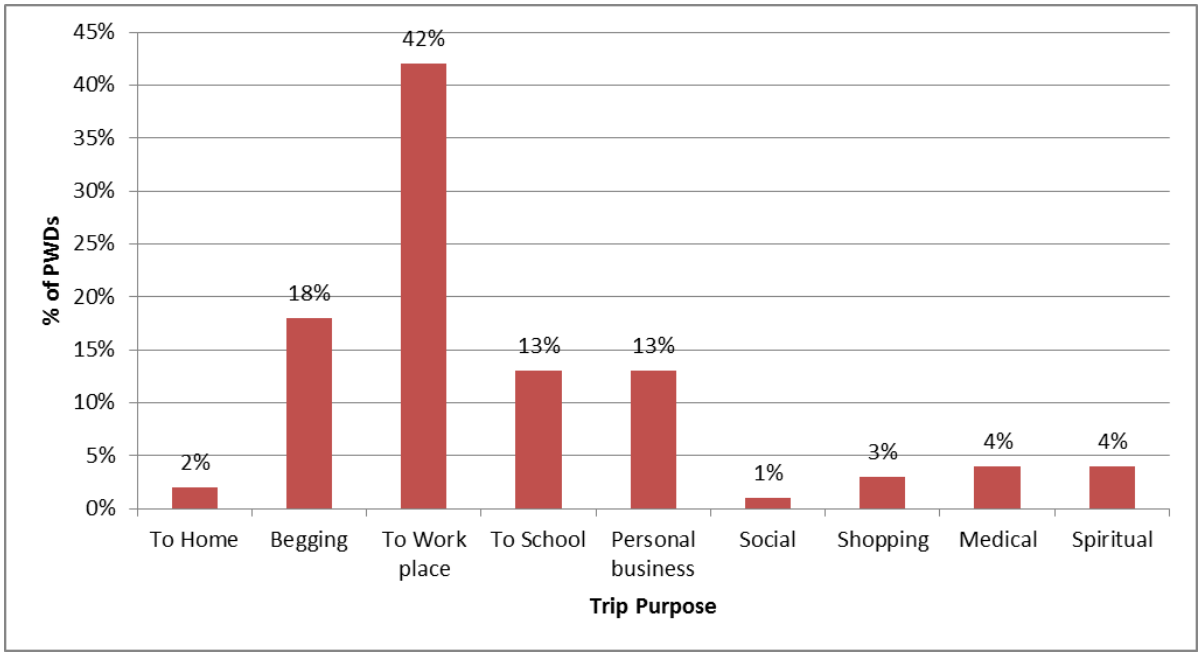
			Type of disability		Total
			Physical	Visual	
Travel mode for trip	Walking	Count	17	31	48
		% within travel mode	35.4%	64.6%	100.0%
		% of Total	17.0%	31.0%	48.0%
	Matatu	Count	8	1	9
		% within travel mode	88.9%	11.1%	100.0%
		% of Total	8.0%	1.0%	9.0%
	Bus	Count	0	1	1
		% within travel mode	.0%	100.0%	100.0%
		% of Total	.0%	1.0%	1.0%
	Bicycle	Count	5	0	5
		% within travel mode	100.0%	.0%	100.0%
		% of Total	5.0%	.0%	5.0%

	Tricycle	Count	21	8	29
		% within travel mode	72.4%	27.6%	100.0%
		% of Total	21.0%	8.0%	29.0%
	Motorcycle	Count	1	2	3
		% within travel mode	33.3%	66.7%	100.0%
		% of Total	1.0%	2.0%	3.0%
	Passenger car	Count	3	0	3
		% within travel mode	100.0%	.0%	100.0%
		% of Total	3.0%	.0%	3.0%
	Truck	Count	1	0	1
		% within travel mode	100.0%	.0%	100.0%
		% of Total	1.0%	.0%	1.0%
	No response	Count	0	1	1
		% within travel mode	.0%	100.0%	100.0%
		% of Total	.0%	1.0%	1.0%
Total		Count	56	44	100
		% within travel mode	56.0%	44.0%	100.0%
		% of Total	56.0%	44.0%	100.0%

Source: Field Survey (2014)

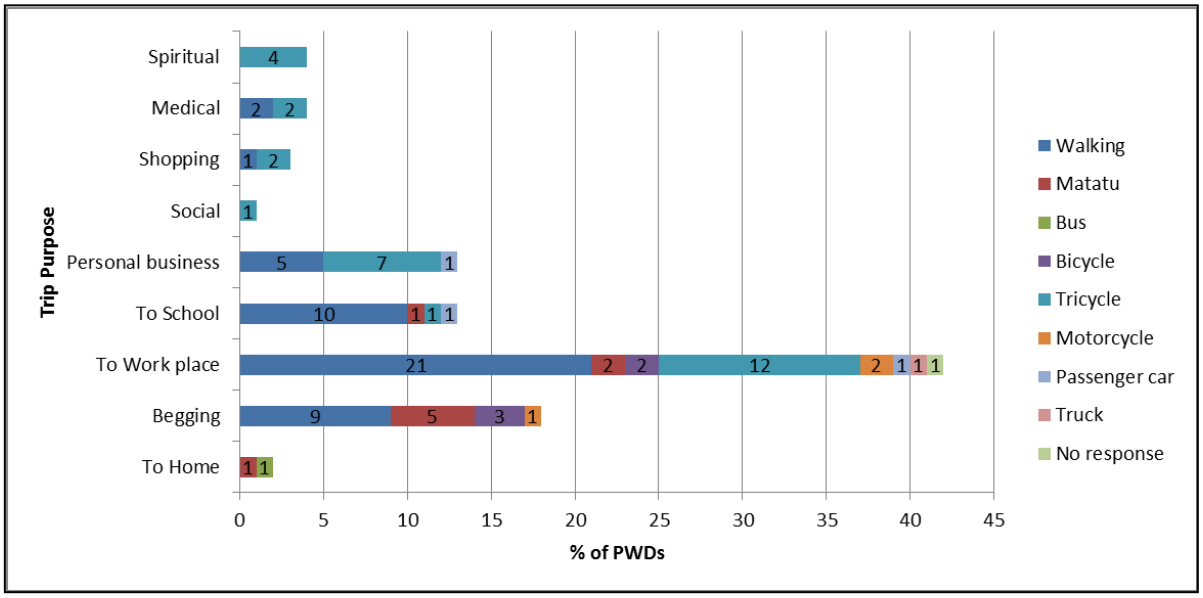
ii. Modal Share by Purpose of Trip

Figure 5.9: Percentage share of Trip Purpose



Source: Field Survey (2014)

Figure 5.10: Percentage Modal Share vs. Trip Purpose



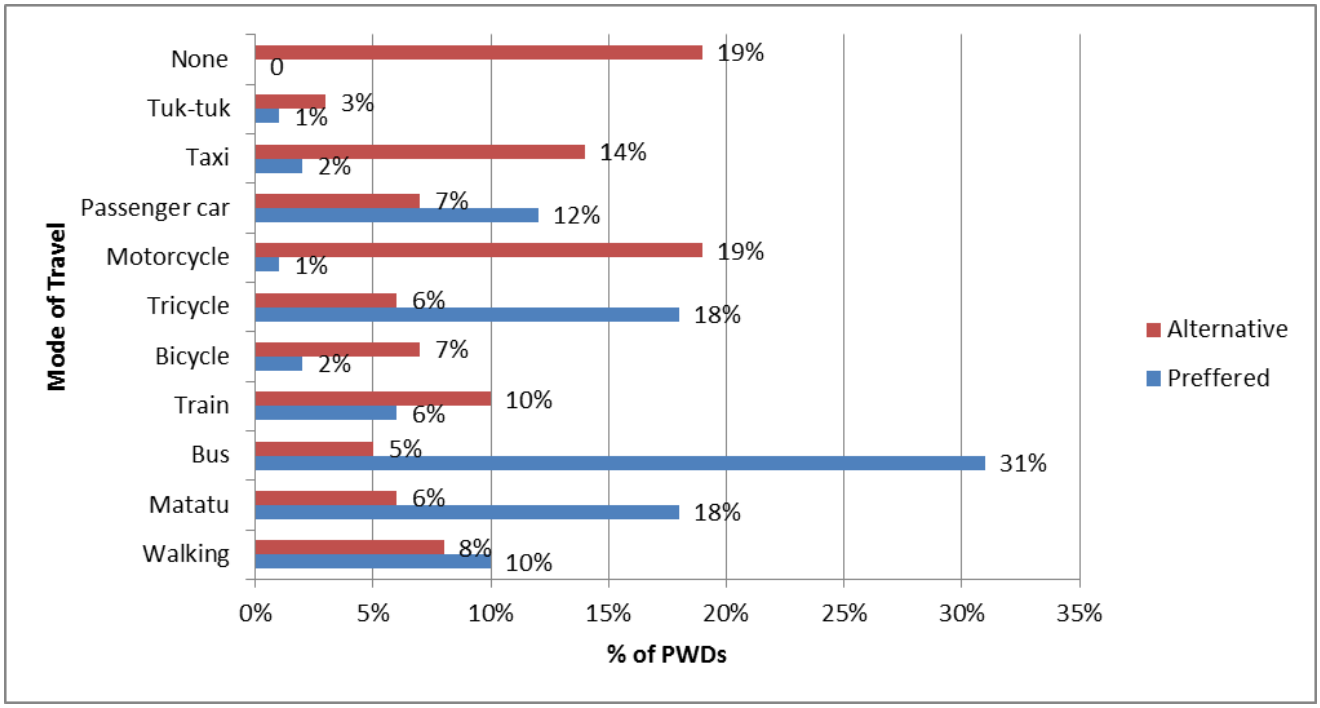
Source: Field Survey (2014)

Of the Total majority of 42% of PWDs who travel to their workplaces, 21% proportion travel by walking while about 12% of them use tricycle. This is also true for the school goers where a proportion of about 10% travel by walking. For those attending to personal business, a larger proportion of 7% used tri-cycle compared to those travelling by walking at 5%. The dominance of walking as a mode of transport was also reflected on the recent personal trip survey by the JICA lead team on the study for the The Project on Integrated Urban Development Master Plan for the City of Nairobi, where about 45% averagely travelled by walking in Nairobi. However, in their comparison of the travel mode by trip purpose between 2004 and 2013, they concluded that generally, percentage of walking decreased in every trip purpose. Regarding the trip purpose of "To work", percentage of private car and matatu decreased and two wheel modes and large bus replaced those two modes. As for the trip purpose of "To school", percentage of both matatu and large bus increased. (Draft INUDMP, 2013)

d) Preffered and alternative mode of public transport

Most PWDs when asked which mode of public vehicle they preferred to use given the prevailing normal circumstances, almost 31% of the respondents suggested they preferred the Bus with majority arguing that they were cost effective and had reasonable space to accommodate their special requirements, they however registered their dissatisfaction with the availability of the buses on most routes. Matatus were also preferred at about 18% mainly because of their availability. The use of tricycle was also significant for persons with physical impairments at about 18%.

Figure 5.11: Percentage Prefferd vs. Alternative mode of public transport available for PWDs



Source: Field Survey (2014)

Use of passenger car was also significant at about 7% but this has strong relationship with car ownership. According to the Draft Nairobi Urban Master Plan (INUDMP, 2013), with regards to the non-car owners, modal share of two wheel mode, matatu and large bus are increasing. It is anticipated that use of two wheel mode such as motorcycle will increase more in near future (INUDMP, 2013). This increase again is likely to exclude PWDs even more from accessing safe and affordable public transport, justifying the more need by the government and other stakeholder to consider their specific improvements on their requirement for travel.

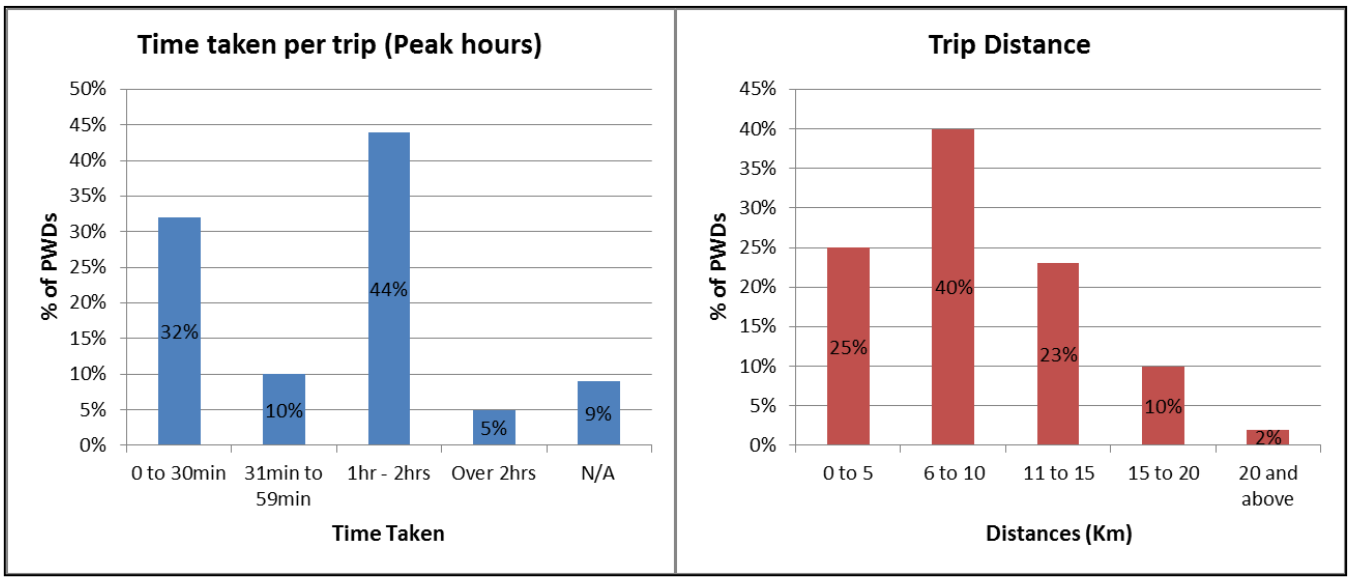
On the alternative mode of transport, participants were asked to recommend which mode they use especially when the most common public transport services means such as Matatus and Buses are not available. Majority of PWDs [about 19%] indicated that they use Motorbikes; popularly known as Boda Boda[5], this they indicated is because of their availability and flexible routing. There were a significant number (19%) who indicated they had no other means at all as alternative. The preference of motorcycles only as an alternative could be attributed to the cost element since Boda Boda and Taxi are relatively more expensive means of public transport compared to the rest. **Fig 5.11** shows the results of this analysis.

[5] *A popular motor cycle means of transport in Kenya whose name is a corruption from the English word "Border" since they were used mostly for cross border transport between Kenya and Uganda.*

e) Trip Distance and Time [Peak Hours]

The largest proportion of the PWDs interviewed travelled a commuter distance of between 6 to 10 km at about 40%, while around 25% of the PWDs travelled between 0 to 5Km. This adds to a total proportion of about 65% [about two thirds of the PWDs] that travels below the 10km distance.

Figure 5.12: Travel Times and Distances



Source: Field Survey (2014)

The implication is that majority of the PWDs prefer to live closer to the city center where there are various options of mobility and access to their destinations of travel as opposed to the far areas where access to public transport may present challenges and options may be limited. A considerable number of about 33% travelled between the 10 to 20km distances with a very small percentage of about 2% travelling beyond the 20km distances. This again confirms the assertions as indicated above.

It takes about 2 hours to cover 10 – 20 km commuting distance. In the 6 – 10 km central area where about 44% of the travelers travelled from, travel time at peak hours is about 1 -2 hours long because of the heavy traffic congestion according to the public transport operators. From the same operators, the off-peak travel time is averagely between 10-30 minutes for the 6-10km central areas of Nairobi. Given the fact that most vehicles and the infrastructure provided do not fully meet the PWDs safe and secure requirements for travel, the longer travel distances and times has a negative effect on the part of PWDs especially with respect to their comfort, heavy traffic congestion on the road at peak hours also lead to longer travel times.

f) Disability Assistive Devices

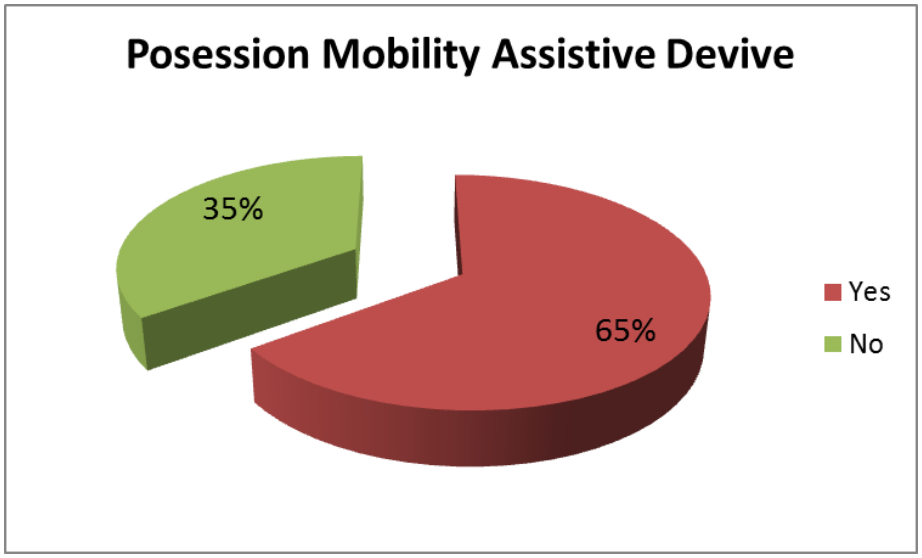
In understanding accessibility, there is a need to appreciate the level of access to personal mobility assistive devices before access to NMT and public transport can be achieved. In this respect, Persons with disability were also asked to state whether they possessed any disability assistive device to aid their mobility such as wheel chairs, walking sticks etc. About 65% of the respondents had such devices compared to the KNSPWD 2007 survey that showed that Nairobi had the highest (42%) use of assistive devices compared to other provinces.

Box 5.1: Assistive Devices

A third of PWDs use an assistive device or Support service. PWDs with Physical disabilities were more likely to possess a personal mobility device than their visually disabled counterparts.

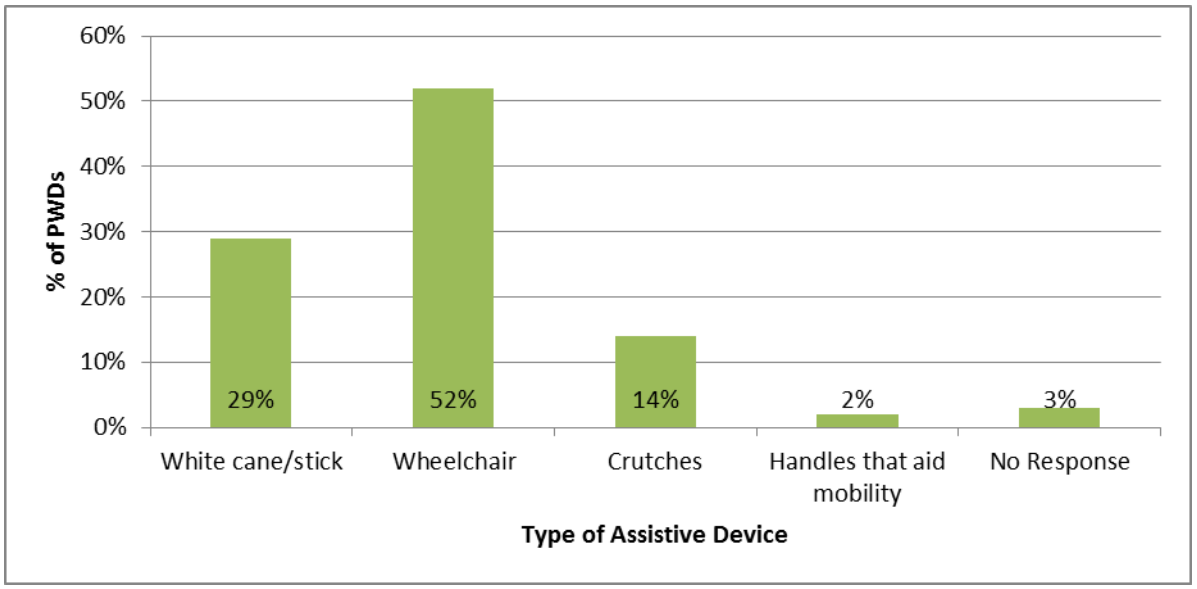
Source: Field Survey (2014)

Figure 5.13: Possession of Personal Mobility Assistive Device



Source: Field Survey (2014)

Figure 5.14 Percentage of ownership by Types of device Possessed



Source: Field Survey (2014)

Wheelchair was the most common mobility device available for persons with physical impairments at 52% ownership while a white cane at 21% was more popular with persons with visual impairments. Crutches and handles that aid mobility was not as common compared to the other devices. This can be attributed to the type of disability prevalent among the people interviewed.

This is very important to note as an area that may require specific intervention by the actors in the attempt to begin improving the accessibility of persons with disabilities; it is evident that more efforts need to be taken towards the provision of personal locomotive/mobility aids as the first stage towards public transport accessibility since movement from travel origin to bus stages as well as from terminals to destinations heavily depend on these devices.

5.5. Key Challenges Faced by PWDs

The following is a summary of the Key challenges that were identified to greatly affect the mobility of PWDs while using NMT facilities and Public transport service. **Table 5.9** lists the challenges in relation to NMT while **Table 5.10** lists the challenges in relation to public transport.

Table 5.9: Key Challenges in relation to accessing NMT Facilities

FACILITY	CHALLENGE AND IMPACT
Traffic Signals	• There are no advance warnings to vehicles to stop or giving priority to pedestrians. • There are no warnings to visually impaired pedestrians that they are approaching

	street crossing where they are available. • There are no methods of informing visually impaired pedestrian when it is safe to cross. • Where signals are provided, motorized traffic are not stopped long enough to allow slow walkers to cross. • Poor traffic control, including a lack of traffic signals, and management to meet the requirements of PWDs
Footways and Cycle tracks)	• Most of the sections where the NMT facilities are provided, Surface quality is uneven and infirm: unfit for use by wheelchair users and persons on sticks except for some few sections like e.g. Uhuru Highway walkway with tactile surface for the blind, and the sidewalks along the newly built western ring road which fits the requirements of persons on a wheelchair. • In some sections where the sidewalks are provided, the bollards or barrier are placed too close in such a way that PWDs on wheelchairs may not access. • Traffic congestion worsened by encroaching hawkers who use NMT facilities like walkways, sidewalks and cycle paths as space for business • Increasing ownership of private cars and two wheelers (Motor Cycle) who overcrowd the pavements required by Pedestrians and cyclists
Foot over Bridges (FoBs) and Pedestrian Tunnels	• Very steep (high gradient) ramps on foot over bridges rendering them unsuitable for use by PWDs • Where such facilities exist, they are unsafe and insecure for use. This course for limited usage

Road Crossings	• In most places where these are required, there are not properly provided or do not exist at all. • Kerbs are not flashed with the carriage making them irregular and unsuitable for use by PWDs • Crossings are not clearly marked on the surface of the road. • Generally there is poor street lighting. • Traffic calming to reduce vehicle speeds is not properly done.

Source: Author (2014)

Table 5.10: Key Challenges in relation to accessing PT

FACILITY	CHALLENGES AND IMPACTS
Bus Stops (Bays) and Terminals	• Bus Bays and Terminal facilities are poorly maintained and are not accessible by PWDs. • Some are located very far from the most suitable locations accessible by PWDs • Insufficient parking spaces for bicycles and tri-cycles used by PWDs
Roads (Main Carriage)	• There are very few sections of Nairobi Roads where the designs comply with the requirements for access and use by the Persons with disabilities. This includes the road surface type, conditions and design standards in general. • The traffic calming facilities like bumps and rumble strips are also not placed at the right places where they are required. This can expose PWDs to possible risks of accidents • Unsuitability for use by low floor public transport vehicles leading to unwillingness to investment in the same by Private owners. • Narrow, poorly maintained, unpaved, and limited road networks that do not sufficiently meet the service level requirements for PWDs
Taxis	• All most all the Taxis are of normal private car in terms of design and may generally accommodate PWDs given the situation; however, the normal private car design does not comply with the required standards for use by PWDs. • Uncertainty around safety of seating in mobility aids in Taxis
Buses and coaches	• All the buses assessed were of raised floor and of narrow doors • The interior design and seating arrangement were completely unsuitable for PWDs especially those on wheelchair • There existed very limited of tools for coordination between the crew and passengers • Effective travel information flow in the bus was lacking • Uncertainty around safety of seating in mobility aids in buses and coaches • There were no easy and unhindered boarding via ramps e.g. Level boarding for wheelchair users into bus. • Priority seats near entrance were not available for disabled passengers. • Easy stowage of mobility aids (wheelchairs, walking sticks) was not provided. • Bell/light activation to inform driver of request to stop were available in some vehicles but are placed very high on the roof top making them hard to use especially by PWDs. • Overcrowded, non-accessible, and inefficient public transport vehicles that do not

	meets the requirements of PWDs
Mini Buses and Matatus	• Same as Above • Exclusions that apply to mini-buses and matatus limit current and future provision of services for persons with disability

Source: Author (2014)

5.6. Synthesis of the findings with respect to the implications and best practices.

The following section is a brief synthesis table on the emerging issues on the existing situation in relation to the best practices or what is expected. **Table 5.11** is on the NMT environment while **Table 5.12** represents the synthesis on the PT environment

Table 5.11: NMT Travel Environment

Facility	Aspect	Existing Situation	Best Practice requirements
Footpaths	Safety	▪ The surfacing is rugged and poorly maintained. ▪ Some are are not properly separated from vehicular traffic by either kerbs or drains. ▪ Characterized with open utility covers, and street works especially by service providers, making them potential accident prone. ▪ Most sections not well street lighting.	▪ Level and smooth surface. ▪ Clearly separated from vehicular traffic. ▪ Adequate clear width and height. ▪ No open utility covers, street works. ▪ Good street lighting.
	Accessibility	▪ Full of obstacles, including parked vehicles on the footway. ▪ In some sections the gradients are too steep. ▪ Lack of strategic and well placed resting places along routes. ▪ For the visually impaired people, the layouts are complex and do not accommodate adequate signals.	▪ Remove obstacles, including parked vehicles from the footway. ▪ Gradients not too steep. ▪ Adequate resting places. ▪ Simple layout and adequate cues to visually impaired people.
	Reliability	▪ In most of the Footway observed, there was no provision for uninterrupted access between designated points.	▪ Footway should provide uninterrupted accessible way between designated points.
	Affordability	To the provider: ▪ Most access improvements in regular maintenance and new construction have not included NMT. ▪ upgrading is not prioritized on high pedestrian areas	To the provider: ▪ Minimize costs by including access improvements in regular maintenance and new construction. ▪ Maximize impact by upgrading highly used pedestrian areas first.

Facility	Aspect	Existing Situation	Best Practice requirements
Street Crossings	Safety	▪ Crossing markings are faded and not clear on the surface of the road. ▪ There are no advance warnings to vehicles to stop or give priority to pedestrians. ▪ Currently in Nairobi, there are no warnings to visually impaired pedestrians that they are approaching street crossing. ▪ Again in Nairobi, there are no methods of informing visually impaired pedestrian when it is safe to cross. ▪ In places where junctions or crossings are signalized, traffic is not stopped long enough to allow slow walkers to cross. ▪ Some sections traffic calming are needed to reduce vehicle speeds for safety.	▪ Crossing clearly marked on the surface of the road. ▪ Advance warning to vehicles to stop or giving priority to pedestrians. ▪ Warning to visually impaired pedestrians that they are approaching street crossing. ▪ Method of informing visually impaired pedestrian when it is safe to cross. ▪ If signalized, keep traffic stopped long enough to allow slow walkers to cross. ▪ Traffic calming to reduce vehicle speeds
	Reliability	▪ Warnings, information and traffic signals are not well-maintained and in constant bad working order.	▪ Warnings, information and traffic signals well-maintained and in good working order.
	Accessibility	▪ There are no provisions for kerb ramps to provide level crossing from footway to road. ▪ In some sections, the crossing distances are too long for PWDs to comfortably cross.	▪ Kerb ramps providing level from footway to road. ▪ Minimize crossing distance, for instance, by extending kerbs across parking lanes or installing center islands.
	Affordability	To the provider: ▪ Most access improvements in regular maintenance and new construction have not included proper crossings. ▪ Street crossings have not prioritized well the high pedestrian areas.	To the provider: ▪ Minimize costs by installing at least kerb ramps and warning surfaces at newly constructed or upgraded crossings. ▪ Maximize impacts by prioritizing crossings with high pedestrian volumes.

Facility	Aspect	Existing Situation	Best Practice requirements
Footbridges	Safety	▪ Where such facilities exist, they are unsafe and insecure for use. This course for limited usage ▪ Poorly lit posing unsafe environment for use	▪ Regular cleaning ▪ Provide lighting and regular security measures.
	Reliability	▪ Poorly maintained with most of them assuming residence for street families ▪ Some of them are roofless making them difficult to use especially during rainy seasons	▪ Periodic and regular maintenance practice should be observed. ▪ Provide roofing for all footbridges
	Accessibility	▪ Some have Very steep (high gradient) ramps on foot over bridges rendering them unsuitable for use by PWDs	▪ Ramps should have a minimum ramp gradient of about 8% to accommodate those ambulant on wheelchair.
	Affordability	▪ Footbridges have not prioritized well the high and difficult pedestrian crossing areas. e.g Bellevue in Mombasa Road	▪ Maximize impacts by prioritizing difficult crossings sections with high pedestrian volumes

Source: Author (2014)

Table 5.12: PT Travel Environment

Facility	Aspect	Existing Situation	Best Practice Requirements
Bus and Matatus	Safety	▪ There were no wheelchair spaces for wheelchair users to remain seated in their wheelchairs. ▪ There were incidences of rough driving and braking that can cause injury to PWDs. ▪ Where buttons exist to request a stop, the same were placed too high requiring the passengers to leaving their seats. ▪ Handrails and stanchions for boarding, alighting and standing passengers were designed without considerations for PWDs requirements.	▪ Dedicated wheelchair space for wheelchair users to remain seated in their wheelchairs. ▪ Smooth driving and braking to avoid injury. ▪ Ways to request a stop without passengers leaving their seats to be provided. ▪ Handrails and stanchions for boarding, alighting and standing passengers.

Facility	Aspect	Existing Situation	Best Practice Requirements
	Accessibility	▪ For buses and mini buses, boarding via steps was notably very difficult for PWDs. ▪ Level boarding for wheelchair users into bus was not provided. ▪ Step noses and hazards were invisible. ▪ Priority seats near entrance were not available for disabled passengers. ▪ Stowage of mobility aids (wheelchairs, walking sticks) was notably difficult ▪ There were no clear signage indicating bus route/ destination, fare, and other relevant information as required	▪ Easy and unhindered boarding via steps (if any). ▪ Level boarding for wheelchair users into bus. ▪ Step noses and hazards highly visible. ▪ Priority seats near entrance available for disabled passengers. ▪ Easy stowage of mobility aids (wheelchairs, walking sticks). ▪ Clear signage indicating bus route/ destination, fare, and other relevant information.
	Reliability	▪ Bus routes and schedules were not predictable. ▪ In some cases there were no clear announcements of major stops. ▪ Bus driver and conductor were not providing helpful service and assistance to PWDs as required	▪ All advertised accessibility features available and working. ▪ Bus stops in same place every time. ▪ Clear announcement of major stops. ▪ Bus driver and conductor providing helpful service and assistance
	Affordability	To the Provider Affordable and functions solutions have not been considered by the providers citing high investment cost that may need to be passed again to the consumers.	To the provider: ▪ Retrofit existing buses with low-cost features for ambulant passengers. ▪ Introduce wheelchair access route by route to the user: ▪ Concessionary fares could be considered.

Source: Author (2014)

The empirical parts of this research analyzed the challenges faced by PWDs in accessing NMT and PT and the need for improving the service in Nairobi, Kenya. It also examined the causative factors of accessibility to NMT and public transport, the implications, and transport elements to be improved, and who as well as the roles of stakeholders to be involved. It was noted that in general the level of NMT and public transport of Nairobi city were inadequate or unattractive, most modes of travel according to respondents are death traps and this was found to be a constraint to spatial interactions.

More fundamental is the increasing exclusion in public transport in the city; which impeded the livelihood of PWDs in terms of hindering access to facilities, services.

The first finding with regard to the examination of the travel environment was obviously the poor design, construction and maintenance of NMT facilities that hinder their usability by PWDs. This to a large magnitude influenced their travel patterns in terms of travel frequency with majority travelling only once mostly to their regular work places, also PWDs prefer to travel shorter distances where there are "lesser" difficulties in accessing affordable public transport. In other words findings show that PWDs are the worst hit of the prevailing conditions of NMT and PT travelling environments. Observed difficulties in access to the several facilities of NMT in strategic locations of the study area give an indication of the short supply of these facilities. Most footbridges and stops are also located inappropriately; while some have been converted to locale for informal trading activities. The footbridges are mostly dirty, sometimes occupied by thugs and resting places for lay-abouts who use the structures to idle and rest. There is no proper lighting; poor sheltering of the footbridge roofing. Based on reviewed literature, the importance of NMT to the sustenance of accessible urban mobility for people with disabilities cannot be overlooked. Stem on this, finding complement this argument by revealing that most people depend on NMT and public transport for spatial interactions.

The second finding was on the challenges PWDs experience within the public transport environment. Analyses revealed that most PWDs challenges occurs while using public transport service vehicles like, buses, minibuses, "matatus" and "boda boda" (commercial motorcycles) etc. Again most public transport vehicle bodies, apart from being poorly designed; lacks basic facilities that are required to make PWDs comfortable and safe while travelling., lack of travel information etc, these shortfalls in bus stops management serves as a generator of criminal activities as exemplified in the literature and theories. These findings showcase the prevailing transport elements within the public transport service system that contribute to some form of challenges experienced by PWDs in the study areas. It however ascertained that, there is no effective urban public transport policy that guides the operational activities of public transport service in the city based on the international best practices.

This study further analyzed the main contributory factors explaining the reasons for the current situation with the steps that can be taken to address the situation. Availability of resources to upgrade public transport infrastructure is a major contributory factor where the national government through its road transport infrastructure providers and Nairobi county government are experiencing the greatest pressure on resources in meeting their obligations to provide accessible public transport. Lack of

urban roads design standards to address mode specific issues, Effectiveness of governance and administration of the transport regulations and standards were some of the major issues that were identified as key contributors to this situation. The passenger vehicle body construction standards issued by KEBS, as a single document applied across the public transport sector, struggle to pick up various mode-specific issues and exceptionally ignore the needs of PWDs. For example, there exist very critical gaps and challenges in implementation of the Person with disability act. e.g, in section 23 of the act;

> *(1) On **Public service vehicles.** The act states: "an operator of a public service vehicle shall adapt it to suit persons with disabilities in such manner as may be specified by the Council.*
>
> *(2) All operators of public service vehicles shall comply with subsection (1) within two years after this section comes into operation.*

It clear that the Council has not been able to obtain access to the necessary technical capacity to formulate the specifications mentioned above. The same have not been codified into manuals and standard specifications which practitioners can implement. This research attempts therefore to provide the springboards from which the specifications can be derived.

It is important also to note that the management of urban transport is highly fragmented in Nairobi city. Too many institutions are involved in dealing with the different aspects of it. There is little coordination among them. Further, in Kenya, the focus of public transport governance has been on inter-regional transport, which is very different from urban transport. It is essential, therefore, to have institutions that are dedicated to urban transport.

5.7. Specific Proposals on the Integration of Disability Sensitive Urban Public Transportation Guidelines

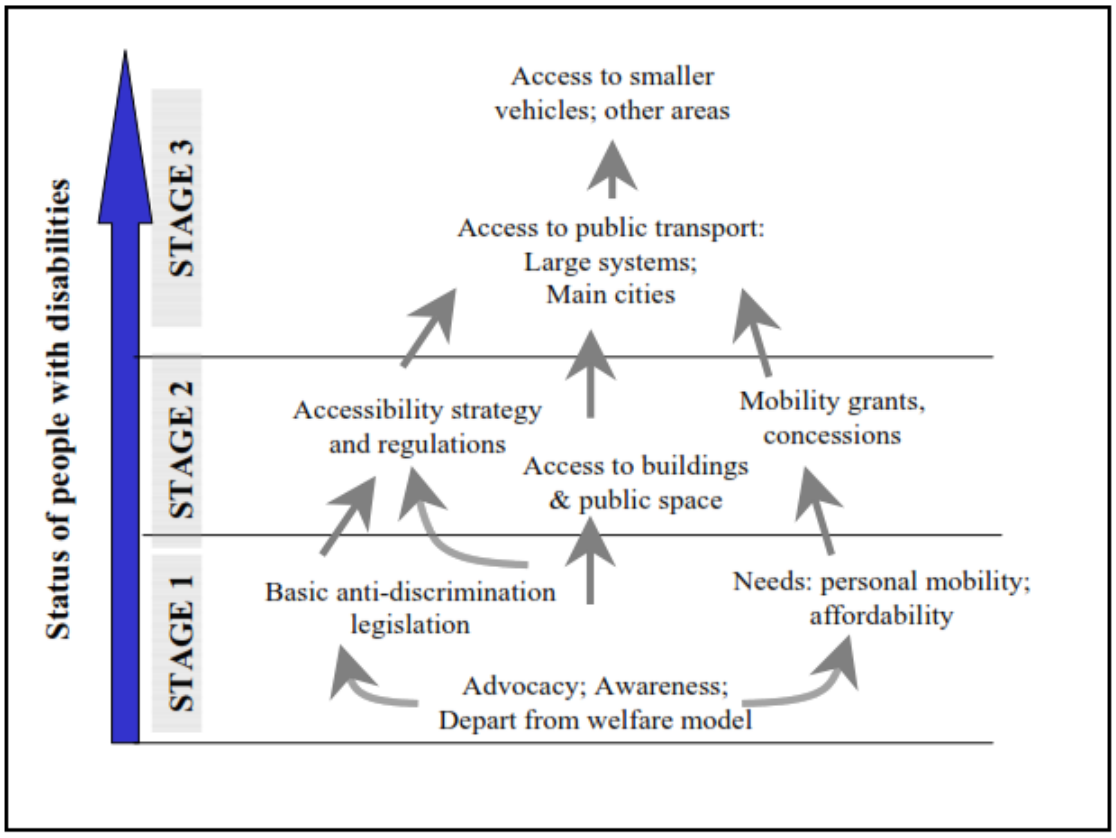
The interview with officials from the Ministry of transport and infrastructure indicated that the following aspects have been mainstreamed in to the day to day design, construction, and maintenance of roads infrastructure to ensure that PWDs are able to access the facilities. These are some of the key aspects as highlighted in brief;

- On road sections whose cross section includes raised kerbs or traffic islands, kerb cuts and sloped ramps are installed at crossing points
- For new overhead pedestrian bridges such as Thika Road, access ramps with relatively gentle slopes are being installed to facilitate movement by wheeled devices and persons for whom stairs are not appropriate
- On all new roads or roads for which rehabilitation is being undertaken, shoulders are being widened and bituminized unlike the earlier practice of having unpaved shoulders. The sealed shoulders can accommodate wheeled devices and are in general much easier to use.
- The Ministry is also aware of the provisions of subsidiary legislation in the Act which requires provision of audible signals at traffic lights and is working towards attaining this.

5.7.1. Proposed general framework for accessibility provision for PWDs in Nairobi City

When reviewing the progress made on accessibility, a progression of approaches becomes evident. **Figure 5.15** is a schematic representation of the main aspects of this progression. The pattern of development described by this framework applies perfectly to Kenya and Nairobi City in particular; yet, it could be helpful in describing the general trends observed.

Figure 5.15: Proposed General Framework of Progress in accessibility provision for PWDs in Nairobi, Kenya.



Source: adopted form Venter, Rickert, Maunder (2002)

According to Venter et al, (2002), in general, the level of response to access and mobility issues is closely related to the status of people with disabilities in a society. More mature transport responses are generally accompanied with greater public and political awareness of the issues affecting people with disabilities. This is indeed the result of a mutually reinforcing cycle **(Figure 5.15):** Greater awareness and political influence create greater pressure for transport improvements; and improved mobility creates greater visibility which in turn reinforces public awareness. (ibid; 2002)

Three stages of responses are evident: a first stage where the focus is on basic rights and personal mobility; a second stage where some strategies and regulations start to be put into place; and a third stage where physical improvements to public transport are achieved.

5.7.2. First stage responses: Basic rights and personal mobility

To begin to address access to NMT and Public transport in Kenya , access to personal mobility devices (such as wheelchairs and white canes), which is constrained both by poverty and by inadequate social service delivery, a proper strategy that will see all those who do not have but need a

wheelchair need to be formulated by all actors responsible. An initiative like the "Niko fiti" campaigns by the Kenya Reinsurance Company is a major step towards delivering the first step to urban mobility. On the positive side, Kenya being on the second stage of development has started to take legislative action by enacting basic anti-discrimination legislation such as the Persons with Disability Act of 2003. These efforts are putting into place a legal framework on which further action can be leveraged. Given the severe shortage of resources and the competing objectives for development in Kenya, more rights-based disability legislation may be particularly important in ensuring that disability issues become mainstreamed into government programs.

5.7.3. Second stage responses: Environmental access and special programs

In the second stage of actions, more detailed regulations and strategies should be developed and enforced to address particular mobility problems; these will include the development of an urban roads design manual, which among others should give specific standards for design of NMT facilities. Kenya has particularly adopted national accessibility standards for buildings, but not to NMT or Public transport. However the degree to which these standards are actually being followed is not always clear.

In this stage, government's deliberate efforts need to be realized in the form of fare concessions and mobility grants to start addressing problems of affordability of transport. Responses in this stage will tend to stop short of physical improvements to the public transport system. These trends should mirror to some extent the introduction of concessionary schemes in Nairobi City to make bus travel more affordable, which preceded many of the access improvements to vehicles and infrastructure that are likely to be adopted with the new BRT and LRT programs proposed for the Nairobi metro development strategy.

5.7.4. Third stage responses: improvements to NMT and public transport

Significant improvements to the physical accessibility of NMT and public transport are typically achieved only once legislative and regulatory frameworks for equality of access are in place. At this point a sufficiently large number of people with disabilities are economically empowered and mobile enough to effectively advocate for accessibility. Steps that extend accessibility interventions to systems within and outside Nairobi city, and to systems that are less well regulated, are where major needs currently lie. Some of the most functional recommendations that can be presented as starting point include:

1) Improvement to NMT Facilities

i. Pedestrian footways:

The most common barriers to safety, accessibility and reliability of pedestrian footways and footpaths in Nairobi city are bad surface quality and obstructions in the form of poles, kerbs, parked vehicles or traders. First steps in providing adequate pedestrian facilities should therefore include:

- Prioritize the high pedestrian corridors like the section between Kibera informal settlement and the Industrial area for accessible NMT.
- Surfacing footways with an all-weather material (asphalt or concrete) as a performance contract target with specific targets by the implementing agencies like KURA and NCC;
- Installing kerb ramps where the footway crosses streets, driveways and so forth;
- Ensuring that street signs and street furniture are located to provide an adequate clear width and height that is continuous along the footway; and
- Ongoing enforcement to keep parked cars, vendors, and rubbish out of the clear width of the already existing infrastructure.

Of course this standard cannot be achieved everywhere at once. But KURA and NCC can start by taking the following steps:

- When doing regular maintenance, upgrading or construction of roads and footways, ensure that accessibility guidelines are followed. Access improvement can be achieved in this way at minimal cost.
- Start by identifying high priority pedestrian routes used by many people (including many people with disabilities), for upgrading first. The travel patterns, the origins and destinations of people along this route, should be considered in order to ensure that reliable, uninterrupted accessibility is provided between these points. Providing a footway only on one side of the street and later completing the other side may be adequate as a start, although it is generally desirable to provide footways on both sides of streets used by pedestrians.

ii. Street crossings and footbridges.

Whenever new street crossings and footbridges are constructed, or existing ones are upgraded, the opportunity should be taken to install at least kerb ramps and gentle ramps respectively, even if other features are only to be added at some future date. If KURA or NCC has to prioritize at which crossings to install the access features described here, the decision could be guided by factors like:

- Prioritizing street crossings that are part of accessible networks and are thus important for completing an origin-to-destination travel chain for disabled people;

- Prioritizing crossings with high pedestrian volumes (like in CBD) or near major public transport stops, if no accessible networks have been identified in the city;
- Prioritizing crossings where vulnerable pedestrians like children, disabled people, or patients would benefit from improved safety and accessibility. Examples include crossings near schools, hospitals/clinics, or sheltered homes/workshop for disabled people. A typical example being the crossing at the Association of Physically Disabled of Kenya (APDK) headquarters in Wetlands areas which houses major PWD advocacy offices including NCPWD and is regularly crossed without a proper infrastructure.

Minimum requirements for these crossings will be dictated by what is needed to ensure satisfactory levels of safety for pedestrians. Usually this will include at least clear markings, signage and/or traffic calming measures to warn motorists of the crossing and to slow down vehicles; central pedestrian refuges are extremely helpful, especially for streets that are wide, carry traffic in two directions, or carry fast traffic. High pedestrian volumes and high vehicle speeds may require traffic signals to be installed if affordable. It must be remembered that, without signal control, many visually impaired people will be unable to use crossings on busy roads without help.

2) Improvement on the Public Transport Service

i. Incremental and Full wheelchair access on buses

The most inexpensive way to incorporate best practice features into buses is to include them as specifications when new vehicles are ordered. Bus manufacturers should be able to include at least adequate handrails and stanchions, correctly designed route number and/or destination display, color contrasted step noses and handrails, bell pushes, and a well-designed priority seating area at marginal cost. Every effort should also be made to improve the design of entrances and steps to better serve all ambulant passengers, especially with regard to steepness and the height of steps.

Bus operators can install very useful features even on existing vehicles, at low incremental cost. The features mentioned above can improve the ability of many ambulant disabled people to travel by bus, even if the bus still has a very high floor. As a starting point, the features above could be concentrated around the front entrance/exit door, extending only as far as the priority seating area behind the driver – this will not serve all passengers, but at least target those who could benefit most. As a measure to overcome overcrowding that is endemic on many bus systems in Nairobi, the reserving of priority seats and the use of a priority entrance by disabled and older passengers can be considered.

Improving operating practices is another low-cost intervention – but it will need some retraining and supervision of drivers and conductors. Practices such as the calling out of major stops, consistently drawing up close to kerbs (where possible), considerate driving habits, and generally cultivating awareness of the needs of passengers with disabilities, will work best in the context of a general improvement in customer orientation in bus services.

Finally, full access, including for wheelchair users, can incrementally be achieved through a combination of better bus design, on-board equipment, and infrastructure upgrading. Whichever options are appropriate for wheelchair access, these could first be deployed along major corridors (or accessible networks) with the highest potential for serving people with disabilities, and later extended as funds allow. This would allow time to ensure that bus stops and the infrastructure surrounding them also do not present barriers to wheelchair users. Making one route fully accessible is preferable to having every second or third bus being accessible on a variety of routes. Disabled persons may take a few months to become accustomed to accessible public transport and, as with all passengers; reliability is needed in order for passengers to gain confidence in the service and for usage to grow.

ii. Regulations and Operations

The first step towards improving safety and accessibility for all passengers on buses and matatus, including those with disabilities, is to start fostering greater accountability within the industry. This requires coordinated approaches to creating partnerships with both National and County government, formalizing routes and services, stabilizing operating conditions, stepping up enforcement, and empowering customers. As with larger capacity buses, the retrofitting of existing vehicles with low-cost features such as handrails, adequate signage and color contrasting can benefit many passengers and should be pursued if circumstances allow. But in practice opportunities for such interventions are severely limited by operators' financial inability to invest in vehicles they do not own.

More effective ways of improving vehicle standards are for government regulators to require higher standards of new vehicles used for public transport services. This can also be undertaken in an incremental manner, starting with some of the low-cost features described above to assist ambulant passengers, and incorporating wheelchair access in some portion of the fleet. In Nairobi's case, governments should be involved in subsidizing the replacement of vehicles through tax regimes, and using this opportunity to specify significantly higher standards for access. Whether vehicle design is improved incrementally or through large-scale government-sponsored replacement programs like

the Nairobi County Government's plans to do, it is important that the operating practices of drivers be addressed through adequate training and monitoring.

3) Specialized transport services

Providing subsidized door-to-door services should be considered if funding can be raised. Specialized services for disabled people is the most common first step to serve people who are excluded from using other forms of transport, especially wheelchair users who do not have access to private vehicles. Door-to-door services can often be initiated more quickly than upgrading bus and rail services. Door-to-door services do not rely as much on accessible footways and other infrastructure as do bus and matatu services.

Service Routes are also more expensive than regular bus and matatu transport, though not as expensive on a per passenger basis as door-to-door services. This may be an approach particularly suited as an interim solution in Nairobi, where accessibility of the mainstream public transport system is poor. Starting by funding well-designed Service Routes may ensure that funds are spent where they can best be used in terms of transporting passengers who cannot use other modes. But Service Routes alone are usually not sufficient, and as a second stage the rest of the transport system should be upgraded and made accessible. In the long run this will serve the most passengers (disabled and other) at minimum cost.

5.8. Specific Proposal on restructuring the framework of functions for managing urban transport.

It is important to note that the management of urban transport is highly fragmented in Nairobi city. Too many institutions are involved in dealing with the different aspects of it and there is little coordination among them. Further, in Kenya, the focus of public transport governance has been on interregional transport, which is very different from urban transport. It is essential, therefore, to have institutions that are dedicated to urban transport.

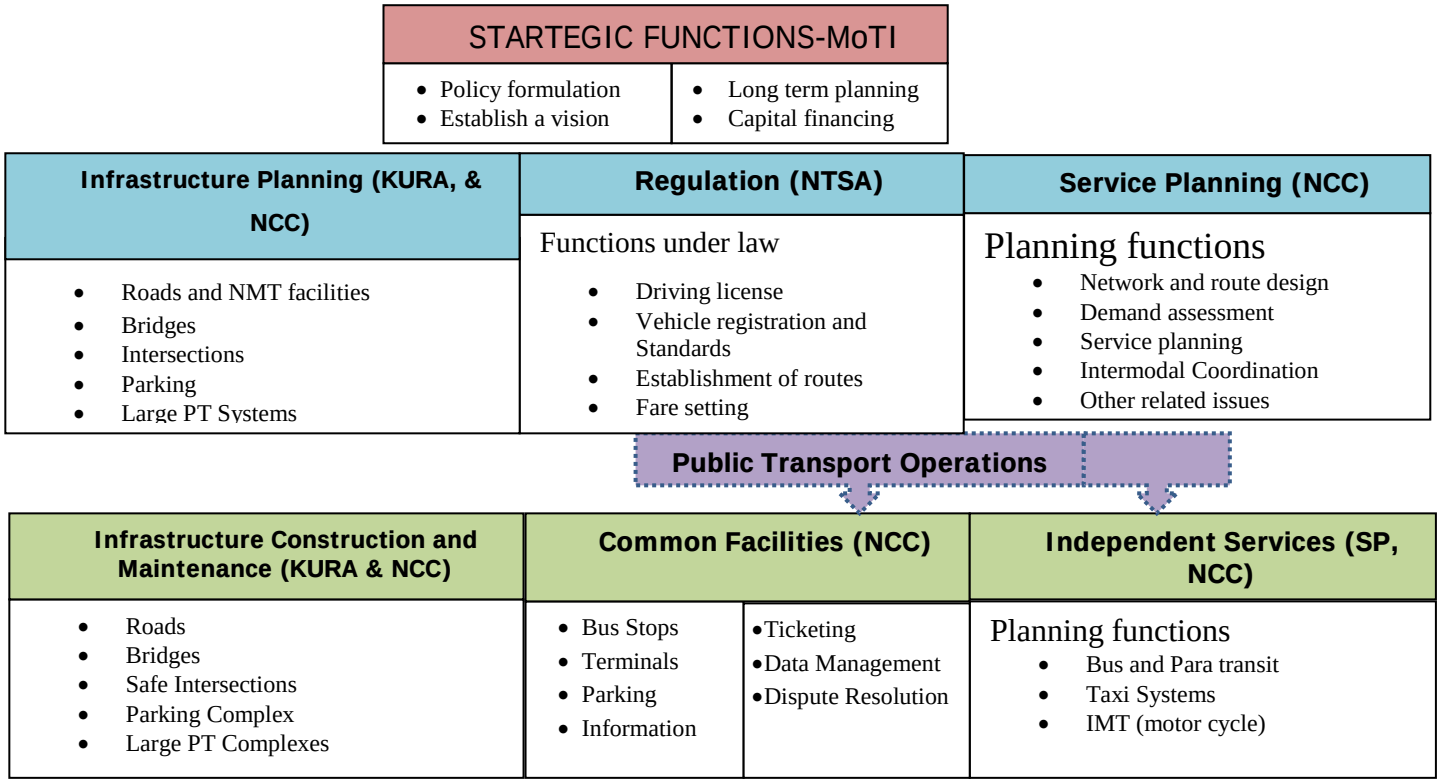
Functions that need to be performed in managing and ensuring good urban mobility can be divided into three levels: **strategic functions**; **infrastructure planning**, **regulation** and **service planning functions**; **and infrastructure construction and maintenance and public transport operations.**

The lead agencies or institutions are important in managing and regulating the transport system in any city. In setting up such institutions, there are several questions that need to be answered. There are

pros and cons to each option, so choices have to be made in line with the local context. Each city is unique and requires unique solutions.

According to the study, the proposed categories and levels functions that can optimally be applied within the current policy and legislative frameworks for Nairobi city are outlined on the structure on **Figure 5.16** below:

Figure 5.16: Proposed Framework of Functions for Managing Urban Mobility for PWDs in Nairobi City, Kenya



MoTI- Ministry of Transport and Infrastructure

KURA- Kenya Urban Roads Authority

KeNHA- Kenya National Highways Authority

NTSA- National Transport and Safety Authority

NCC- Nairobi City County

SP- Service Providers e.g. Matatu Owners Associations [MOA]

NM & IMT- Non-motorized and intermediary means of transport

Source: Adapted from the WBI notes by the Author

6. CONCLUSIONS AND RECOMMENDATIONS

6.1. Conclusions on the study

The study aims were to asses and presents the challenges that remain to be studied empirically to achieve a complete understanding of the travel environment for people with disabilities; to assess the challenges they face and to identify industry best practices, models, emerging technologies, and barriers to transportation for PWDs; and inform policymakers, law makers, transportation providers, and individuals with disabilities on the way forward.

To achieve these objectives, the study has appraised the experiences of PWD public transport users and the challenges they face in their travel environment. The study found out that currently it is challenging for a majority of PWDs to travel using public transport vehicles in Nairobi city. The challenges are varied and range from reduced accessibility to the public transport vehicles due to poor designs, irregular reliability of these vehicles on their operation schedule and routes, poor safety of PSVs engendered by the poor body and interior designs as well as the driving skills of operators and finally, the ever rising exorbitant cost of public transport that consume in to the competing needs of most PWDs, of who majority are in the informal sector earning lower than the average national minimum wage and in most cases have more social and financial requirements that their non-disabled counterparts. It has been noted also that The KS 372-2011 standard guideline for PSV body design is lacking and non-inclusive in the general principles of inclusion and therefore needs to be revised to cater for the needs of persons with reduced mobility.

It has also been demonstrated that NMT facilities in Nairobi city are not optimally designed for use by PWDs. Most footbridges are designed without due regard to their accessibility by PWDs, and where they are provided; they are more often poorly maintained and unsafe. The street crossings are also not designed with proper accessible specifications for PWDs especially those on wheelchairs. The most notable was the huge disparity in the provision of accessible footpaths within the city. In areas where they are provided, the designs were exclusively catering for only the needs ambulant pedestrians. This scenario was again notably due to lack of standard urban roads design manuals to guide the geometric designs of NMT facilities. An inclusive NMT policy guide is therefore a necessary tool if this is to be achieved.

The study also noted that the national government and the Nairobi county government have also not strategically planned and invested adequately in the infrastructure developments that enable safe

mobility of PWDs and access to NMT and public transport. Instead, the public transport sector has been driven by capitalist tendencies of profit maximization; market forces of supply and demand, as opposed to a socially driven public transport benchmarked with international best practices for access to all. Given these challenges, the levels of accessibility have not been achieved.

Finally, it is worth noting that there are also capacity gaps for Key institutions dealing with issues of for people with disability in creating awareness and implementing structures for their rights and under the constitution of Kenya 2010 and the Persons with disability Act 2003. The key stakeholders in the disability sector like NCPWD are trying their best to disseminate information and integrate disability mainstreaming programs, but they also are facing challenges of limited access to resources and technical capacity. The institutional framework for transport related institutions is also not properly organized with most institutions such as NTSA, KEBS, KURA and NCC sharing mandates; this creates duplications, conflicts and competition especially for revenue.

6.2. RECOMMENDATIONS

Recommendation 1: On the issue of Lack of standards to guide the design and provision of NMT and Public transport service vehicles that meet the requirements of PWDs

A technical experts group be convened, with Ministry of Transport and Infrastructure, National Transport and Safety Authority, Kenya Bureau of standards and other lead stakeholders, to develop technical standards and if possible an NMT Policy, specifically suited to public transport conveyances and infrastructure as an improvement from the existing passenger vehicle body construction standards KS 372:2011 and the draft urban road design manuals. Once developed, these Standards should be benchmarked with the international best practices, and made available for public use. Mode specific guidelines should be developed by modal sub-committees. These guidelines would be a recognized authoritative source for providers, which can be used also during a complaints process

In the new governance, arrangements should be applied to establish accountability for progressing recommendations from a time bound review. MOTI should have coordinating responsibility for new initiatives (including modal committees and the technical experts group) in partnership with NCPWD, NTSA, KURA, KeNHA, KeRRA, NCC, KEBS, Private Sector Players and Civil Society Actors.

The new standards should be regularized to require new public transport vehicles greater than 14 seat capacity to comply with the new public transport standards commencing by 2017, (with full compliance by 2030 in line with vision 2030.

Recommendation 2: On the issue of lack of funds for Infrastructure upgrades

National Government and County Governments of Nairobi consider establishing a special fund for infrastructure upgrades especially the NMT facilities. The funding of projects would be directly attributable to those areas of greatest need, where geographical conditions increase the cost of infrastructure upgrades for both governments. This program should be supplemented with information and education programs for National and County Government to assist them in understanding their obligations under the Constitution of Kenya (2010), the persons with disability act of (2003) and the UN Convention on the Rights of Persons with Disability (2006).

Recommendation 3: On the issue of lack data for appropriate planning for PWDs

Ensure that the NCPWD, KNBS and any government body responsible for collecting data on

PWDs include questions on public transport patronage in their disability surveys to enhance demographic data for planning.

6.2.1. Relevant areas for further study

1. Government should commission research into the safety of PWD passengers travelling in other modes [Railway, water and Air] whilst using mobility aids. This research should make recommendations around whether there is a need for MoTI to address these aspects of standards and safety for use by all persons categorized by PWDs under law.

2. The motorcycle mode, which is quickly becoming an important and dominant mode of transport, should also be considered for further studies with recommendations on how they can be designed with PWDs accessible features as these have not been documented.

3. The study also restricted the scope to cover the physically and visually impaired only. Further research could be instituted to cover all types of disabilities including other people with reduced mobility such as the elderly and children.

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APPENDINCES

Appendix 1: Research work plan

	Activity		February 2014				March 2014				April 2014				May 2014			
		Weeks	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	Proposal/Approval																	
2	Data collection Tools																	
3	Pilot Study																	
4	Data Collection																	
5	Data Analysis																	
6	Presentation																	

Appendix 2: Research Budget

Item	**Unit**	**Quantity**	**Man Days**	**Amount (KES)**	**Amount (KESs)**	
Pilot study	Persons	12	1	1000.00	12,000.00	
Data collection	Persons	12	20	1000.00	240,000.00	
Communication + Transport	Pcs	12	21	200.00	50,400.00	
Data analysis	Lumpsum				20,000.00	
Data Presentation	Lumpsum				20,000.00	
Total					**342,400.00**	

Appendix 3: Research Instrument (Sample)

AN ASSESMENT OF NON-MOTORIZED AND PUBLIC TRANSPORT CHALLENGES FOR PEOPLE WITH DISABILITIES (PWDs) IN NAIROBI COUNTY

Introduction

This Survey is conducted by **Odak, Paul Owino** of The department of Urban and Regional Planning, University of Nairobi. It is designed to obtain information about the public transport challenges faced by Persons with Disability in Nairobi County, Kenya towards completion of an MA degree in Planning.

Your co-operation and support will be greatly appreciated by providing vital information stated in the questionnaire. Kindly rest assured that information provided would be treated with utmost confidentiality.

FORM 1: RESPONDENT DETAILS

Interviewer details:

Name of Interviewer	**Date of Survey (dd:mm)**	**Date of trip surveyed (dd:mm)**

1. **Personal Information**

Name of Respondent: (*Optional*).....

2. **Gender:**

Male ☐ **Female** ☐ **AGE/ (Years)** ☐

3. **Type of Disability**

	Type	*Any More Detail if possible?*
1.	Physical	
2.	Visual	

4. **Race of Respondent**

1	African	
2	Asian	

3	European	
4	Mixed Origin	
5	Other (specify)	

5. Education Level

1	African	
2	Primary	
3	Secondary and A level	
4	University/ tertiary level	
5	Post graduate	
6	Other (specify)	

6. Work Address

Address of Work	**No./ Building**	**Street**	**Estate/ District**	**City/ Municipality**

7. Occupation

1.	Employer	
2.	Employee	
3.	Own account worker	
4.	Student (Primary)	
5.	Student (Secondary)	
6.	Student (University/College)	
7.	Housewife	
8.	Jobless	
9.	Others Specify	

8. Employment Sector

1.	Agriculture/Forestry	
2.	Mining/Quarrying	
3.	Manufacturing	

4.	Electricity, Gas, Water supply	
5.	Construction	
6.	Wholesale, retail trade	
7.	Informal (Repair of vehicles, personal, household goods etc.)	
8.	Hotel & restaurant	
9.	Transport storage & Comm.	
10.	Financial intermediation	
11.	Real estate, renting	
12.	Public administration	
13.	Education	
14.	Health & social Work	
15.	Service indusrty	
16.	Private household	
17.	Other (include, student, jobless)	

9. What is your Monthly income (tick appropriately)?

1.	Under KES 1,999/=	
2.	KES 2,000- 4,999/=	
3.	KES 5,000 – 9,999/=	
4.	KES 10,000 – 14,999/=	
5.	KES 15,000 – 19,999/=	
6.	KES 20,000 – 29,999/=	
7.	KES 30,000 – 39,999/=	
8.	KES 40,000 – 49,999/=	
9.	KES 50,000 – 99,999/=	
10.	KES 100,000 over	

10. Do you own a vehicle for your own use?

TYPE	HAVING	NOT HAVING	Fitted with any form of Disability assistive device?
Bicycles			

Motorcycles			
Car/ 4WD			
Truck			
Others			

11. Do you have a driver's license? YES NO

12. Do you have any disability Assistive device (To aid Mobility?)

YES NO

13. Which One and how do you use it?

.....

.....

.....

FORM 2: TRIP INFORMATION

Instruction: To be completed by any Respondent 5 years and above

Total Number of Trips in a day? ☐

14. From Which of These Places do you normally start your journey?

1.	Home	
2.	Work place	
3.	School	
4.	Others	

15. From the above answer, kindly specify the place of the trip origin?

No./ Building	Street	Estate/ District	City

16. Origin Place Category?

1.	Residence	
2.	Shop, market, shopping center	
3.	Office	
4.	Factory warehouse	
5.	School, university, educational	
6.	Recreational	
7.	Medical	
8.	Religious and social land welfare	
9.	Wholesale and retail shop	
10.	Restaurant/ Entertainment	
11.	Others (Specify)	

17. Kindly state your Normal destination?

1.	Home	
2.	Work place	
3.	School	
4.	Others	

18. From the above answer, kindly specify the place of your destination?

No./ Building	Street	Estate/ District	City

19. Destination Place category?

1.	Residence	
2.	Shop, market, shopping center	
3.	Office	

4.	Factory warehouse	
5.	School, university, educational	
6.	Recreational	
7.	Medical	
8.	Religious and social land welfare	
9.	Wholesale and retail shop	
10.	Restaurant/ Entertainment	
11.	Others (Specify)	

20. Kindly state the trip purpose?

1.	To Home	
2.	To work	
3.	To School	
4.	Personal Business	
5.	Firm Business	
6.	Social	
7.	Shopping	
8.	Others	

(Indicate all)

21. Which Travel Mode do you use often? (*Instruction: See Column***)**

Trip Number	**Travel Mode**	**Original Mode**	**Transfer Mode**	**Final Destination**
1.	Walking			
2.	Bicycle			
3.	Tricycle			
4.	Motor Cycle, Boda-boda			
5.	Passenger Car			
6.	Truck			
7.	Trailer			
8.	Taxi,			
9.	Tuk-Tuk			
10.	Matatu			
11.	Buss			

12.	Metro Shuttle			
13.	Railway			
14.	Others			

NOTE: Please answer all the travel modes used in this. For example Walk, Matatu and Walk

FORM 3: STATED PREFERENCE SURVEY

22. Which is your preferred mode of transport in Nairobi City?

.....

.....

23. Kindly state reasons why this mode(s) is preferred by you?

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24. Is there alternative mode available for you?

1.	Bicycle	
2.	Motorcycle	
3.	Private Car/ Truck	
4.	Taxi	
5.	Others	

25. If new public transport system (Bus Rapid Transit or Light Rail Transit) is introduced in Nairobi City, will you use the new public transport system?

1. Yes ☐ **2. No** ☐

26. If your answer is "Yes", what facilities would you like for the new public transport system to have with respect to your Comfort as Person with Disability (PWD)?

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27. If your answer is "No" what is the reason?

1.	Bus/Matatu is cheapest	
2.	Operation is frequent	
3.	Transfer is not necessary	
4.	Other ……. (Specify)	

NOTE: Bus Rapid Transit and Light Rail transit are operated on Exclusive route and their Operation speed is faster than Present public Transport service.

FORM 4: PUBLIC TRANSPORT USER SURVEY

Travel Environment Survey

28. For What Purpose do you regularly travel using public transport?

1.	To Home	
2.	To work	
3.	To School	
4.	Personal Business	
5.	Firm Business	
6.	Social	
7.	Shopping	
8.	Others	

29. How much do you pay per trip?

x

30. How much time do you take per trip on Peak Hours?

31. How much time do you take per trip on Off-Peak Hours?

32. Distance of Travel

	Distance range	
1.	**0 to 5Km**	
2.	**6 to 10Km**	
3.	**11 to 15Km**	
4.	**15 to 20Km**	
5.	**Over 20km**	

Trip Frequency

33. How Many times do you Travel In a day?

6.	Over 2 times per day	
7.	Everyday 1 time	
8.	A few times per week	
9.	Once a week	
10.	A few days per month	
11.	once a month	
12.	a few days per year	
13.	Other (Specify)	

34. What are your reasons for using Public Vehicle? (*Plural answers are permissible***)**

1.	I have no other means for travel	
2.	Bus service is available for this travel	
3.	Bus is cheapest	
4.	Travel time is stable	
5.	Travel time is shortest	
6.	Operation frequency is high	
7.	Easy to carry luggage	

8.	Others…..(Specify)	

Factors Responsible and What can be done

35. Kindly rate the following based on your level of use of public transport as Person with a Disability?

	Excellent	Very Good	Good	Average	Poor
Speed (How fast)					
Comfort					
Reliability					
Seats/Shelters					
Ease of use (Availability)					
Travel Information					
Easy/waiting time					
Safety/Security					

36. Can you tell me about your experience when going out and about?

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37. What specific types of challenges are experienced?

38. What is your candid opinion about the provision of public transport for Persons with Disabilities?

39. Kindly rate the public transport travel environment in your opinion with respect to your condition as a PWD?

	Fully Satisfied	Satisfied	Indifferent	Dissatisfied	Fully Dissatisfied
Road Condition					
Road Marking/ Furniture (e.g Signals)					
Walking Distance to Bus stop					
Bus stops (Condition)					

Bus stops (Placement)					
In-Transit					
Others					

40. In your own opinion, what do you think can be done to solve these problems?

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41. Who are those you think should be involved and why?

	Agency	**Roles**
1	County Government of Nairobi (CGN)	
2	Ministry of Transport and Infrastructure (MoTI)	
3	Infrastructure implementation agencies e.g KURA, KeNHA	
4	National Council for Persons With Disabilities (NCPWD)	
5	National Transport and Safety Authority (NTSA)	
6	The Civil Society	
7	The Private Sector e.g. Matatu operators/ owners	
8	Other (Please Specify)	

42. Are you aware of any Policy with regard to the inclusion of PWDs in public transport?

YES	NO

43. If Yes, Which one and in what context?

.....

.....

.....

Thank you for your response…….

Filled Questionnaires to be delivered to:

PAUL O. ODAK
UNIVERSITY OF NAIROBI
DEPERTMENT OF URBAN AND REGIONAL PLANNING
ADD BUILDING, OPP YMCA, GROUND FLOOR
P. O. BOX 30197-00100
NAIROBI.

CELL: +254 271 270625.
Email: odakpwino@gmail.com

Appendix 4; Research Photos

A footbridge across the Railway Station: the FOB is inaccessible to PWDs

Source: Field Survey (2014)

Typical Entrance of buses in Kenya: Notice the narrow door and steep steps inaccessible by PWDs in both pictures

Source: Field Survey (2014)

Bus Entrance

Source: Field Survey (2014)

A section of the crossing at the Kaunda Street designed for proper access by persons on a wheelchair

Source: Field Survey (2014)

A section of the crossing at state statehouse road which is inaccessible by PWDs on a wheelchair.

Source: Field Survey (2014)

Newly completed footbridge at Ruiru

Source: Field Survey (2014)

A kerb cut at juja along Thika road

Source: Field Survey (2014)

Newly completed section of Thika road between Muthaiga and Pangani

Source: Field Survey (2014)

Appendix 5: Research Letter of Authority