

**AN ASSESSMENT OF MOBILITY LIMITATIONS OF THE PHYSICALLY
DISABLED IN NAIROBI: A CASE STUDY OF TRIP TO CBD.**

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**A Thesis Submitted For Partial Fulfilment for the Requirement of Master of
Arts (Planning) in the Department of Urban and Regional Planning, School of
Built Environment, University of Nairobi**

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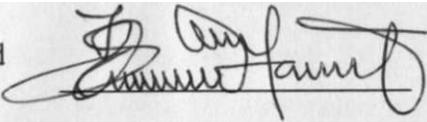
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DECLARATION

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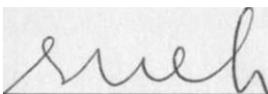
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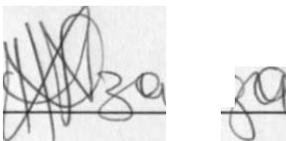
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DEDICATION

This work has been dedicated to my family for their tireless support through the period that I have been undertaking my studies. And to all disabled persons in Kenya, may this piece of work bring comfort, even in a small way, to your travels.

ACKNOWLEDGEMENTS

I am indebted to a number of people and institutions without which this work would not have been a success. First my gratitude go to almighty God for seeing me through this study; to University of Nairobi, for offering me a scholarship to undertake the master's programme; and to management, lectures and staff of Department of Urban and Regional Planning. My utmost appreciation goes to my supervisors, Mrs. Helen Nzainga and Dr Samuel Obiero, for not only their focused and constructive steering of this piece of work, but also their encouragement when it was greatly due. I will not also forget to salute my classmates for standing with me throughout both tough times and enjoyable moments. I will sincerely miss them.

I wish also to send my gratitude to Management of Alliance for Disabled Vendors Association; Mr Murithi of Association for Physically Disabled of Kenya; National Council of Persons with Disabilities; and the disabled who volunteered relevant information for the study. I will not miss to send my regards to Department of Urban Development for granting me unconditional access to their library.

Finally with humility, I wish to pass lots of regards to my mum, my wife Ruth, my brother Caleb and my in-law Nick, for being by me throughout my studies. May I also single out my friends D. Okumu, M. Ngala, W. Kebasu, P. Kawega, D Joe, Jim, Will, Wahome, Z Maritim, Mr Gota, M. Lucy, W. Kalande and Okanga for the various roles they have played that have led to culmination of this programme. To all I say "May God Bless You"

ABSTRACT

Accessibility however necessary and desirable to all; physical abilities, socio-economic characteristics and external environment may make it difficult for the disabled to overcome physical separations of opportunity areas through transport. Ever since mobility limitations in transport systems for the disabled came to the limelight early last century, it has been of great concern to the world community. The limitations deny the disabled equal access to transport, one of the transport challenges that have faced both developed and developing countries. Many international and national bodies, governments and other institutions are putting in place initiatives aimed at removing mobility barriers for the disabled.

United Nations in 1994 did not only identify accessibility as the first area to equalization of opportunities for Persons with Disabilities, but also crafted a rule committing all countries to initiate measures that guarantee them access to public transport services and other means of transportation, streets and other outdoor environments. Kenya on her part enacted Persons with Disabilities law in 2003, which treats accessibility and mobility for the disabled as rights and entitled them to a barrier-free and disability-friendly environment.

The purpose of the study was to establish mobility limitations for the physically disabled in Nairobi and recommend measures that may enhance their mobility. In doing so, the study also sought to: (i) determine the travel characteristics for the disabled; and (ii) investigate necessity of mobility to the disabled population in Nairobi. A total of 53 subjects were sampled from a sample frame of 498 for administration of personal questionnaire. Other primary and secondary data sources were used as well as relevant literature reviewed. Qualitative and quantitative analysis techniques were applied in obtaining the results.

The study found out that regular mobility for the disabled in Nairobi was prerequisite for securing their livelihood. Their travel characteristics were basically influenced by their places of residence and their sources of livelihoods. The disabled were found to

be public transport captives over long distances and either walk or use manual bicycles or wheelchairs for mobility and accessibility over short distances. They, however, experience mobility limitations throughout their trips to their final destinations. The structural design and operation of public service vehicles; the roads and terminal facilities; as well as the public attitude have inherent limitations that prevent or discourage their mobility by both public transit and non-motorized modes of transport.

The interventions recommended include gradual introduction of suitably adapted public service vehicles for the disabled; enhancing inter-modal interface and provisions of sheltered-seats at the terminals; road widening and segregation of cycle paths; provisions for road furniture and transfer facilities; and guaranteed safe crossings. Besides, improving education for the disabled; decentralization of employment sites; and change in transport institutional framework were recommended.

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LIST OF ABBREVIATIONS

ADVA: Association of Disabled Vendors Association
APDK: Association for Physically Disabled of Kenya
CBD: Central Business District
CBS: Central Bureau of Statistics
CCN: City Council of Nairobi
DFID: Department for International Developments
DSS: Department of Social Services
DURP: Department of Urban and Regional Planning
GIS: Geographical Information Systems
ILO International Labour Organization
IMT: Intermediate Means of Transport
ITDG: Intermediate Technology Development Group
JICA: Japan International Cooperation Agency
MT: Motorised Transport
NCPD: National Council for Persons with Disabilities
NGO: Non-Governmental Organization
NMT: Non-Motorized Transport
NRSC: National Road Safety Council
PSV: Passenger Service Vehicles
PTS: Public Transport Services
SSATP: Sub-Saharan Africa Transport Programme
UDD: Department of Urban Development
UN: United Nations
UoN: University of Nairobi
USA: United States of America
USAID: United States Agency for International Development
WHO: World Health Organization

CHAPTER ONE: INTRODUCTION

1.0 Background to the Problem

The realization that transport systems did not cater for some segments of the society, particularly the disabled persons, had elicited lots of advocacy worldwide since early last century. It was first in nations where social movements were strong, whereby governments were forced to intervene for the betterment of transport services for the disabled. Provisions for equal access to transport have been one of the transport challenges that have faced both developed and developing countries. Even though, it has been reiterated that accessible transportation is a passport to independent living for everyone, many have yet to succeed in providing responsive transport services to the disabled (UNHabitat 1996, ILO 2004, and Lung Suen 2005). ILO (2004) acknowledged that one of the most important conditions for equal opportunity, unlimited participations and integration of the physically handicapped into social life is that, "*public space and transport system are designed without any barriers for people with disabilities and that accessibility to all public facilities are ensured*".

A study by Falcocchio and Cantilli in 1974 identified physical inabilities, social and economic characteristics and difficult external environment as some of the mobility constraints for the disabled. The study categorised the limitations in public transit broadly as physical and operation barriers in the vehicles, and at the terminals and bus stop. Altshuler and Rosenbloom(1976) focusing on *equity issues in urban transportation* noted major limitations in public transport to the handicapped as physical and structural barriers, cost of transport services, time for boarding and alighting from the transport vehicles and distances to and from transport facilities. Consequently, Boer (1986) in his book ⁴ *Transport Sociology*' observed, "*Distribution of access (time-distance to facilities) is unequal, both geographically and socially. People live at varying distance from opportunities and differ in their abilities to overcome this by means of transport. The car-less, the old and the physically*

handicapped, usually may need more time and greater efforts to reach the same destinations as the younger people with motorized transport".

Many studies had attributed the external limitations to transport for the disabled to past transport planning philosophies that did not factor in differentiated needs for transport users; but rather entirely based them on economic objectives. Falcocchio and Cantilli (1974) and Kipke (2001) observed that until the 1970s, user perspective was hardly the basis for transportation planning. Banks (1998) pointed out that for sometime; transportation has been seen as an economic activity, and decision about transportation systems were motivated by economic concerns: but not the social needs and obligations.

As one writer pointed out, one of major causes of disabling settlements is the fact that they are built for a non-existent population (Nduli 1998). The buildings, the roads and open spaces, cater exclusively to fictitious model of human being. This is a man in the prime of life and the peak of physical fitness-not the disabled, the young, the elderly, etc. In agreement to this, Hamilton (1992) observed that transport services are not equally or randomly distributed within our society but followed well-established line of social inequality. Unequal access to transport is characterized by hindrance to freedom of movements and accessibility to opportunity areas and to other people (Boer 1986).

Countries like United States of America and United Kingdom had as early as 1970s enacted legislations providing for accessibility to transport and solutions to other handicaps stemming from disabilities. In the meantime, United Nations noted that problems stemming from disability, including mobility limitations, were universal and required a common approach. Hence in 1994, the United Nations crafted a rule committing all countries to initiate measures that guarantee them access to public transport services and other means of transportation, streets and other outdoor environments. Accessibility was identified as the first area of equalization of opportunities for Persons with Disabilities.

Lung Suen (2005) in his paper *Accessible Transportation and Mobility* observed that, many developed countries have introduced legislations, programmes and are involved in research and development, whose main objective is to make transport services accessible to the disabled. The United States, Canada, Australia, and the United Kingdom all have human rights legislation with regards to transport for the disabled, and Sweden has legislation aimed at normalization and integration of the disabled into transport services

Kenya on her part enacted Persons with Disabilities law in 2003, which treats accessibility and mobility for the disabled as rights. Sec (21) states that, "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 assertive devices and other equipments to promote their mobility".

1.1 Statement of Research Problem

According to Kenya Roads Board (2004), Kenya has had no transport policy but is in the verge of preparing an Integrated National Transport Policy (INTP) whose vision is to be *"A world-class transport system that is integrated and responsive to the needs of people and industry"*Whereby, poor quality transport services; un-integrated transport system, lack of urban transport policy and institutional deficiencies have been highlighted as some of the transport challenges in Kenya. Notably, provision of transport system that is responsive to the needs of the handicapped was not identified as one of the challenges.

Nairobi Metropolitan Growth Strategy (NMGS) of 1973, which is still guiding development in Nairobi including the Urban Transport System, is outdated and should have been replaced by 2000. Even so, there is nowhere in the plan that the transport for the handicapped is mentioned. Similarly, the on-going Nairobi Metropolitan Transport Study by JICA (2004) does not comprehensively provide for

the disabled mobility. The furthest it ever went is recommending for priority given to alighting passengers, particularly the disabled and the elderly.

Some studies in Nairobi have shown that accessibility of the disabled into public buildings and other public infrastructure has rarely been factored in during design stages and implementation (Nduli 1998, Mwaniki 2001). Improvements in accessibility to these places were recommended. But, how do they reach those destinations in Nairobi? What about the design of transport infrastructure and vessels as well as their conditions and operations? Do they have influence on accessibility to the aforesaid buildings and other places?

Provisions for accessibility and mobility for the disabled in Persons with Disabilities Act of 2003 is in doubt, whether it was informed by an understanding of Kenyan unique transport challenges for the disabled or pressure from United Nations and other countries from the developed world. Since, neither Nairobi Metropolitan Transport Study by JICA (2004) nor the Kenya Integrated National Transport Policy has identified transport limitations for the disabled persons as one of the transport challenges facing the country. Furthermore, according to National Council of Persons with Disabilities (NCPD), the section on accessibility and mobility has not been made effective by relevant authorities owing to implementation challenges it was likely to face. According to Mwaniki (2001), segregated transport policies that Kenya has had, also tended not to have direct focus on the special transport needs of the disabled. What is even more critical is that problems of access and mobility for disabled are better addressed right from the initial transport planning and design (UN 1994). If not, adapting transport infrastructure and vehicles to suit them is more costly undertaking.

It is also unclear whether; Kenyan realizes necessity of mobility for the disabled too well to warrant public interventions? If so, why does it appear their needs in transport have not been recognized? It is imperative, therefore, to understand the necessity of mobility as well as the extent and the nature of the mobility limitations for the

persons with disabilities in Kenya. In doing so, the study sought to answer the following questions in relations to mobility for the disabled in Nairobi:

- Is mobility necessary for the physically disabled?
- What are the travel characteristics of the physically disabled?
- What are the limitations in mobility faced by the physically disabled?
- Which measures can be employed in improving mobility for the physically disabled in Nairobi?

1.2 Research Objectives

The overall research objective was to establish mobility needs and limitations for the physically disabled in their journey from residential area to City Centre, as a basis for planning recommendations for improving their mobility in Nairobi.

The following comprises specific objectives:

1. To investigate necessity for mobility for the disabled;
2. To determine travel characteristics of the physically disabled in Nairobi;
3. To establish mobility limitations of the physically disabled; and
4. To propose planning strategies that may enhance mobility for the physically disabled in Nairobi

Specific research questions include the following

- i. Where do disabled come from and where are their regular destinations
- ii. Which modes of transport do the physically disabled use from residential area to city centre?
- iii. When do the trips to and from Nairobi CBD begin?
- iv. How often do they carry out their journeys to Nairobi CBD?
- v. Why do they carry out the journey?
- vi. How necessary is their travels?
- vii. What are the limitations in their travel to CBD?

- viii. Where are the limitations in their travel to CBD?
- ix. How can mobility of the physically disabled be improved in Nairobi?

1.3 Research Hypothesis

The following comprises hypothesis that presented possible answers to research objectives.

Ho: Monthly income of the disabled is related to the frequency of travels to Nairobi CBD.

Hi: Monthly income of the disabled is not related to the frequency of travels to Nairobi CBD.

1.4 Significance of the Research

Necessity for mobility need not be overemphasized for every living human being, disabled or not. Individual needs to travel to access and engage in opportunities that are away from their places of residence. However, opportunities for mobility are not equally distributed across all segments of the society in most urban transport systems (Boer 1986 and Hamilton 1992). The disabled, due to their reduced physical abilities, comprise the segments that are vulnerable to face mobility limitations. The study aims at improving mobility and accessibility for the disabled, which is an area of concern for the United Nations, other international bodies and countries including Kenya.

The timing is good since the Kenyan Government has just enacted law regarding the rights of the disabled; is preparing a comprehensive transport policy; has set a human rights commission and evidently, has began embracing reforms aimed at improving living standard of the less fortunate (prisoner, disabled, street families, etc). Section (21) of Kenya Persons with Disabilities Act 2003, provide for rights to accessibility and mobility for the disabled and entitles them to a "barrier-free and disability-

friendly environment". Section 40(1) of the defeated draft constitution, in 2004, had upgraded the accessibility for disabled to bills of rights.

The study is also in conformity with the UN (1994) rule No. 5 in the Standard Rules for Equal Participations for Persons with Disabilities. According to UN (1994), accessibility is indispensable in ensuring equal opportunities, participation and integrations of the physically handicapped into the society. The rule reiterated the requirements for States to ensure access to the physical environment and access to information by the disabled.

The study, therefore, is intended to pose a challenge to transport planning and management authorities to integrate transport needs of the physically handicapped in their transportation policies and plans, as well as in evaluations of transport systems. By doing so, then they are driving towards making the transport systems of universal design, which is advocated for in recent days. The recommendation should give a basis for effective policy and laws to ensure non-discrimination of these people to public transport system.

1.5 Assumptions

1. Urban mobility problems in Nairobi are getting more complex with regards to provision of transport services for all
2. Most of the disabled in Nairobi are poor and can not afford private automobile and private assistant; thus there is need for public interventions to cushion them against existing transport challenges
3. The disabled will continue to exist, now and in the future.
4. Identifying and eliminating some of the transport constraints of the disabled, potentially results into resolving some of the transport problems for the wider society, especially the elderly.

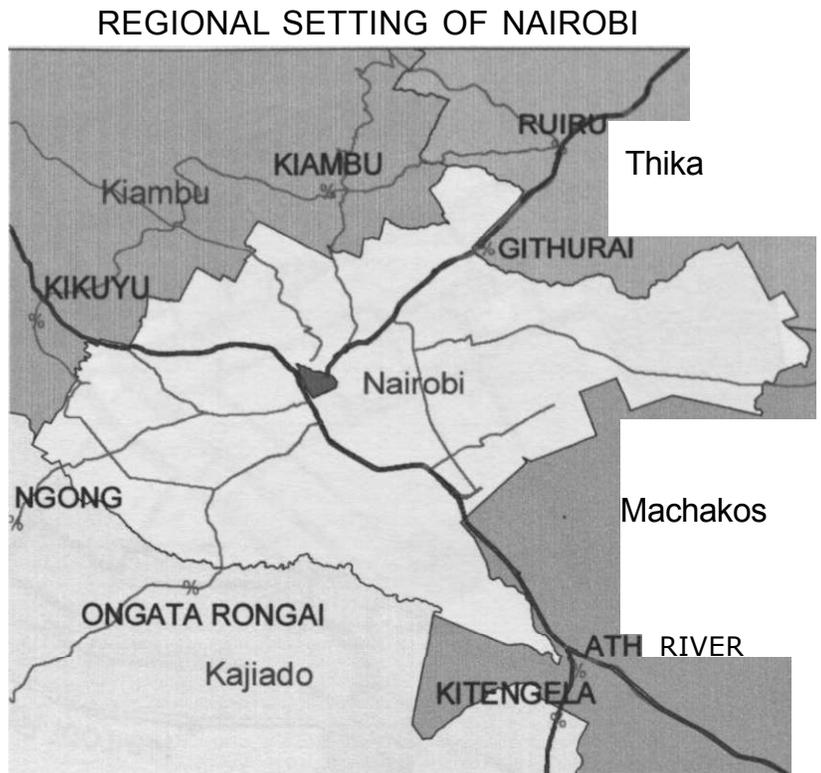
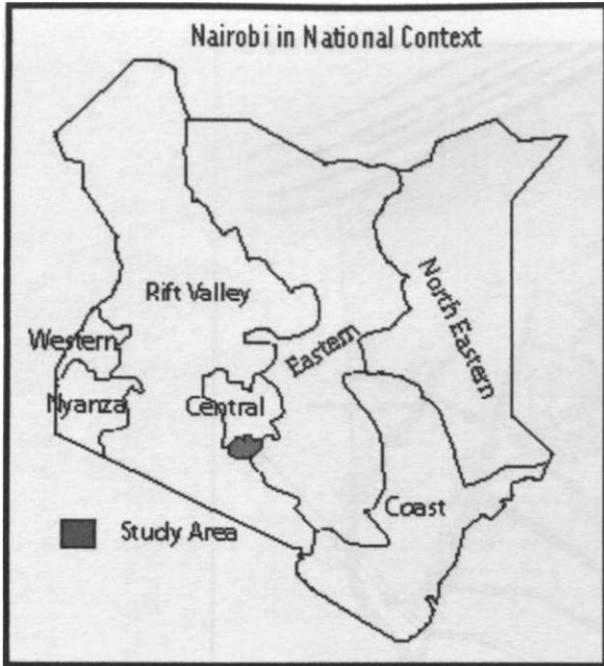
1.6 Location of the Study Area

The study was carried out in the city of Nairobi. Nairobi is the capital city and administrative headquarter of Kenya. Administratively, it is a district as well as a province in Kenya. It is also the commercial, administrative and industrial headquarter of many national, regional and international institutions and organizations, both private and public. Map 1 and Map 2 below shows Nairobi in the national and regional context respectively. Regionally, Nairobi is bordered by Kiambu, Thika, Machakos and Kajiado districts as well as a numbers of urban settlements. Nairobi Central Business District (CBD) is the major employment area and lies at the convergence of radial transport routes.

Nairobi was considered as most appropriate for the study in Kenya. Since the number of persons with disabilities is directly proportional to total population according WHO (1999), Nairobi have the majority of disabled population in Kenyan urban context. The city has diversified transport network and transport means, heterogeneous community (physically disabled being part). Thus, effects of mobility problems are deemed to be greatest in Nairobi than in any other urban centre in Kenya. Therefore, intervention in the city is deemed to have greater impact and would easily diffuse to the rest of the urban centres in Kenya and beyond.

Map 1: Location of Nairobi in the National Context

Map 2: Location of Nairobi in the Regional Context



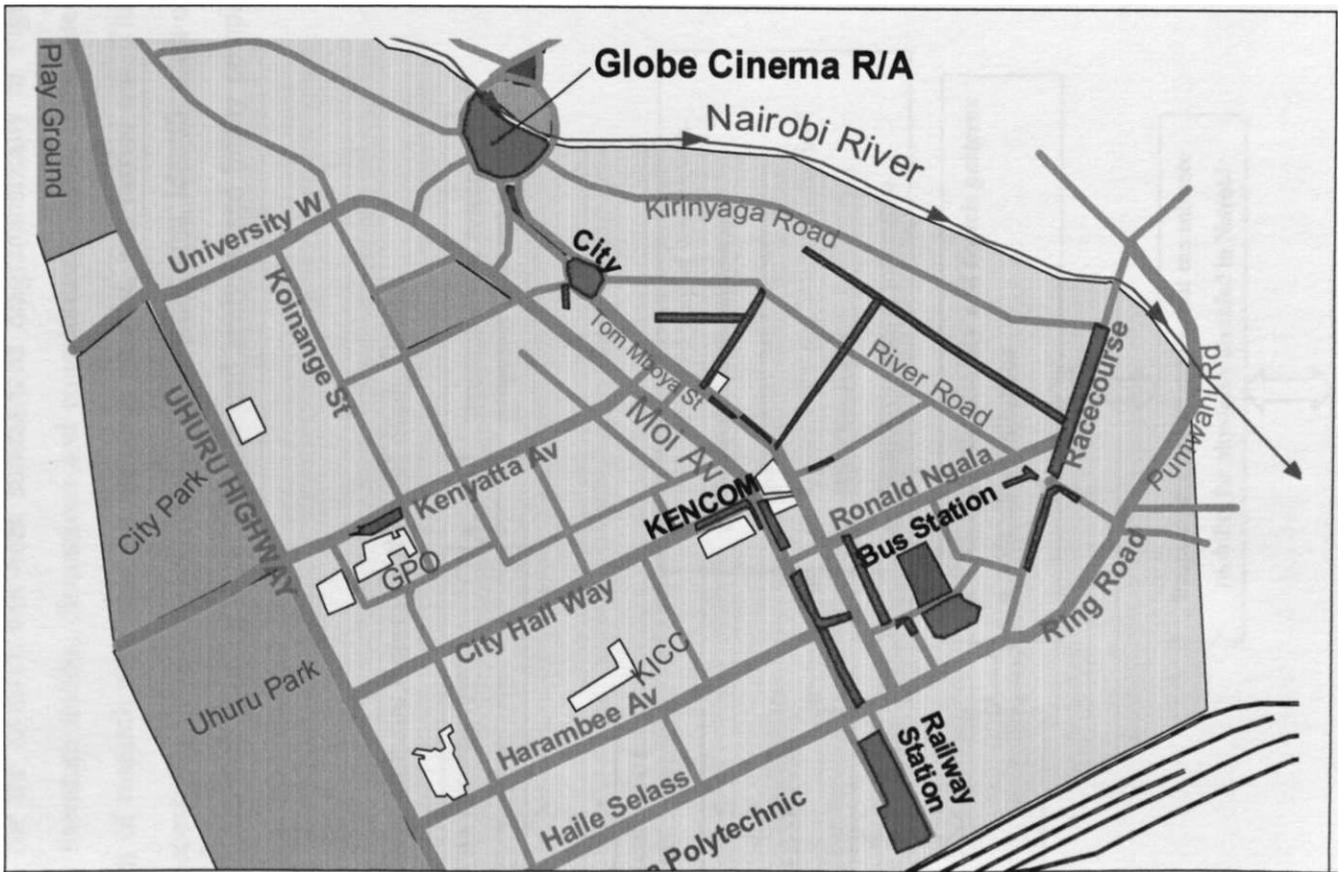
LEGEND

Districts	Urban Settlements
Kajiado	•• Nairobi CBD
Kiambu	/S y Class A roads
Machakos	/\ y Class B roads
Thika	/\ / Class C roads

Scale: 1:250000

Compiled by Ouma S. N

Map 3: Nairobi Central Business District (CBD)



LEGEND

Bus Terminals
Matatu terminals

Parks
Buildings (Some)
Built Up Areas

River
Railway
Major Roads
Other Roads

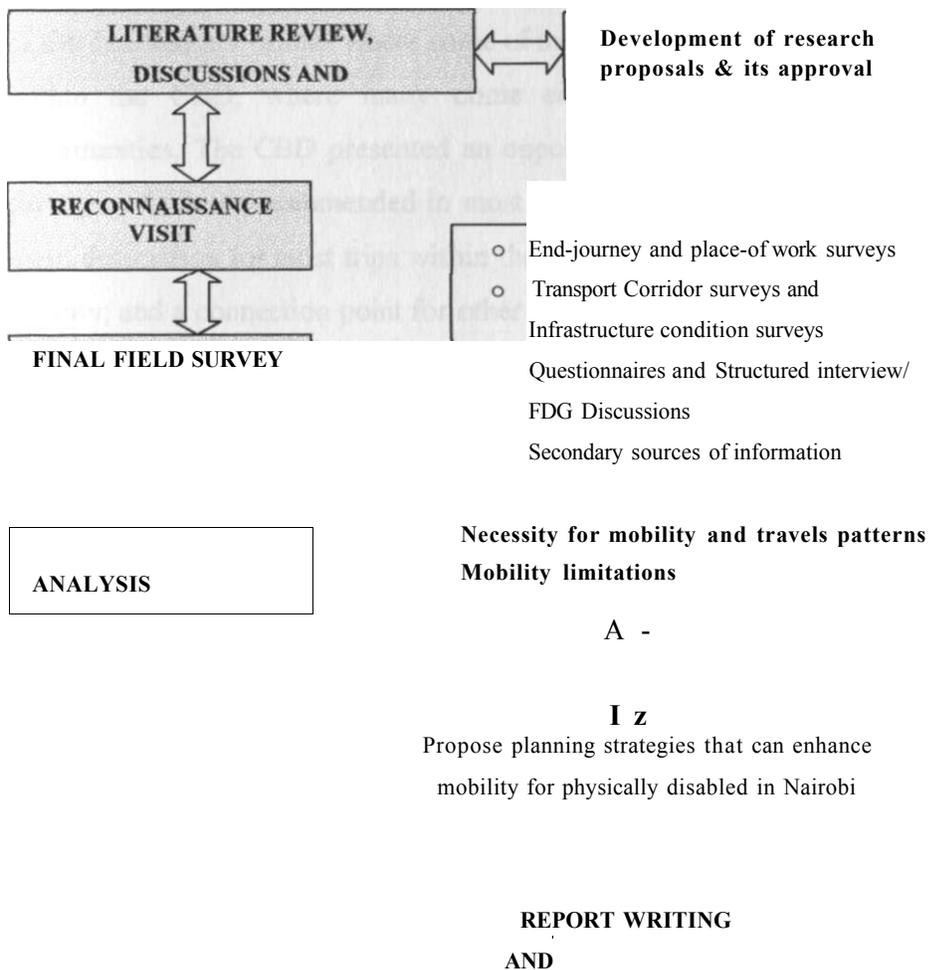
N
+
Scale 1: 250
BY Ouma S. N

1.7 Research Methodology

1.7.1 Research Design

The design for the research has been summarized diagrammatically in Figure 1. Preliminary literature review, discussions and consultations, which culminated into development of research proposals, on the study interest, was carried out. This was followed successively by reconnaissance visit to the study area; identification of data requirements and their sources; data collection and analysis; and finally compilation of thesis report.

Figure 1: Diagrammatic Representations of Study Design



1.7.2 Population and Sample

The study was about the mobility for the physically disabled in Nairobi. Thus, the physically disabled in Nairobi formed the population for the study. The physically disabled, comprises the wheelchair and the ambulant. As opposed to the visually impaired, hearing impaired and mentally impaired; the physically disabled may be easier enhanced to live 'a near normal life' through elimination of transport barriers. They were also found to be on the increase due to accidents (Mwaniki 2001)'.

Nairobi Central Business District (CBD) was selected as a cluster within which subjects for the study were sampled. The CBD provided an appropriate place to get the subjects for the study. This is because it was neither possible to locate residences of the disabled nor offices where some of them work. Rather, it was easier to get them within the CBD, where many come either for their livelihood or for other opportunities. The CBD presented an opportunity for an end-journey or work place surveys: which is recommended in most transportation surveys. The CBD is also the main destination for most trips within the city; an entry and an exit point to and from the city; and a connection point for other trips.

Alliance for Disabled Vendors Association (ADVA) provided the sampling frame from which subjects were selected. ADVA is an association of the disabled operating within the CBD of Nairobi. Out of 498 registered members by December 2006, 53 subjects were randomly sampled. A major challenge was, however, to locate specific subjects due to 'mobile-nature' of their activities. Thus, ADVA registration records provided a substantive sampling frame from which to establish the sample size. The subjects were thereon randomly selected from the physically disabled persons within the CBD, along different streets and at the *bus/matatu* terminals. Since rigorous requirements for random sampling could not be observed due to the challenge, due diligence was exercised to ensure that the responses were not influenced; and that the composition of the subjects included male and female, wheelchair users and

The information was sourced from Kenyatta National Records by Mwaniki (2001)

ambulant. Table 11 shows that 42 male and 11 female were sample comprising 32 wheelchair and 21 ambulant. The assumption was that irrespective of which individual with physical disability sampled, there are insignificant variations in their responses especially on mobility limitations. Moreover, they would have travelled and were better placed to provide relevant information for the study.

Table 1: Analysis of the Sample

Sex			
	Male	Female	Total
Sample	42	11	53
Sample frame	285	213	498
Proportion of sample frame	15%	6%	11%
Nature of Physical Disability			% Of the sample
Ambulant	21		40%
Wheelchair	32		60%

Source. Fieldwork 2006

1.7.3 Data Collection

The research used both primary and secondary sources of data. Primary sources were questionnaires, Focus Group Discussion, key informants interviews, Origin-destination surveys, field observations and condition surveys. Sketches, photography, and measurements were carried out during field observation surveys. Secondary data were sourced from Transport Licensing Board (TLB), Central Bureau of Statistics (CBS) demographic data, ADVA registration records and past studies.

1.7.3.1 Disabled Personal Survey

This was done through administration of questionnaires to the disabled along the streets and at transport terminals within the CBD, with intentions of gathering household data as well as data on their travel patterns, travel limitations and on the

effects of disability, both generally and in specific to mobility. These included age, sex, marital status, household size, occupation, education, nature and cause of disability, onset of disability, income, trip purpose and modal mix and mobility limitations. Their opinions on improvements in their mobility were also captured. Focus group discussion was also held with a group of the disabled vendors to inform and confirm some of the individual responses from the questionnaires.

1.7.3.2 Key Informants and Interview Surveys

Key informants opinions were sought with regards to mobility limitations of the disabled among other challenges as well as their opinion on the transport system that they aspire. The key informants included the management of Alliance of Disabled Vendors Association (ADVA); Association of Physical Disabled of Kenya (APDK)); National Council of Persons with Disability (NCPD), in the Department of social services (DSS), Ministry of Culture, Sports and Social Services.

1.7.3.3 Origin-Destinations Survey

This was done using the same questionnaires administered for household surveys. It was intended to provide data on the following variables: place of residence, origin and destinations, trip length, trip purpose, trip assignment, travel time, frequency of trip making and distance to the nearest transport facilities. This helped to identify transport routes and terminal facilities to be selected for observation and condition surveys.

1.7.3.4 Field Observation and Condition Survey

A field observation and condition survey was carried mainly along transport corridors and public service vehicle (PSV) terminals. It involved observation and inventorying of the conditions of roads and other transport infrastructure such as terminal facilities, bus stops and pedestrian facilities; Passenger Service Vehicles (PSV) design, operations and services, and existence and condition of transfer facilities for the disabled such ramps within CBD and how the transport infrastructure were utilized.

1.7.3.5 Secondary Data Surveys

These comprised accessing and extracting data and or information from secondary sources which included: JICA's Urban Transport Study of Nairobi Metropolitan Area, past transport studies in Nairobi, Nairobi Metropolitan Growth Strategy, Abstracts from registration records of ADVA, past research on the disabled accessibility, CBS demographic data, Transport Licensing Board traffic offences data, route maps and topographic map of the study area.

1.7.4 Analysis and Presentation

Qualitative and quantitative analysis coupled with proximity analysis (in GIS) made it possible to realize the findings *from* which conclusions were drawn. Data editing, coding and entry into computer preceded the analysis of the raw data from some of the primary and secondary sources. Analysis and presentations of non-spatial data was done using SPSS and Microsoft Excel. Qualitative data such as sex, marital status, residence, education levels, causes of disabilities and effects, responses on limitations on roads and PSV, travelling modes, etc. were measured using frequency distributions and cross-tabulations to describe the data, show the distributions and reveal relationships. Quantitative data such as, frequency of travels, income and household size were analysed using measures of central tendency, measures of variability as well as descriptively.

Cross-referencing was necessary in order to get more meanings or understandings of the data. This was important deriving relationships, for instance cause of disabilities and age; income and education; etc. Comparison of means of household sizes, age and incomes with that of population of Nairobi and some generally acceptable constants was done to establish differences in the variables using t-statistics. Various spatial data sets containing major urban centres, transportation routes, and administrative boundaries were digitised and linked to attribute data from demographic data for spatial analysis. Arc View GIS 3.2 was applied in carrying out proximity analysis to determine the geographical distance from the CBD to places of

residences, and their distributions; and then presenting the result in visual representations.

Social, economic and travel characteristics of the disabled were used to deduce necessity of transport for the disabled. Limitations on mobility were informed by responses from field questionnaire, backed by researcher's field observation incorporated by photography and conceptualised into sketches. Inferences were made from the findings from questionnaire, FGD, interviews from key informants, observations and literature review in interpreting findings.

Results of the analysis have been presented, both orally and as a report, as a requirement for Master of Arts in Planning. Both presentations are in softcopy and hardcopy format incorporating text, table, graphs, charts, diagrams, photographs and maps

1.8 Structure of the Thesis

Chapter one introduces the problem of the study and formulation of methodology for carrying out the research. Chapter two contains literature review on transport needs and challenges for the physically handicapped as well as efforts in the transport challenges. The chapter culminates into a conceptual framework for the research. Chapter three focuses on the study area: location, the physical structure, demography, and urban passenger transport in Nairobi. Chapter four basically contains necessity for mobility and travel characteristics for the disabled. Chapter five contains their mobility limitations. Finally chapter six is made up of key findings, recommendations and conclusion.

1.9. Definition of Operational Terms and Concepts

The disabled, (or physically disabled) refers to *Paraplegics* within the study area. These *are the* disabled who can move independently using either assistive devices or mobility aids or both. They may need some assistance but not always. They can manage to carry out some activities such as mobility, self-care and communications. The disability may be as a result of paralysis or amputations of some limbs.

For the purpose of the study, the disabled the physically disabled; those who due to impairments can not use public transport services and infrastructure as effectively as any ordinary person without some kind of physical or social adjustments. It is a person who can not easily interact and or manipulate his/herself like ordinary persons.

- **Wheelchair disabled.** Those who can neither stand nor walk. They must rely on mobility aids (Wheelchairs and Tricycle for mobility) for mobility. Otherwise they crawl on their knees, buttocks, etc.
- **Ambulant disabled** (*People with Impaired Mobility*). Those who have impairments that reduces or precludes walking or standing. Unlike the wheelchair users, they can stand and walk either independently or use assistive devices, like artificial legs, canes or walking sticks.
- **Mobility aids** **Mobility Aids** - are for indoor and outdoor use. They may include wheelchairs, tricycle power wheelchairs and/or power scooters.
- **Assistive Devices** are non-medical tools, which relate to and assist with mobility, transportation, communication, activities of daily living, and performance of job related activities.

Accessibility *Access* is defined as the ability to reach desired goods, services, activities and destinations (together called *opportunities*). Accessibility is achieved through deliberate land use arrangements, mobility and Mobility Substitutes.⁷

Mobility refers to physical movement, including travel by walking, cycling, public transit, taxi, and private automobile and other motorized modes. The main objective of mobility is to access opportunities.

Mobility limitations, (*also mobility constraints, challenges or problems*), refers to physical and social environments that either prevent or discourage traveling (trip making). The extent to which an individual experiences mobility limitations depends on his/her physical condition

⁷ **Mobility substitutes** include Telecommunication and delivery services that provide access with minimal physical travel

Urban Transport System (UTS): A transport system includes the transport vehicle/vessels, infrastructure and operations. **UTS** refers to a transport system for an urban setting.

1.10 Limitation in the Study

The study encountered the following limitations:

1. Due to limited time and financial resources for carrying out the research, the study was confined to particular categories of the disability, i.e. the physically disabled.
2. Reliable statistics for the disabled in Nairobi were not there. Thus the problem of determining the population for the study and for adequate planning.
3. Some respondents were not ready to cooperate with the researcher; some out of apathy but other on suspicious of the motive behind the research, therefore it required a lot of patience and understanding.
4. There was difficulty in accessing data in some offices due to analogue data storage, unavailability, and lack of commitment to provide the same from concerned officers

CHAPTER TWO: TRANSPORT AND THE HANDICAPPED

2.0 Introduction

According to Habitat (1996), quality of life for all people depends on, among others, economic and social environment, on cultural factors, physical conditions and spatial characteristics of our towns and cities. Transportation and ease of access to all basic goods and services and public amenities have a crucial bearing on the liveability of the environment (ibid). This is particularly important to the handicapped persons, who are vulnerable to face barriers in mobility and in participating in society. Therefore, recognition of diversity and promotion of equality in transport as well as in securing livelihood is paramount.

This chapter review literature on transport for the physically handicapped, with focus on their transport needs, challenges and global efforts in dealing with the challenges. It finally culminates in development of a conceptual framework for the study: encompassing mobility limitations for the physically disabled and interventions aimed at improving mobility.

2.1 The Disabled in the Transport for the Handicapped

2.1.1 Overview

Many transport writers have observed that there has been lack of equality in transport services, as some segments of population require special provisions or else they face limitations in mobility (Falcocchio and Cantilli 1974, Banks 1998, SMILE 2000, Kasuku 2001). This group include the elderly, people with disability, the youth, and the poor as shown in Figure 2, which have been variously referred to as the physically handicapped, the transport disadvantaged, mobility handicapped, the captive riders or the vulnerable group. Falcocchio and Cantilli (1974) in their book, *The Transport and the Disadvantaged*, noted that, "the segment of the nation's population that most critically needs basic community services is the same segment that tends to have the least physical access to these services because, they cannot afford or are unable to

drive an automobile; they cannot afford public transport; and they reside in areas poorly served by public transport". The design and service feature of public transportation systems was observed to pose difficult health, manoeuvrability, or orientation problems to some of them.

Figure 2: The Universe of Transportation Users

	The handicapped	
The Youth (Under 18)	Adequate (normal)-physical and mental capabilities	The Elderly (Aged above 64')
	Adequate income levels	
	The poor	

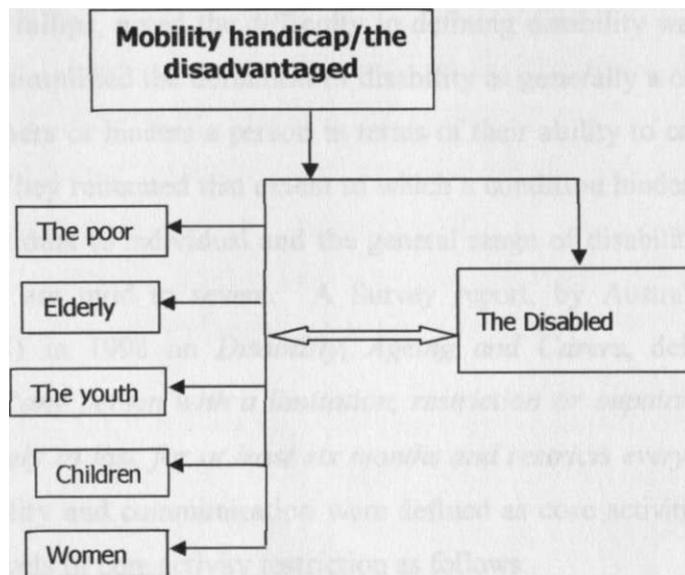
Source: Falcocchio and Cantilli (1974)

A publication by Transportation Systems Centre (1973) was quoted in Falcocchio and Cantilli (1974) as defining the physically handicapped as, "Any individual who, by reasons of illness, injury, age, congenital malfunctions, or other permanent or temporary incapacity or disability, is unable without special facilities or special planning design to utilize mass transportation facilities or services as effectively as persons who are not so affected". Australian Bureau of Statistics (1998) insisted that the conditions so mentioned should persist for at least six months for an individual to qualify as physically handicapped.

2.1.2 Disability and the Handicap

Literature portrays handicap and disability as synonymous; and Figure 2 is no exception. However, *to allay such* confusion, it is important to acknowledge that handicap is much broader than disability: the latter being a subset of the former. It has also emerged that the disabled belongs to a category of transport-disadvantaged known as the physically handicapped, which has been defined herein. Figure 3 shows that the disabled are placed in a very vulnerable place in the transport disadvantaged. They may be poor, elderly, youth, children and women in addition to being disabled.

Figure 3: Place of the disabled in "Transport disadvantaged"



Source: adapted from Falocchio and Cantilli 1974, SMILE 2000, Kasuku 2001

2.1.3 Who is the Disabled?

One of the serious problem confronting policy-makers, planners and researchers involved in addressing issues regarding disability is its proper and objective definition and classifications of disability (UN 1990). However, World Health Organization (WHO) undertook to provide the first universally agreed definition and classifications of disability, in their report dubbed the *International Classification of Impairments, Disabilities and Handicaps (ICIDH)* in 1980.

According to **ICIDH** classifications, *Impairments* or reduced functions of body organs result into such states as blindness, deafness, mental retardations, paralysis or amputations of legs or arms. *Disability* is the description of reduced functions at the levels of a person, such as: descriptions of people who have difficulty in standing, walking, hearing, seeing, speaking and being understood. Some may have been born with impairments due to genetic composition. They could have suffered certain adverse effects before, during or after birth or while living normal lives. They could also be caused by injuries from roads, factories, riots, wars, earthquakes and the most common in old age.

In a report dubbed *Disability Support and Services in Australia in 2001*, by McIntosh and Phillips, noted the difficulty in defining disability was underscored. However, they simplified the definition of disability as generally a condition that in some way hampers or hinders a person in terms of their ability to carry out day-to-day activities. They reiterated that extent to which a condition hinders a person will vary from individual to individual and the general range of disabilities varies from conditions that are mild to severe. A Survey report, by Australian Bureau of Statistics (ABS) in 1998 on *Disability, Ageing and Carers*, defined disability specifically as "*any person with a limitation, restriction or impairment which has lasted, or is likely to last, for at least six months and restricts everyday activities*". Self care; mobility and communication were defined as core activities (op cit). The ABS defines levels of core activity restriction as follows:

- *Mild* — where a person has no difficulty with self care, mobility or communication, but uses aids or equipment,
- *Moderate* — where a person does not need assistance, but has difficulty with self care, mobility or communication;
- *Severe* — where a person sometimes needs assistance with self care, mobility or communication; and
- *Profound* — where a person is unable to perform self-care, mobility and/or communication tasks, or always needs assistance.

This study has covered the mild, moderate and severe disabled persons who can manage carry out the core activities either independently or with minor assistance.

Handicap is neither classified according to individuals nor their attributes but rather according to the circumstances in which the disabled people are likely to find themselves, circumstances that can put individuals at a disadvantageous position in relations to their peers when viewed from the norms of society. Examples of handicaps include: confinement at home, inability to gain access to public or motor transport, economic inactivity, underemployment, social isolations, illiteracy and confinement to an institution. Handicaps is experienced at three levels; namely at individual, at family and at societal levels.

- a. At individual- where decreases in independence, mobility, leisure activities, social integration and economic viability is experienced
- b. At family level-where care is needed, distributed social relationships and economic burdens are experienced
- c. At societal levels-where care is necessary and where loss of productivity and social integration is experienced

It has therefore emerged out from the literature on disability that, irrespective of the extent, type and classifications of disability; mobility-limitation is one of the handicaps they are suffering from. Other handicaps as outlined herein may have emerged out of their lack of mobility. Again, the study only took care of mild, moderate and partly severe disabled who are in a position to undertake the core activities, since, they can benefit from improvements in transport.

2.1.4 Necessity of Transport for the Disabled

According to Falcocchio and Cantilli (1974) necessity for mobility transcends every human creature. This has been reflected in the Figure 2 above, which is dubbed the *Universe of Transport Users*. Boer (1986), in his book *the transport sociology* noted that, 'geographic distance to opportunity areas by no means necessitates transport and

³ Ibid

also determines which transport means to use'. This necessity transcends global, regional and local transport needs (Rodrigue 2005, Falcochio and Cantilli 1974). Urban spatial pattern theories, such as concentric zone theory, the sector theory and multi-nuclei theory, all describes an urban setting as comprising segregated land uses.

However, individuals' ability to overcome the distance separating various land uses is affected by their physical abilities and distance among others. As Boer (1986) put it, *"distribution of access (time-distance to facilities) is unequal, both geographically and socially. People live at varying distance from opportunities and differ in their abilities to overcome this by means of transport. The car-less, the old and the physically handicapped, usually may need more time and greater efforts to reach the same destinations as the younger people with motorized transport"*.

Furthermore, the handicapped span all economic levels and all ages; ethnic and interest groups; all social and economic groupings. By age groups, handicapped children must have special handling to school and rehabilitation centres; older children and adults need some special considerations in using Public Transport. In particular handicapped adults have jobs, are in search of job or are engaged in income generating activities, thus necessitating their regular travelling (ibid). If neither young nor old, their need to travel is almost equal to their 'normal' counterparts. They need to go shopping, entertainment, recreational areas, educational institutions, medical and dental expertise, to and from rehabilitation centre and to work.

The society is also looking upon them to have families and support them, contribute to economic development of the country and, at least graduate out of life of dependency from charity to independent living. This is apparently a tall order without responsive transport system that caters for the mobility need of the disabled, which also widens their opportunities. ILO (2004) acknowledged that one of the most important condition for equal opportunity, unlimited participations and integration of the physically handicapped into social life is that, *"public space and*

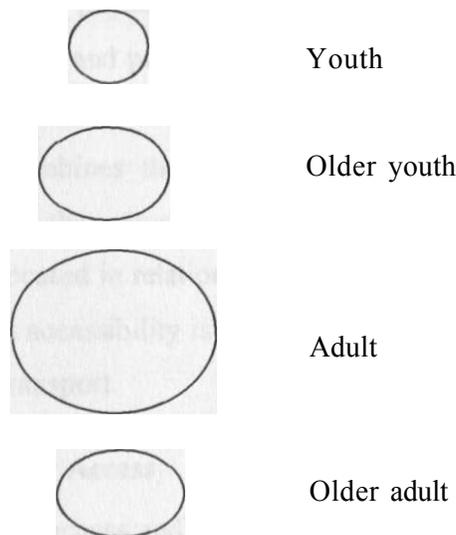
transport system are designed without any barriers for people with disabilities and that accessibility to all public facilities are ensured\

2.1.5 Life Space Concept

In trying to understand nature of travels for the disabled with respect to others, '*life space concept*' by Cantilli and Shmelzer in their Study on mobility of the elderly in 1970, highly applies.⁴ Figure 4 shows a progressive increase in "Life Space¹ from the youth to adult, but decreases during old age. The argument being as follows:

- Children life space is as a result of their immaturity in capability, interest and finances
- Adult's greater life space result from necessity (work) and desires (recreation, money to spend, socialize, education, etc)
- Aged reduced life space is due to necessity (reduced physical power and financial means), or desire (fear of muggings, falling, 'not keeping up', anomie, etc)

Figure 4: Concept of life space



Source: Adapted from Falcochio and Cantilli (1974)

Cantilli, E.J., and Shmelzer, J.L. (eds), transportation and Aging-Selected Issues, proceedings of the Interdisciplinary Workshop on Transportation and Aging, Department of Health, Education, and Welfare, Washington, D.C., 1970 as quoted by Falcochio, J. C. and E. J. Cantilli. (1974).

Mobility characteristics of the disabled who can use public transport, was found to resemble, to a greater extent, those of the elderly. However, the disabled have more desires and necessities than the elderly during adulthood (Falcocchio and Cantilli 1974). The disabled adults were found to exhibit same travel necessity and desires as well as similar travel patterns and purposes as their normal counterparts. Further reduction to their life space may imply constraints to their economic and social well-being; which further imply inequality, limited participation and integration.

2.2 Accessibility and Mobility

According to Victoria Transport Policy Institute (VTPI 2005), Accessibility (or just Access) is defined as the ability to reach desired goods, services, activities and destinations (together called opportunities). For instance, a stepladder provides access to the top shelf in your kitchen. A store provides access to goods. A library, telephone and the Internet provide access to various types of information. A highway or transit improvement can increase access to goods, services and jobs from a neighbourhood.

Mobility refers to physical movement, which is made through walking, cycling, public transit, taxi, and private automobile and other motorized modes. Access is the ultimate goal of most transportation. According to Banks (1981), accessibility is a concept that combines the geographical arrangement of land, land use and the transport system that serves these land use. It is a description of how conveniently land uses are located in relation to each other and how easily they can be reached via transport. Thus accessibility is broader than mobility, which deals with one aspect of accessibility: transport.

2.2.1 Demand for Access

The demand for access and mobility is affected by people's needs and abilities (op cit). It was noted that people typically make about two round-trips outside their home each day. Those who work outside the home or attend school tend to make more trips than people who work at home, are retired or unemployed. And people with dependents tend to make more trips than other adults. A single trip may provide a

variety of access opportunities. For example, commuters often run errands after work, and shopping trips often involve stops at several different stores.

As the cost of physical access declines, either because mobility becomes convenient, cheaper, faster and easier, or because more destinations and activities are closer, people tend to access more destinations and activities. People who have more mobility (e.g., motorists and physically able), and people who live in more accessible locations (e.g., in an urban area with many services and activities nearby) tend to have higher levels of access, as they reach more destinations, than people with less mobility or more isolated locations. For example, a higher-income, physically able, urban motorist is likely to visit more destinations than a lower-income, non-driver with a physical disability.

Different transport modes play different roles in providing mobility and accessibility. For example, non-motorized modes serve shorter-distance trips and motorized modes serve longer-distance mobility. The transport modes to be chosen by an individual are determined also by social and economic status and physical abilities.

2.2.2 Factors Affecting Accessibility

According to *Victoria Transport Policy Institute (2005)*, the following four factors were identified as affecting accessibility:

1. **Mobility:** The more one travels the more destinations one can reach.
2. **Transportation Options.** Transportation Options (also called Transportation Diversity and Transportation Choice) refers to the quantity and quality of transportation services available to a particular type of user under particular conditions. Improved Transportation Options tends to improve access
3. **Mobility Substitutes:** Mobility substitutes include Telecommunication and delivery services that provide access with minimal physical travel.
4. **Land Use Factors (Land-use Impacts on Transportation):**

land use factors affect accessibility include: density, Clustering, Land-use mix and roadway connectivity. A more accessible land use pattern means that less mobility is

needed to reach goods, services and activities as advocated by Urban Smart growth Principle. *Density* refers to the number of people or destinations in an area. The number of residents, housing units or employees per acre, usually measures it. Clustering refers to grouping people or destinations together.

Density and clustering are somewhat different concepts. A low-density area can have a high degree of clustering. For example, residents and businesses in rural areas often cluster into villages. Land use mix refers to various types of land use (residential, commercial, institutional, recreational, etc.) located close together. Land use density, clustering and mix tend to increase accessibility. Density affects accessibility. Higher density areas rely more on walking, cycling and transit, and less on driving. In such conditions, clustering and the quality of pedestrian conditions are important transportation factors. Areas with low densities, single land uses, and more dispersed destinations are automobile dependent, and not very accessible by other modes. Clustering of transportation facilities and services also tends to increase transportation convenience and accessibility. For example, locating automobile and bicycle rentals, and high quality transit at airports, rail and bus terminals, improves access by facilitating connections between the different modes. Although mobility is one of the factors affecting accessibility, other factors have the potentials of also influencing mobility in terms of transport means used, travel time and the convenience of travelling.

2.3 Urban Transport Demand Analysis

Transport demand analysis attempts to describe travel in meaningful terms, explains travel behaviour; and on the basis of these, predicts demand for various transportation services to transport users. Travel models have been developed to help in analysis of travel behaviour.

2.3.1 Travel Behaviour

Trip is considered the basic unit of travel behaviour. Trips involve movements from a single origin to single destinations and usually described in terms of purpose, origin, and times of occurrence, travel modes, and routes. Transport demand analysis attempt

to explain travel behaviour in terms of *utility* concept,⁵ However, unlike other goods, travel choices are usually mutually exclusive; one can only make one trip at a time. This is on condition that the utility of travelling is greater than that of not travelling. Where a given trip has more utility, it becomes preferable over others. According to Falcocchio and Cantilli (1974), the following are also pertinent in travels:

- Travel is usually not taken on its own sake, but considered as secondary good, and its utility termed *derived utility*.
- The utility of any trip is judged by the activity it is going to make possible and how the individual value the activity.
- A trip involves costs, or disutility, which must be subtracted from values of travel. The disutilities include monetary and time-spent riding, walking, and waiting as well discomforts and inconveniences. Ideally, all travellers cannot share in equally the travel disutilities due to the heterogeneity of travellers. The disabled and other physically handicapped have to bear the greater burden of travel disutilities.

2.3.2 Characteristics of Urban Travels

The basic trip-making unit is the individual households. Kasuku (2001) noted that about 80 to 90 percent of all urban trips are generated from residential areas. The number of trips generated depends on income, car availability among other characteristics. Daniels et al (1980) as was quoted in Kasuku (2001), noted that demand for travel is dictated by purpose for the travel, which he classified at both individual and family levels as shown in Table 2 below.

Obiero (1992) categorises into three groups the factors that facilitate the demand for travels and also modal choice as:

- **Characteristics of trip maker** i.e. car availability and /or ownership, household structure (young, couple with children, retired, single, etc), income, etc

⁵ In the theory of demand, utility concept is described in terms of *utility functions*, which expresses the relative amounts of various goods that a consumer will choose, given a budget constraints.

- **Characteristics of the journey:** trip purpose, time of the day when the trip is undertaken, trip lengths, etc.
- **Characteristics of the transport facility** this is divided into two: Quantitative factors such as time, relative monetary costs, (fare, fuel and direct costs), and availability and cost of parking; and Qualitative factors which are not easy to measure such as comfort and convenience, reliability and regularity and protection, security, availability, (or non-availability of alternative modes, etc).

Table 2: Classification of Purposes of Personal Urban Travel

Activity	Journey classifications
Economic Earning a living Acquiring a living	To and from work In course of work To and from shops and outlets for personal services In course of shopping or personal business
Social Forming, developing and maintaining personal relations	To and from homes of a friends and relatives To and from non-home
Education	To and from schools, colleges and evening institutes
Recreational and leisure	To and from places of recreations and entertainment In course of recreation and entertainment
Cultural	To and from places of worship

Source: Kasuku (2001)

According to him, transportation demand factors translate themselves as much as possible to modal choices in a specific urban context. However he noted that many urban residents cannot avoid travelling, sometimes for longer distances, to fulfil social and economic roles in the urban community. This is necessitated by the separation of activity/opportunity sites, i.e. homes and workplaces, home and schools etc. Non-travel factors such as house rents do influence residences and work location, which also dictate which transport modes used. Daniel et al (1980) states that an individual's journeys are closely related to his or her activities, age, sex, employment

status, income, health and personal preferences, all influence the frequency with which individuals engage in journeys for different purposes.

Webster et al (1986) recognized that the major trip purpose in world cities, which includes Nairobi, is journey to and from work. The journey to and from work is generally affected by Social and economic factors. Kasuku (2001) quoted Harris (1978) that while focusing on monetary costs of travelling, he outlined public modal choice factors into two; those related to time elements of generalized costs (convenience, directness, access and frequency) and those related to monetary elements (such as cheapness). It should be noted that high cost of transport services negatively affects commuting because most of the public transport users are low to medium income that are the majority in urban settings.

Werner (1985) noted that individual trip making behaviour depends not only on the attractiveness of the intended destination, purpose and distance that has to be overcome to get there, but also on the availability of opportunities elsewhere; opportunities that are competitive and can satisfy the purpose of the planned trip. This is what is known as the intervening opportunity model that assumes that individuals will always choose the nearest opportunity. However, there usually occur variations due to trip purposes and the level of services.

2.4 Mobility Limitations for the Handicapped

2.4.1 Explaining the Root Cause

Mobility limitations for the handicapped have a long history, drawing its origin from past *transport* planning inadequacies and worsen with time. According to Rodrigue (2005) urban mobility problems have increased proportionally with urbanization, a trend reflected in the growing size of cities and in the increasing population. Falcocchio and Cantilli (1974) apparently traced the root of the urban transport problems as emanating from past planning philosophies. Reasons being, they were centred on limited objectives against which transportations plans and improvements

could be evaluated. They were merely focused on volume, capacity, speed and level of service but not responsiveness to user needs, which is to be blame for lack of improvements in public transport system (Falcocchio and Cantilli 1974). It has been stated that this trend had resulted into:

- The construction of highways that that increased mobility of that segment of population, which drive cars or have access to one.
- Increased sub urbanizations of people, jobs and other activities
- Decline of mobility for majority of people who do not have access to cars, which include the poor, physically handicapped, youth and the elderly- the 'disadvantaged'.

Kipke (2001) in a report dubbed *User Perspective, Marketing & Sub-Markets* in transport observed that, until the 1970's, the user perspective was hardly the basis for transportation planning In developing countries interest had long been concentrated on public transport (initially state-owned and in a second stage privately owned); considered the answer to the transportation needs of the poor. The focus was therefore on the supply-side rather than demand-side.

Nduli (1998) once quoted Margaret Mead (Athens) as reiterating that, *"one major cause of disabling settlements is the fact that they are built for a non-existent population. The buildings, the roads and open spaces, cater exclusively to fictitious model of human being. This is a man in the prime of life and the peak of physical fitness-not the disabled, the young, the elderly, etc"*No wonder, Pradeep Kumar⁶, was quoted by Herald (2005) as saying that, *'for a normal person, travelling by public transport is tiresome, to say the least. How much more exasperating is it for those of us who are physically challenged?'"*

Hamilton (1992) observed that the transport services are not equally or randomly distributed within our society but followed well-established line of social inequality. Thus mobility gap tends to become bigger and affects a number of members of the

⁶Pradccp Kumar is an Assistant Commissioner for Disabilities of the government of Kamataka

society. At a global scale, he noted, there are many of the disadvantaged living where they lack mobility.

Boer (1986) drawn a conclusion that, *"Distribution of access (time-distance to facilities) is unequal, both geographically and socially. People live at varying distance from opportunities and differ in their abilities to overcome this by means of transport. The car-less, the old and the physically handicapped, usually may need more time and greater efforts to reach the same destinations as the younger people with motorized transport. Some may be completely immobile, without relying on gadgets or assistance by other human being... Improvement of infrastructure may have redistribute effects, yielding better access to those who already have more of it already. These make other systems less attractive and cause them to deteriorate, and in the end improve access for the better off and worse it for those underprivileged"*.

Banks (1998) pointed out that for sometime; transportation has been seen as an economic activity, and decision about transportation systems motivated by economic concerns: but not the social aspects. It is against this background that one of the transport challenges is equality of access for all (Falcocchio and Cantilli 1974, Banks 1998, SMILE 2000, Kasuku 2001). Other related challenges include traffic congestion, traffic safety, environmental protection and funding. Thus, all urban transport systems based on the past transport plans are bound to be unresponsive to disadvantaged segment of population, unless interventions have been put in place.

Nonetheless, currently mobility has gained new dimensions to encompass the physical structure and social needs of the urban areas (Falcocchio and Cantilli 1974). It has been further suggested that transport facilities and plans should, by and large, be view also as a means of alleviating many urban problems, which create great concerns to public and its elected leaders. These problems include urban crime, unemployment, substandard housing and discriminations. Whereas, they are not directly linked to transportations, they can indeed be reduced or increased, somewhat by manner in which transportation developments is directed (ibid). Again when one

talks of transportation improvement factors, invariably the question arise, who does it benefit, and is the amount of benefit received worth the cost to someone else? It is important; therefore, to ask how transportation can be used, and what type of transportation services are required to improve the mobility and quality of life for the disadvantaged.

2.4.2 Mobility limitations

A study entitled, *Mobility Constraint for the Carless* by Koutsopoulos and Schmidt (1986), categorized mobility limitations as either trip-making constraints or environmental constraints. Trip making constraints are based on individuals' physical, psychological and social-economic characteristics. Environmental constraints were mainly external limitations imposed by the physical and social environment. The constraints prevent or discourage the ease and possibility of mobility by individuals.

2.4.2.1 Trip-Making Constraints

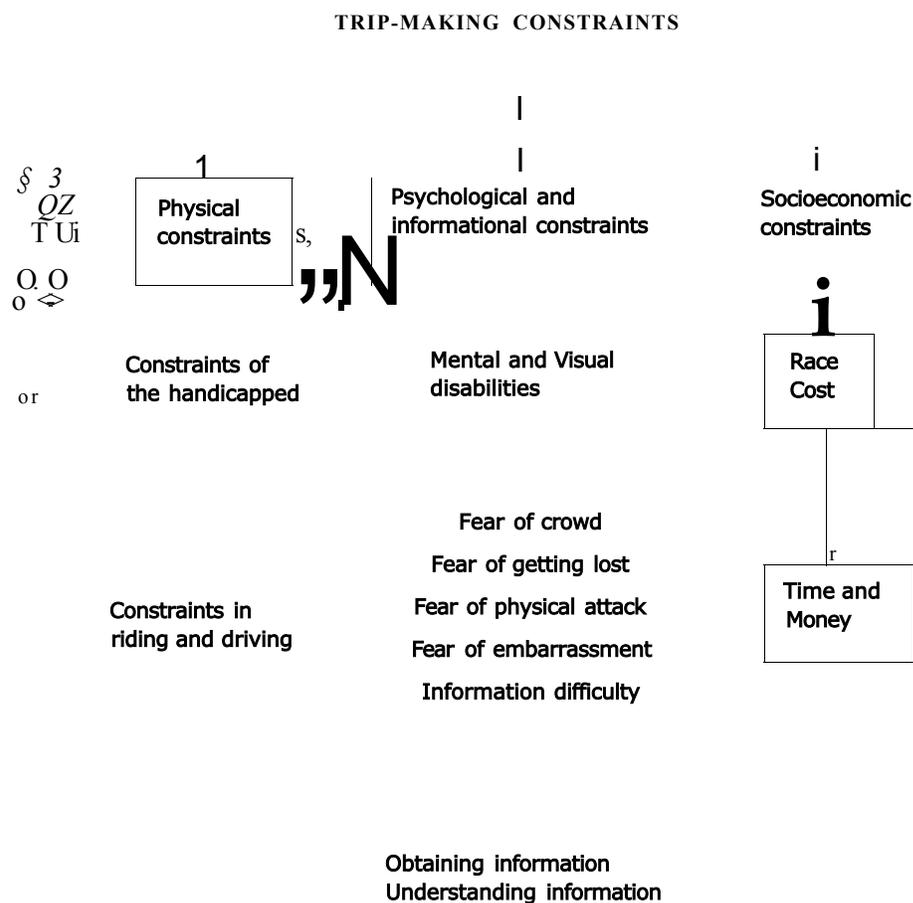
Basing on American experience, many people were noted to have one or a combination of several physical or mental disabilities, as well as socio-economic restrictions that adversely affect and influence their trip making characteristics (ibid). It was further reiterated that limiting employment, social, educational, and recreational opportunities restricts the extent to which these group of individuals are able to be productive members of the society. These constraints were found to be responsible for the population's inability to generate a vehicular trip, by prohibiting a household from owning or operating an automobile, by prohibiting or restricting their use of mass services. Figure 5 shows that the trip making constraints were categorized as physical, psychological and socio-economic constraints.

Not all handicapped, however, are unable to use mass transit. But the inability to perform one or more of the required physical operations prevents a large group from riding them, and difficulty in meeting some of the physical requirements make their operation laborious for even larger group. Furthermore, using mass transit is more complicated during bad weather and when mechanical aids are to be utilized. It was

also observed that the earless, and by extension the disabled, usually face perceptual barriers that inhibit their use of mass transit as follows: these include:

1. Fear of crowds- some made nervous by crowds or anxious about their rudeness, which may cause them to function faster than their comfortable rate Fear of getting lost
2. Fear of physical attack while waiting for or riding in public transportation vehicle
3. Fear of embarrassments stemming from the impatience of other riders, especially the latter's actions and attitudes towards them
4. The difficulty in getting transport related information

Figure 5: Trip-Making Constraints of the Handicapped



Source: adapted from Koutsopoulos and Schmidt. (1986:171)

2.4.2.2 Environmental Constraints

Environmental constraints exist when a person is available for work or needs to undertake a shopping, health, or recreational trip but the external or environmental difficulties are so great that they either prevent or discourage the activity. Koutsopoulos and Schmidt (1986) categorized them as Locational constraints, Administrative constraints and Demand-Response constraints as shown in Figure 6 below.

a) Locational Constraints

In case opportunities are not present in a given location, or the means to reach them are not provided, then, there exists mobility constraint. Since these mobility barriers relate to where a household live, they are termed locational constraints. It was identified that major transit problem facing the Carless could be conceptualised in terms of absence of public transit not merely to employment opportunities but to the other important facilities as well. This, in principle, applies to the physically handicapped.

b) Administrative Constraints

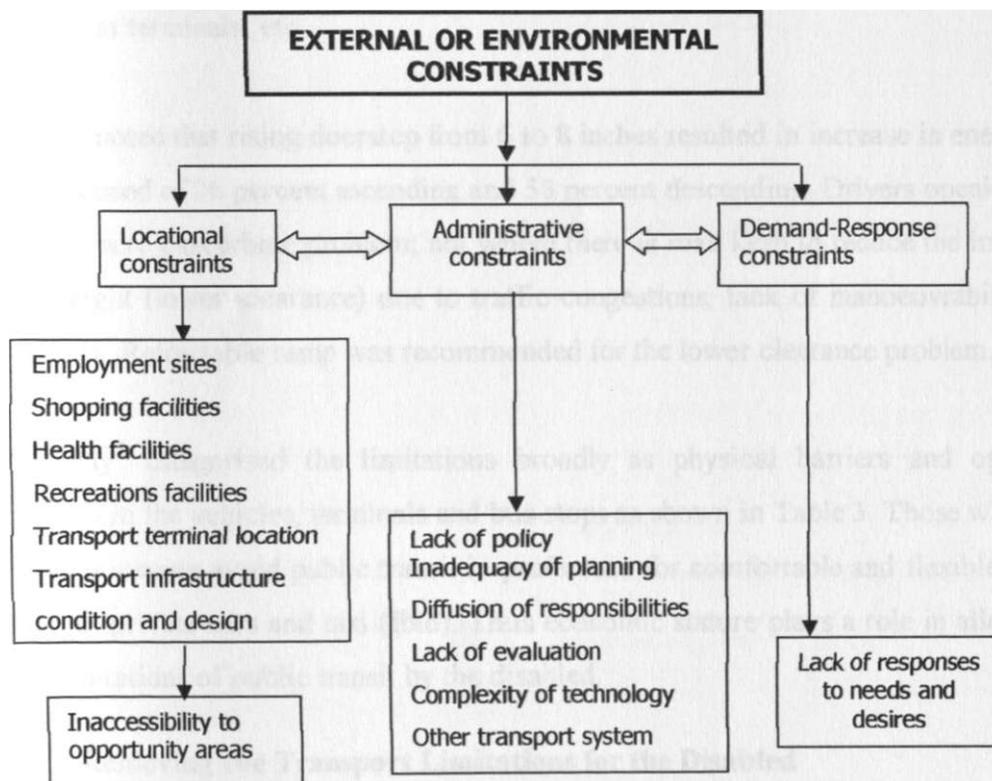
Transportation planning, like any other planning task, is by no means a multidisciplinary task involving the planners, engineers, economists, sociologists and residents (affected group) among others. Coordination and communication among these diverse groups is fundamental in preparation of transport plans. Rarely is this the case, leading to productions of weak transportation plans followed by weak implementation and motoring mechanisms. It may be apparently a tall order to imagine if mobility improvements of the disadvantage can be effected within such administrative structure.

c) Demand-Response Constraints

Most transport services are meant to meet a particular need when they are instituted, thus ignoring changes in users' need. It was found out that Public Transportation Services seemed to be slow in responding to new demands of changing urban environment. Therefore, there was evidence of transportation services

oriented to "yesterday's needs and desires offered to today's" users. Most transport decisions were found to favour those who own cars, but unresponsive to the needs and desires of the Carless, and by extension the disadvantaged group. It was noted that even though transport services are important to all population groups, but in cases of the elderly and the disable, lack of adequate transportation can have more deleterious effect than the loss of transport services (ibid).

Figure 6: External or Environmental Constraints of the Handicapped



Source: adapted from Koutsopoulos and Schmidt. (1986:173)

2.4.3 Limitation Areas in Public Transport

Altshuler and Rosenbloom(1976) noted major limitations in public transport to the elderly and handicapped and made some recommendations as follows:

1. **Time:** time to load and unload for the public modes of transport need to be adjusted for the handicapped due to their reduced physical abilities

2. **Distance:** distance to mass transit facilities must be considered reasonable for majority of public transport users including the handicapped and the elderly who overcome such distances with lots of efforts, pains and difficulty
3. **Cost:** the cost is another limitation owing their low economic viability
4. **Structural and physical barriers,** which was described as the most serious. These are related to inadequacies with structural designs of public vehicles, operations of public transport, terminal facilities and inconveniences in the course of travelling. These included: stepped and high doors, one door way, instability during travels, overcrowding during boarding, lack of sheltered seat at terminals, etc.

It was noted that rising doorstep from 6 to 8 inches resulted in increase in energy and efforts used of 96 percent ascending and 58 percent descending. Drivers opening door everywhere exacerbate problem; not where there is road kerb to reduce the impact of the height (lower clearance) due to traffic congestions, lack of manoeuvrability and laziness. Retractable ramp was recommended for the lower clearance problem.

A study⁷ categorised the limitations broadly as physical barriers and operation barriers in the vehicles, terminals and bus stops as shown in Table 3. Those who have enough *income* avoid public transit in *preference* for comfortable and flexible means such as private cars and taxi (Ibid). Thus economic stature plays a role in alleviating the limitations of public transit by the disabled.

2.4.4 Removing the Transport Limitations for the Disabled

Altshuler and Rosenbloom (1976) noted that removing barriers in transport system presents a lot of challenge to governments. It takes that work of pressure groups for government to act. In USA, an organization called BART successfully spearheaded the crusade to have urban transport system accommodating the travel need of the handicapped and the elderly. Change in attitude in planners, designers, builders,

Falocchio and Cantilli (1974) quoted A study of *handicapped and elderly market place in mass transit in USA* in 1973

operators and regulators of public transport system was also suggested (Altshuler and Rosenbloom 1976). The efforts were to be directed to:

Table 3: Public Transport Barriers

Physical barriers	Operation barriers
<p>Vehicle</p> <p>High and stepped entrance Difficulty to get into and out of seats Seats not available forced to stand Difficulty to reach household No place to put packages Can not hear or see location information</p>	<p>Vehicle</p> <p>Frequency of service Driver/assistant attitude Acceleration and deceleration Information presentation Schedule maintenance Inappropriate routes Too many transfers</p>
<p>Terminals</p> <p>Long stairs Long walks Poor fare collection facilities Poor posting of information Poor crowd flow design Insufficient seating Little interface with other modes</p>	<p>Terminals</p> <p>Poor attitude of the operators Information clarity and dissemination Crowd flow not directed Little or no interface with other modes</p>
<p>Transit stops</p> <p>Insufficient sheltered seats Inadequate posting of information</p>	<p>Transit terminals</p> <p>Poor location compromising safety and convenience Not enough stops Information delayed and insufficient</p>

Source. Falcocchio and Cantilli (1974)

- 1. Vehicle designers:** to consider the handicapped and other vulnerable segment of the society. It was observed that public transit buses were continuously being replaced in both rural and urban transport systems but the new ones are generally similar to the old ones. The vehicle manufacturers, fleet owners and licensing agencies were to be influenced to change their attitude

2. **Road designer:** so as to consider providing more than one or two vehicle widths. Pedestrians and cyclists had to have a claim to a larger share of the ownership of city's streets' crossings, resting areas and refuge areas. This has been discussed into details in 'democratic street concept' below.
3. **Terminal facilities designers and planners:** should have concern for all users. Distance to and means of raising from one level to the other; information dissemination; safety; and interface with other modes should be factored in
4. **Operators of the system:** the operators must be persuaded to know that there is a greater purpose more than just making money. That is the social transport service they offer to the public, especially to the handicapped and elderly to the society. Courtesy, helpfulness and considerations on the handicapped travel needs had to not only be directed at public transport facility but also be backed by government official policy.

2.5 International Initiatives Towards Reducing Mobility Barriers

2.5.1 United Nations Rule on Accessibility for the Disabled

In its endeavour to ensure the recognition of the rights of persons with disabilities and elimination of all forms of discrimination against persons with disabilities, the United Nations General Assembly, through the Commission for Social Development developed Standard Rules on the Equalization of Opportunities for Persons with Disabilities. The purpose of the Rules is to ensure that girls, boys, women and men with disabilities, as members of their societies, may exercise the same rights and obligations as others. It also committed the States to take appropriate action to remove such obstacles

The standard rules have the first four rules termed as Preconditions for Equal Participation. They include raising awareness, provisions of medical care,

rehabilitation and provisions of support services, by the states, to the disabled. Rules 5 to 12 are termed Target Areas for Equal Participation; and are presented in the Table 4 below. Among these equal opportunity areas, accessibility was put as the first; showing how important it is to the disabled persons.

Table 4: Rules on Target Areas for Equal Participation

Rule 5	Accessibility
Rule 6	Education
Rule 7	Employment
Rule 8	Income maintenance and social security
Rule 9	Family life and personal integrity
Rule 10	Culture
Rule 11	Recreation and sports
Rule 12	Religion

Source: UN 1994

Rule 5 required States to recognize the overall importance of accessibility in the process of the equalization of opportunities in all spheres of society. For persons with disabilities of any kind, it was recommended that States should (a) introduce programmes of action to make the physical environment accessible; and (b) undertake measures to provide access to information and communication. On access to the physical environment, the rule states that.

- o States should initiate measures to remove the obstacles to participation in the physical environment. Such measures should be to develop standards and guidelines and to consider enacting legislation to ensure accessibility to various areas in society, such as housing, buildings, public transport services and other means of transportation, streets and other outdoor environments,
- o States should ensure that architects, construction engineers and others who are professionally involved in the design and construction of the physical

- environment have access to adequate information on disability policy and measures to achieve accessibility,
- o Accessibility requirements should be included in the design and construction of the physical environment from the beginning of the designing process,
 - o Organizations of persons with disabilities should be consulted when standards and norms for accessibility are being developed. They should also be involved locally from the initial planning stage when public construction projects are being designed, thus ensuring maximum accessibility.

Most national and international bodies have since responded by formulating policies and enacting laws that ensure equal opportunities and participations of the persons with disabilities. By 2004, the UN is in the process of developing design manual for securing barrier-free environments to the disabled, in transport infrastructure, public transport services, and outdoor environment among others.

2.5.2 Other Countries Initiatives

Lung Suen (2005) in his paper *Accessible Transportation and Mobility* observed that, many developed countries have introduced legislations, programmes and are involved in research and development, whose objective is to make transport services accessible to the disabled. The United States, Canada, Australia, and the United Kingdom all have human rights legislation, and Sweden has legislation aimed at normalization and integration of the disabled into transport services

a. Legal Provisions

Section 504 of the U.S. Rehabilitation Act of 1973 (implemented in 1979) was the first U.S. federal regulation regarding accessibility and mobility. In 1990, the Americans with Disabilities Act (ADA) made accessible and usable transportation a qualified civil right. The ADA is unique in that it covers public and private transportation providers and services in all modes, regardless of funding sources. The Federal Transit Administration has become active in complaint investigation and

compliance reviews related to the ADA. Evidence to date suggests that, unlike Section 504, the ADA is effective in providing for accessible transport.

In 1979, Sweden passed legislation mandating that public transport be adapted, over a 10-year period, to the needs of disabled people. This legislation led to a holistic approach, with provision for automobile subsidies and accessible urban and intercity transport services. Regulations published in 1985 define adapted public transport for buses, trains, trams, subways, taxis, ships, and aircraft—but only for people who do not use wheelchairs. Despite progress, many barriers remain to be overcome.

In 1988, the British government published a recommended specification for local buses that would be easy for Elderly and Ambulant disabled people to use. Metropolitan legislation has required all new taxis in London to be wheelchair accessible since 1989. In 1995, the Disability Discrimination Act set the general framework for accessibility legislation. Regulations now apply to all new rail vehicles, and draft regulations for buses and coaches were published for consultation in August 1999. Proposals for accessible taxis have been published and the end of 1999 expected draft regulations.

In Canada, the National Transportation Act of 1987 entrenched the concept of equal access to all. The Canadian Transportation Agency investigates complaints and conducts compliance reviews with regard to the National Transportation Act and Codes of Practice established for air, rail, intercity bus, communication, and related accessibility matters. Codes of practice for water transport were published in June 1999. Many developed countries now have or are moving toward legislation, regulations, standards, or codes of practice that require accessible transportation. Some governments call for accessible options only, but the disabled community advocates totally integrated accessible service, and several countries require it.

Less developed countries have no requirement for accessible transport and thus face severe problems with poor-quality and inaccessible pedestrian infrastructures and poor transport services.

b. Programs

The legislation described earlier has led to implementation programs in many countries. Some examples include the provision for accessible vehicles and services in the United States, Sweden, and Britain and accessible vehicle and equipment acquisition and technology transfer programs as part of a national strategy in Canada. Protracted lead times of 10 to 15 years often are allowed for such implementations. Access and mobility issues have been considered in all U.S. Federal Transit Administration programs. They include research (Transit Cooperative Research Program), training (the National Transit Institute and other efforts), and information sharing and transfer. Project ACTION (Accessible Community Transportation).

c. Research and Development

Two decades of research, development, and operational experience have established a knowledge base for designing accessible transport.

Trip Chains

One important concept for accessible transport is that of the "trip chain". A typical trip consists of many links (for example, home to curb, curb to vehicle, ride in vehicle, transfers, vehicle to curb, curb to entrance of building, entrance to destination). If any one link is not accessible, then the journey becomes impossible. Every link in the chain must be considered and improved as necessary.

Access for All

Many travellers have mobility limitations or handicaps due to a physical, sensory, or cognitive impairment; accompanying children or baggage; a language barrier; or

unfamiliarity with the local area. In most countries, some 12 to 16 percent of the populations have an impairment that limits mobility; however, 20 to 25 percent of public transport passengers at any one time usually have mobility handicaps. Therefore, designing and operating transport systems to be easy for everybody to use ("universal design," or "access for all") will improve transportation services for disabled travellers.

Family of Services

Basing on Swedish experience shows that accessible public transport is best provided through a family of services:

- Mainstream public transport services (road and rail) accessible to people in wheelchairs, ambulant disabled people, and frail elderly people;
- Service routes that use accessible low-floor midi- or minibuses on routes close to housing for elderly and disabled people, health facilities, shopping, and other common destinations;
- Accessible taxi services with user-side subsidies to assist older travellers and those with mobility limitations; and
- Door-to-door services such as dial-a-ride, community buses, and voluntary car services for passengers who need assistance from house to vehicle, during travel, or at their destination.
- Pedestrian infrastructure (sidewalks, traffic signals, street crossings); Terminals, stations, and stops; and
- Travel information for people with sensory, cognitive, or linguistic impairments.

2.5.3 Kenya Efforts in Removing Mobility Barriers for the Disabled

Kenya has enacted *Persons with Disability Act 2003*, which provide for the rights and rehabilitation of persons with disabilities; to achieve equalization of opportunities for persons with disabilities; to establish National Council for Persons with Disabilities (NCPD); and for connected purposes.

NCPD is a corporate body charged with applying the Act. Sec 7 (b) defined some of the functions of NCPD as to formulate and develop measures and policies designed

- To achieve equal opportunities for persons with disabilities *to the maximum extent possible that they obtain education and employment, and participate fully in sporting, recreational and cultural activities and are afforded full access to community and social services*
- To recommend measures to prevent discriminations against persons with disabilities
- To put to operation schemes and projects for self employment or regular or sheltered employment for the generation of income by persons with disabilities
- Corporate with the Government during national census to secure accurate Figures of persons with disabilities for the purposes of planning

The Act has also spelt out rights accorded to persons with disabilities. They include rights access public service vehicles and public buildings. Sec (21) which identifies accessibility and mobility as rights states that, "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 equipments to promote their mobility".

Sec23 (1) states that, "*an operator of a public Service vehicle shall adapt it to suit persons with disabilities in such a manner as may be specified by the council*". Sec 23 requires all operator of passenger service vehicles to comply within two years the section comes into operations. To date, this section on accessibility and mobility has not come into operations.

Part V of the Act provide for the establishments National Development Fund for Persons with Disabilities. Sec 32(2) states that, "the fund shall be a permanent fund and income there from shall be used to benefit persons with disabilities in Kenya". The fund is to be administered by the council through the board of trustees. Among

its functions outlined in sec 33(2) include contribution to expenses, including capital expenses to organizations of or persons with disabilities, institutions that train them, project undertaken by government that benefit persons with disabilities, as well as contribute to cost of assistive devices and services.

Sec 33 (2)(e) of the functions of the fund include paying allowances to persons with disabilities to the following categories and who have no other source of income.

- a) Persons with severe disabilities and are therefore not trainable in any skills;
- b) Aged persons with disabilities; and
- c) Single parents with children with disabilities and who can not therefore seek employment

Notably, most of the target group for this study has been left out without these allowances. It is therefore imperative to for the council to provide them with enabling environment to generate their income; of which effecting section on accessibility and mobility is indispensable.

The recently defeated draft constitutions in Kenya upgraded rights and freedoms of persons with disabilities to BILL OF RIGHTS in chapter six. Sec 40 (1) states that, "persons with disabilities are entitled to enjoy all the rights and freedoms set out in the bill of rights, and to fully participate in society". Access to all public places, to public transport and to information and communications is part of these rights. Even though defeated, it is expected that there will be no changes in this clause as it was not contentious in new constitution. Other rights as outlined in Sec 40(2) include: rights to:

- a. Respect and human dignity
- b. Access to education and institutions and facilities
- c. Access to all public places, to public transport and to information and communications
- d. Use sign language
- e. Participate in all decision-making levels
- f. Equal right to inherit, have access to and manage property

2.6 Conceptual Framework

The need to travel is as important and essential to the physically disabled as it is to the normal person. However, due to their reduced physical abilities and other handicaps that have been identified above, they are vulnerable to suffer from transport limitations. Evidently, even though provisions of responsive transport for them may not be a panacea to solving all their problems, it is nevertheless the bridge to solving most of them. They need to access work and other economic places, education institutions, cultural places, recreational places as well as rehabilitations places.

Mobility limitations refer to any physical, socio-economic and psychological and external barriers that either prevent or discourage trip making by the physically disabled. There exist personal limitations which are related to the disabled as an individual; and external limitations that which refer to physical environment and transport conditions that the society avails to the disabled. An urban public transport system has limitation when transport component such as public transport vehicle, operation, and transport infrastructure as well as public transport users either prevents or discourages trip making. The location and distance to transport facilities, physical conditions and cost may also presents limitations. These may be due to discomfort and inconveniences; delays, safety concerns; unaffordability; unavailability of transport means; and when it requires efforts and exposure

From literature review, it may be concluded that

- Transport barriers have long history worldwide because past transport planning did not take care of the user needed and it is a problem most countries have faced. Efforts and initiative to remove the barriers were merely reactions to correct past problems in transport to accommodate users' needs.
- An urban transport system may have mobility limitation to all trip makers but the gravity of the limitations is disproportionately distributed according to physical abilities, income levels, age, sex, etc. Those who have high income may afford

private automobile and or assistance that eventually alleviate the gravity of limitations

- Location of residences from opportunity areas, the climatic conditions and topographical characteristics of an urban area are a common problem to all urban dwellers.
- Mobility limitations exist for the disabled due to past planning paradigms that did not incorporate user-perspective and social needs into urban transport planning
- Mobility limitation is not only attributed to their physical inabilities but other handicaps which limit their opportunities and capabilities of either generating or affording to make trips.
- The limitations would persist without public interventions in terms of either transport policy or legal provisions or both
- Existence of policy alone without implementations still constitutes limitation which been termed as demand-response constraint

Figure 7 summarizes the conceptual framework. The mobility limitation has been categorised as personal and external. The external limitation has been viewed not only at the level of public transit but should traverse through mobility system of the disabled including pedestrian and cyclist infrastructure as well and public attitude.

The Figure also shows a two-way relationship between existence of limitations and unresponsiveness of transport system. The mobility limitations make urban transport system unresponsive the disabled. Similarly, unresponsive transport system has limitations. Public intervention is required to get a desirable transport system. But the interventions should be backed by research based on local conditions and possibilities, which is the basis for this study. Until such interventions are implemented, there still exist limitations, which deters achievement of what Kasuku (2001) referred to from Apple (1971) as development of people-centered approach in urban transport planning aimed at:

1. Increasing of transport availability to deprived segment of the society
2. Better quality and choice for travel for all
3. Lowering the undesirable impacts of transport in human and natural environment
4. Enhancing environmental quality through improved transport planning

Figure 7: Summary of Conceptual Framework

**Mobility limitations for
the Disabled**

Personal limitations

- Physical limitation
- Social and economic
- Psychological limitations

Environmental limitations
<ul style="list-style-type: none"> • Policy • Location • Physical environment • Transport infrastructure • Public transport vehicles and services • Public attitude

**Unresponsiveness
of transport system**

7%

iz

Public

interventions

7y

v_

Desirable transport
system for the disabled

Source: adapted from several literature by the researcher

CHAPTER THREE: URBAN TRANSPORT SYSTEM IN NAIROBI

3.0 Overview

3.1 Location, Spatial Structure and Demography

3.1.1 Regional location

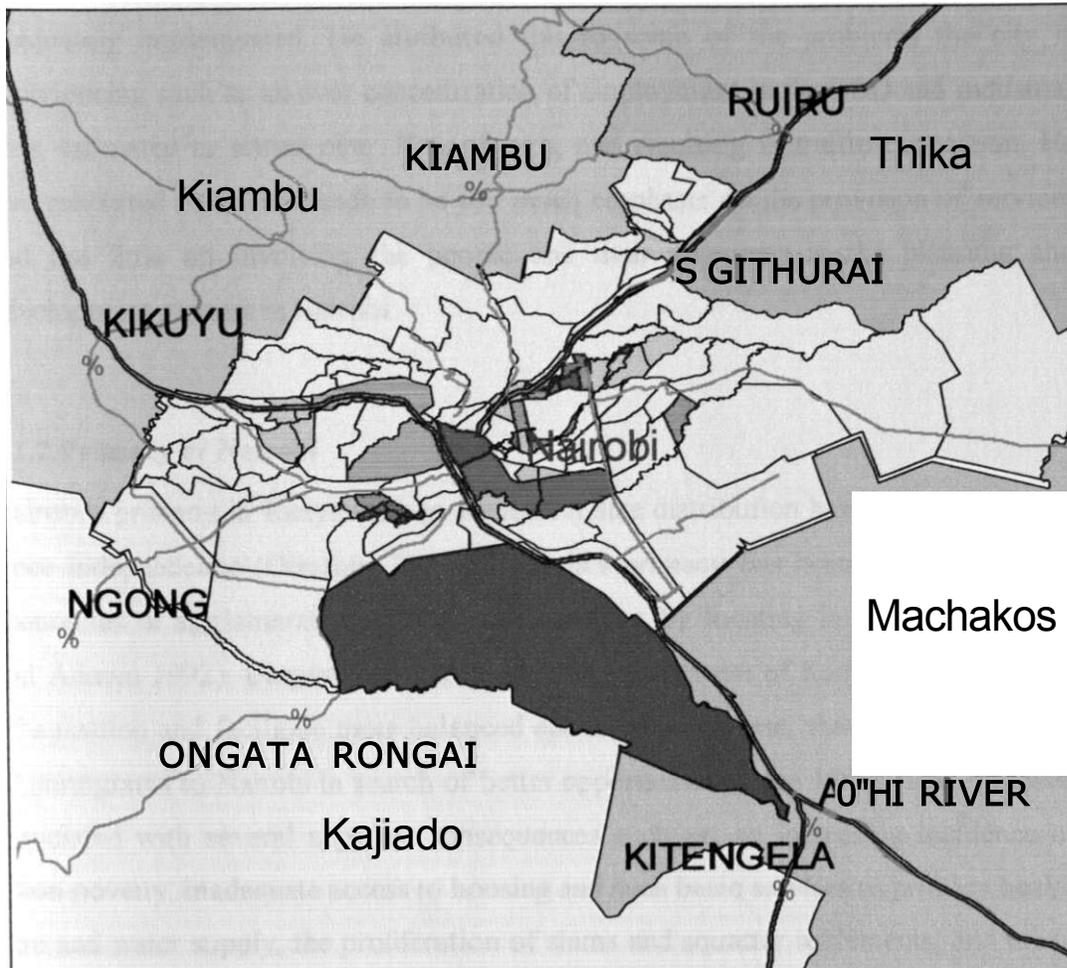
Nairobi is the capital city and administrative headquarter of Kenya. Administratively, it is a district as well as a province in Kenya. It is also the commercial, administrative and industrial headquarter of many national, regional and international institutions and organizations; both private and public. Nairobi city together with its surrounding upcoming urban centres such as Kiambu to the North West, Thika to the north east, Athi River and Kitengela to the south east and Ngong to the west; forms Nairobi Metropolitan Area (NMA).

The city owes its site to authorities of the Kenya Uganda Railway (KUR) which made it its headquarters by 1899 (CCN 1973, Obudho and Aduwo, 1992); before it was made Kenyan administrative headquarters by the end of the same year (Morgan, 1967). Nairobi's Central Business District lies right at the centre of two major primary trunk roads and an array of other radial road having the CBD as the core.

The physical structure of Nairobi is characterized by a single major employment centre located at the CBD and the adjacent industrial area attracting over 75% of all trips. Within the vicinity of the CBD, are Upper Hill and Westland, gradually graduating into other alternative employments sites. Outside the city centre are basically residential areas with differing densities, which are trip generators to CBD. The CBD being a major commercial centre and being located at the convergence of major transport routes makes it a destinations for most trips within the city; an entry and an exit point to and from the city; and a connection point for other trips. It contains several terminals for road transport and also a railway station. The influence of the CBD extends beyond the city to other neighbouring urban settlements, which act as dormitoy towns for the city.

Map 4: Nairobi Physical Structure

PHYSICAL STRUCTURE OF NAIROBI



Population Density	⁰⁰ Urban Settlements
0-18115	EH Nairobi CBD
18116 - 36231	Industrial Area
36232 - 54347	Upper hill
54348 - 72463	• Westlands
72464 - 90579	E3 Nairobi National Park

Scale: 1:250000

Compiled by Ouma S. N

Obudho (1993b) observed that Nairobi's spatial development is still guided by an outdated Nairobi Metropolitan Growth Strategy (NMGS) of 1973; was also never adequately implemented. He attributed this to some of the problems the city is experiencing such as an over concentration of employment in the CBD and industrial area, estimated to attract over 75% of trips, and resulting in traffic congestion. He also reiterated that there tends to be too much emphasis on the provision of services and too little on involving the people and their resources in the planning and development process in Nairobi.

3.1.2 Primacy of Nairobi

Nairobi's primacy in Kenya's urban settlement size distribution has increased rapidly *since* independence (Obudho, 1993a). Nairobi's primacy has been sustained by the economies of agglomeration offered to enterprises by locating in the city (Obudho and Aduwo 1992). Despite the attempts of the government of Kenya to decentralize urbanization and facilitate more balanced spatial development; there has been influx of immigrants to Nairobi in search of better opportunities since 1950s. This has been associated with several negative consequences such as: an increasing incidence of urban poverty, inadequate access to housing and such basic services as primary health care and water supply, the proliferation of slums and squatter settlements, and urban environmental degradation, deterioration of transportation services, joblessness, among others.

3.1.2 Demographic Characteristic of Nairobi

The population of Nairobi spontaneously grew from 266,795 in 1962; 827,775 in 1979; 1,324,570 in 1989; 2,139,000 in 1999; to about 3.2 million currently. Population growth rate was 4.8% in between 1989 and 1999, but in some periods in the past, rising by up to 10%. Between 1979 and 2002, the population tripled from 827,775 to 2,471,000. Kenya Population and Housing Census of 1999 showed that

active population 62%; average household size of 3.2. And household head by gender is 75.7% men and 24.2 % women.

Table 5: Trends in Population Growth in Nairobi

1962	2,537	266,795	5.9
1969	68,945	509,286	9.8
1979	68,945	827,775	5.1
1989	68,945	1,324,570	4.8 ^a
1994 ^a	68,945	1,690,000	5
1999	69,600	2,139,000	4.8
2002	69,600	2,471,000	4.8
2005 ^a		3,200,000	

Sources: Republic of Kenya (1966, 1971, 1981, 1994, 1999). (a) Estimated

3.1.4 Disabled population in Nairobi

Reliable statistics of the persons with disabilities in Nairobi, as well as in Kenya, is not available (Mwaniki 2001, JICA 2004). The population and structure of the disabled, the nature of disabilities, their places of residences, household characteristics and other social and economic characteristics are not available in Kenya: despite their relevance for planning purposes. Using the WHO (1999) estimates of persons with disability at 10% of the total population, there should be about 320,000 in Nairobi.

A trend in the leading causes of disabilities points to the fact that only physical disability is still on the increase due to accidents, assault and diseases such as HIV/AIDS and Tuberculosis. Table 6 shows that both hearing and visual impairments are on the decrease. However, acts of terrorism which have occurred in Kenya, for instance the 1998 bomb blast at USA Embassy in Nairobi; and collapse of buildings in Nairobi leaves the survivors with various types of disabilities, predominantly physical disabilities. Registration record for the Alliance for Disabled Vendor Association, an association predominantly physically disabled operating with the

CBD, showed over 500 registered members as at December 2005. A testimony that they are present and required to be planned for.

Table 6: Current Trends of Disability

Type of disability	Trend	Reasons
Hearing impairment	Decrease	<ul style="list-style-type: none"> o Establishment for association of the deaf to promote awareness and medical attention o Improved primary healthcare
Visual impairments	Decrease	<ul style="list-style-type: none"> o Establishments of association for the blind o Improved primary healthcare o Health education advocating proper hygiene
Physical Disability	Increase	<ul style="list-style-type: none"> o High rate of road and other accidents o High rate of assault cases due to police brutality, economic hardship, domestic violence, etc o Diseases e.g. HIV/AIDS, TB, etc

Source. Kenyatta National Hospital medical records as presented in Mwaniki (2001)

3.2 Physiography of Nairobi

The physiography of Nairobi such as the black cotton soil, the temperature, the solar radiation, the wind and topography affect variously mobility for either those using Non-Motorized Transport to transport facilities; waiting to board automobiles at the terminal facilities and for accessibility. Unpaved black cotton is muddy and sticky impeding mobility; so does topography. Wind blows away soil particles causing pollution and sun scorching on the NMT users making them uncomfortable.

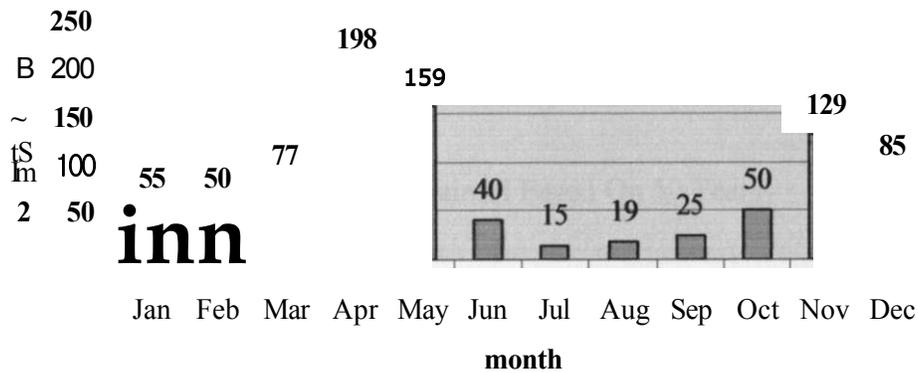
3.2.1 Soils

Nairobi is composed of Black cotton soil, Murram, Red coffee soil and a mixed soil (Morgan 1967). Black cotton soil in particular, has *many* adverse physical properties for its sticky, waterlogged and dries up in dry weather making deep cracks below the surface. These properties make it unsuitable for many developments including transport infrastructure as well as mobility, which tolls during rainy season.

3.2.2 Rainfall and Temperature

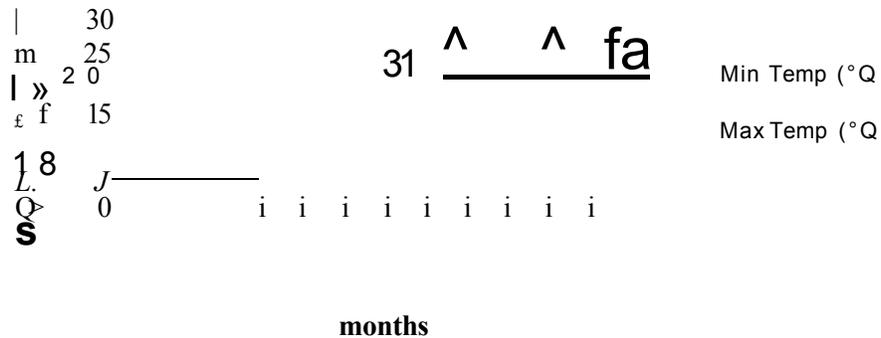
Nairobi has a bimodal rainfall pattern, in which long rains occur between March and April and short rains occur between November and December. Average annual rainfall is 875mm, which may vary from 500mm to more than 1500mm. Average, daily temperature varies from 17° C in July/august, to 28° in March. The maximum daily range of temperature varies from 10° C to 30° C in May and February respectively.

Chart 1: Average Rainfall (mm) in Nairobi Based on 50 Years



Source: Farm Management Handbook

Chart 2: Average Temperature (°C) in Nairobi Based On 50 Years



Source: Farm Management Handbook

3.2.3 Wind Patterns

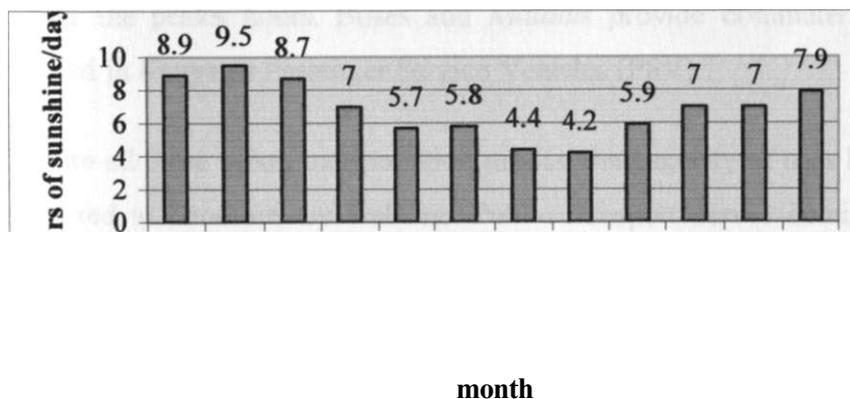
In Nairobi, wind blows from the North East and from a lesser degree to the South East. These are the North East and South East Monsoon, which blow very steadily but

without high intensity. Winds also remain high during December January, February and March. The strongest winds occur during the dry season just prior to the "Long Rains" when speeds of 20 to 25 miles per hour are common from mid-morning to early afternoon. During the night the wind is usually light.

3.2.4 Sunshine and Solar Radiation

Nairobi experiences a total of about 2,500 hours of bright sunshine per annum, which is equivalent to annual mean of approximately 6.8 hours of sunshine per day. July and August are characterized by cloudiness and during these months the average daily sunshine in Nairobi is 4 hours. There is about 30% more sunshine in the afternoon than in the morning.

Chart 3: Sunshine and Solar Radiation on Nairobi Based On 50 Years



Source: Farm Management Handbook

3.2.6 Relief

Nairobi region falls from the edge of the Rift Valley to the west with an elevation of 2,300 metres to 1,500 meters to the east of the city, with the centre at 1,700meters. The prominent features that mark the topography of Nairobi are the Athi Plains and the foothills of the Aberdare Mountains; and the second topographical feature is the deep valleys cut by the Nairobi, Mathari, Masongawai and Ngong streams.

3.3 Public Transport System in Nairobi

3.3.1 Current modal split in Nairobi

Currently passenger transport in Nairobi can be split into five components: private vehicles, buses, *matatus*, commuter train, and taxis. Private vehicles are almost exclusively reserved for the middle- income and upper-income groups because of the high cost of purchase and maintenance.⁸ Taxis have little impact on the mass transportation systems in Nairobi, because they have primarily geared themselves to tourists and high-income individuals (Obudho 1993b). A commuter train operated by the Kenya Railway to help ease transportation to the suburbs, but its coverage, reliability, and quality of service is an issue (Aduwo 1990, Obudho 1993b). Moreover, design of its entrance and access to the railway terminals may not be easy for the disabled. However it can potentially decongest transport routes especially during the peaks hours. Buses and *Matatus* provide commuter services and are referred in Kenya as Passenger Service Vehicles (PSV).

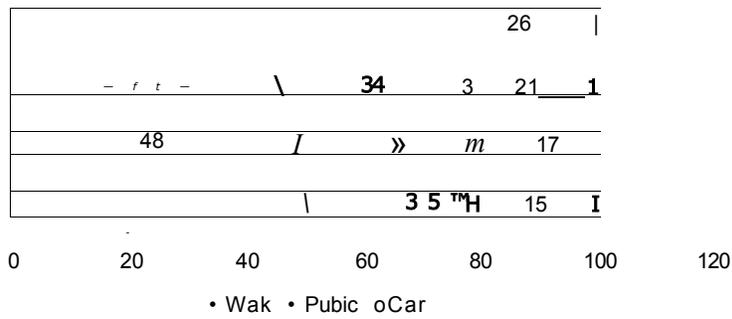
Despite all these urban transportation modes, the majority of trips have been, and are projected to continue, by walking. Public transport serves dominates automobiles while Private Car transport is projected to increase as shown in the chart.4. Of the estimated 4.8 million trips in Nairobi in 2004, walking, public transport and private cars account for 49%, 36% and 15% respectively. Household car ownership has been estimated at 23.3%.

Chart 5 shows that work related trips are the majority; mostly attracted to CBD and industrial area. Work trips and educational trips accounts for 45% and 19% respectively of total of inter-zonal trips; leaving a merger proportion for other trips. According to JICA (2004), the trend is not different in the future

Chart 4: Modal Share in Nairobi

⁸ Aduwo, 1990

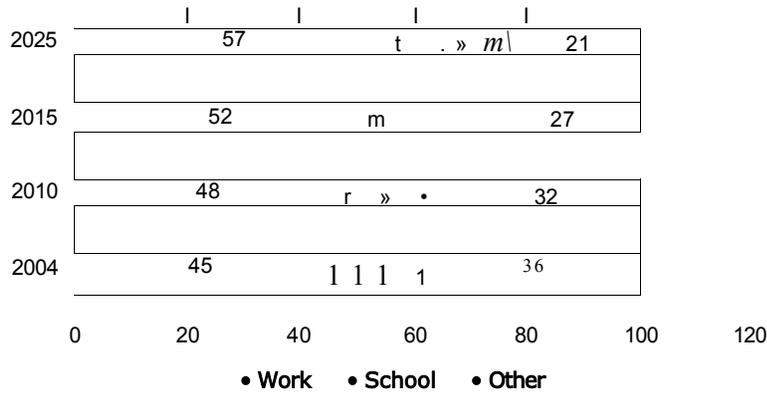
Modal Split in Nairobi



Source: JICA (2004)

Chart 5: Trip Attraction

Average Intra-Zonal Trip Attraction in Nairobi



Source: JICA (2004)

3.3.2 Trends In Passenger Transport Services In Nairobi

Passenger transport services can be traced back to completion on Kenya-Uganda railways in early 20th century, when railway was the only motorized mode of transport. According to Mwai (1994) and Aduwo (1990), government intervention in urban Passenger transport was initially through bus services. The first one involved an agreement between United Transport International and the government of Kenya in the establishment of the Kenya Bus Service (KBS), a public bus service, in 1934. KBS was given exclusive franchise of carrying fare-paying passengers in and around

Nairobi. One very important feature of KBS was their fare regulations which shown children paying lower. Moreover, one of the front seats was reserved for the disabled. Although the fares were quite low they were still high for the majority of residents/ However, recent regulations in speed and number of passengers in PSV; which required all PSV to be fitted with speed governor and seat belts, apparently ran the company down.

The second was Nyayo Bus Services (NBS) launched by the government of Kenya in 1986. It was expected to ease the commuter problem in the city but it has since collapsed, and the failure attributed to gross mismanagement and government procurement procedures resulting in lack of spare parts (Obudho 1993b). *Matatu* industry then emerged to complement and fill a gaping gap due to inadequacy of passenger transport services by the commuter railway services and the two bus companies; all being government interventions. Currently, passenger transport is entirely owned and operated by private sector.

3.3.3 *Matatu* Passenger Transport

The *matatu* is an African invention. Originally illegal private taxis offering regular services with better frequencies than the bus service. Thus, providing a relatively quick means of transportation to the CBD and increasing the accessibility of many of the outlying areas (Aduwo, 1990; Obudho, 1993b). Khayesi (2002), in his paper *Struggle for Socio-Economic Niche and Control in the Matatu Industry in Kenya*, observed that the *Matatu* mode of public transport had, since its official recognition in 1973, grown in importance. It competes with the public bus transport companies not only within towns, but also in medium- and long-distance passenger transport in Kenya

It has been estimated that the *Matatu* industry in Kenya controls over 80% of passenger transportation (Ndung'u P. et al, 2004). Since its inception, the industry has been experiencing an exponential growth in size. Currently the industry has an

⁹ TRANSURB-CONSULT(1989). *Urban Transport Needs of Nairobi*. Ministry of Local Government, Nairobi. Kenya

- Failure to obey traffic regulations on putting on speed governors, seat belts, uniforms and badges.
- Inflicting injuries to passengers and rudeness by the operators

3.5 Integrated National Transport Policy (INTP)

The first transport policy for the whole country covering all means of transport is yet to be finalized and ratified (Kenya Roads Board 2004). Kenya government recognizes transport industry as a facilitator of rapid economic growth and reconstruction, poverty eradication and wealth creation for the country. In the "Economic Recovery Strategy for Wealth and Employment Creation 2003-2007, transport sector has been identified as a third pillar of the economic recovery efforts. It is due to this that Kenya is on the verge of preparing an Integrated National Transport Policy (INTP) whose vision is to become *"A world-class transport system that is integrated and responsive to the needs of people and industry"*. And its mission is to *"To develop, operate and maintain an efficient, cost effective, reliable, safe, secure and integrated transport system and link policy with other sectoral policies in order to achieve national and regional development aspirations in a socially, economically and environmentally sustainable manner"* In doing so the following challenges have been identified as: Poor quality transport services, Inappropriate modal split, Unexploited regional role of transport, Transport system not fully integrated, Urban environmental pollution, Lack of an urban transport policy, Institution deficiencies and Lack of vision for the transport sector

The policy seeks to introduce new element to framework for transport sector management. These include establishment of department of transport; consolidation of transport functions under one ministry, and separation of policy making, regulatory and service provision functions; enhancing role of private sector in transportation infrastructure development and management; integration of NMT and of Urban Public Transport

CHAPTER FOUR: NECESSITY OF TRANSPORT AND TRAVEL PATTERNS

4.0 Overview

This chapter seeks to establish travel needs and desires of the physically disabled in Nairobi. This has been discussed with regards to social and economic characteristics of the disabled as the trip maker; their reasons of coming to the city; and what opportunities travelling offer them. The chapter strives to determine their travel characteristics with the focus of establishing travel needs and limitations. In particular, the chapter strives to answer the following in relation to mobility of the physically disabled:

- What are the characteristics of the disabled as a trip maker?
- Where do they come from and where is their regular destinations?
- How often do they carry out the journey?
- Which modes of transport do they use from residential area to city centre?
- When does the trips to and from CBD begin?
- Why do they carry out the journey?
- How necessary is their travels?

4.1 Social and Economic Characteristics of the Disabled

4.1.1 Social Characteristics

4.1.1.1 Sex and Nature of Disability

The physically disabled that were sampled included 42 male and 11 female. The ambulant and wheelchair users accounted for 40 and 60 percent respectively. Male Ambulant and Wheelchair users respectively comprised 26% and 53% of the sample. Whereas 13% and 8% were female Ambulant and Wheelchair users respectively.

estimated fleet of about 40,000 vehicles, of which 11,000 operate in Nairobi (ibid). It was observed that, the industry is characterized by a plethora of actors, with diverse and sometimes conflicting social, economic and political interests. The end result of this struggle is increased cost of running the business, greater risk of road traffic accidents, poor service delivery and exorbitant fares. It has been reiterated that the *Matatus*, being privately owned and operations, are entirely geared at profit making; not the quality of service.

3.4 Transport problems in Nairobi

JICA (2004) summarized some of the challenges of transport, especially to urban poor, in Nairobi as:

- 1 Limited accessibility to public transport services due to private sector domination of the industry; increasing fare. Also constrained railway commuter services in terms of service coverage and frequency
- 2 Transport safety problems owing to road design, reckless driving and lack of awareness on the part of transport users.
- 3 Limitations on non-motorized usage due to spread of urbanization, insecurity especially after dark, insufficient pedestrian/cycle lanes and road crossings.
- 4 Traffic related pollutions due to vibrations, noise and exhaust; which is aggravated by congestion.
- 5 Rapid growth in slum populations in Nairobi where they are likely to suffer from inaccessibility to transport services.

In conjunction to the above, there is also a concern over the lawlessness and indiscipline of the public transport operators. Transport Licensing Board report on traffic offences committed during the month of May 2006 included the following:

- Overcrowding, over speeding and reckless driving
- Obstructions and Driving on pavements and shoulders.
- Picking and dropping passengers in the middle of the road
- Failure to reach destinations for the passengers

Table 7: Nature of the Physical Disability Concerned in the Study

Sex of the Respondent		Nature of Disability		Total
		Ambulant	Wheelchair	
Male	Frequency	14	28	42
	% of Total	26.4%	52.8%	79.2%
Female	Frequency	7	4	11
	% of Total	13.2%	7.5%	20.8%
Total	Frequency	21	32	53
	% of Total	39.6%	60.4%	100.0%

Source: Field work 2006

According to National Institute for Rehabilitation Engineering (2005) the category of physically disabled considered in this study fall between two classes, namely: disabled riders who are able to transfer from wheelchair to automobile and those who can walk and travel in automobile like other ordinary passengers. They may display one of the following characteristics during mobility:

1. Severely Disabled Passengers Unable to Transfer between wheelchair and bus seat; who must ride seated in their wheelchairs.
2. Disabled Riders Able to Transfer between wheelchair and bus seat; who can most safely ride in a regular seat in a van, bus or train seat - with their walkers, wheelchairs, scooters and other luggage being safely transported in the same van, bus or train.
3. Passengers with No Mobility Equipment, who can walk and use regular seats in the van, bus or train.

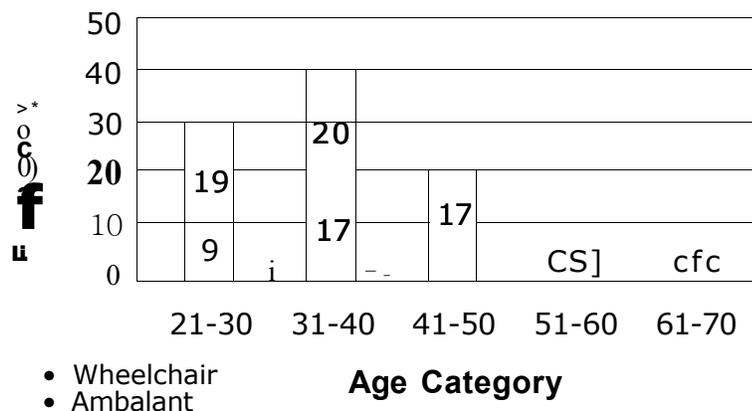
4.1.1.2 Age and Nature of Disability

The age of the sampled disabled ranged 23 to 64 years old. This implies that they are within the active labour age bracket as defined by Central Bureau of Statistics.¹⁰ Therefore, they should be actively engaged in carrying out some economic activity. Chart 6 shows that over 88% fall between 21 and 50 years with the mode being

¹⁰ Central Bureau of Statistics define active labour force to be within 15 and 64 years of age

between 31 and 40. The negligible proportions of the disabled over 50 years and the non-existence of the wheelchair users beyond 50 years may be attributed to their progressive decline in physical abilities with age.

Chart 6: Age Category and Nature of Disability



Source: Fieldwork 2006

4.1.1.3 Causes of Disability

Table 8 shows that the causes of disability were polio, accident and domestic violence. Over 77% that was caused by polio, 66% did happen during childhood, 9% at birth and 2% during adulthood. This does not only reveal but also confirm that the infection related causes of disability are prevalent during childhood, particularly before 5 years when immune systems are still weak. The main cause of disability after childhood was road accidents, which accounted for 15% of causes of disability; representing 82% of all disabilities during adulthood. This may be attributed to the fact that adults travel more out of necessity and for various reasons. Thus, when accident strikes, they become the main casualties. This perhaps is in tandem with Table 5 in Chapter Three, which shows that physical disability is in the increase due to road accidents in Kenya. According to Mwaniki (2001), terrorism act, such as bombing of US Embassy in Kenya in 1998, and collapsing of buildings either under construction or otherwise, are other potential accident related causes of disabilities in Nairobi.

Table 8: Relationship between Onset of Disability and What Caused disability

Onset of Disability		What caused Disability			Total
		Polio	Road accidents	Injuries inflicted by relatives over land	
At birth	Frequency	5	0	0	5
	% of Total	9.4%	.0%	.0%	9.4%
At childhood	Frequency	35	2	0	37
	% of Total	66.0%	3.8%	.0%	69.8%
During Adulthood	Frequency	1	8	0	9
	% of Total	1.9%	15.1%	.0%	17.0%
During old age	Frequency	0	0	2	2
	% of Total	.0%	.0%	3.8%	3.8%
Total	Frequency	41	10	2	53
	% of Total	77.4%	18.9%	3.8%	100%

Source: Fieldwork 2006

4.1.1.4 Marital Status and Household Size

Table 9 below indicates that of the 53 sampled disabled, 64 % are married and 36% are singles. The table shows a disparity of the married and unmarried across gender. 91% of Women are singles as opposed to only 21 Men. Across tabulation of the gender and household size showed that 21% of the sample, who stay in households comprising of only 1 person, were all male. Consequently all the female and the remainder of men have households comprising between 2 and 7 people. The average household size was 3.17, which compares very closely to the average household size of 3.2 for the whole city (the study area). Therefore, the disabled have dependants who they have to provide for just like the rest. The female, however, bears the greatest burden due to the fact they all have dependant, most of them 3 children, but have no husbands to give some support.

Table 9: Marital Status by Gender

Marital Status of the Respondent		Sex of the Respondent		Total
		Male	Female	
Married	Frequency	33	1	34
	% within Sex	78.6%	9.1%	64.2%
	% of Total	62.3%	1.9%	64.2%
Single	Frequency	9	10	19
	% within Sex	21.4%	90.9%	35.8%
	% of Total	17.0%	18.9%	35.8%
Total	Frequency	42	11	53
	% within Sex	100.0%	100.0%	100.0%
	% of Total	79.2%	20.8%	100.0%

Source: Field work 2006

Table 10: Household size and Gender of the Disabled

Household Size		Sex of the Respondent		Total
		Male	Female	
1	Frequency	11	0	11
	% of Total	20.8%	.0%	20.8%
2	Frequency	3	3	6
	% of Total	5.7%	5.7%	11.3%
3	Frequency	10	2	12
	% of Total	18.9%	3.8%	22.6%
4	Frequency	10	5	15
	% of Total	18.9%	9.4%	28.3%
5	Frequency	5	1	6
	% of Total	9.4%	1.9%	11.3%
6	Frequency	2	0	2
	% of Total	3.8%	.0%	3.8%
7	Frequency	1	0	1
	% of Total	1.9%	.0%	1.9%
Total	Frequency	42	11	53
	% of Total	79.2%	20.8%	100.0%

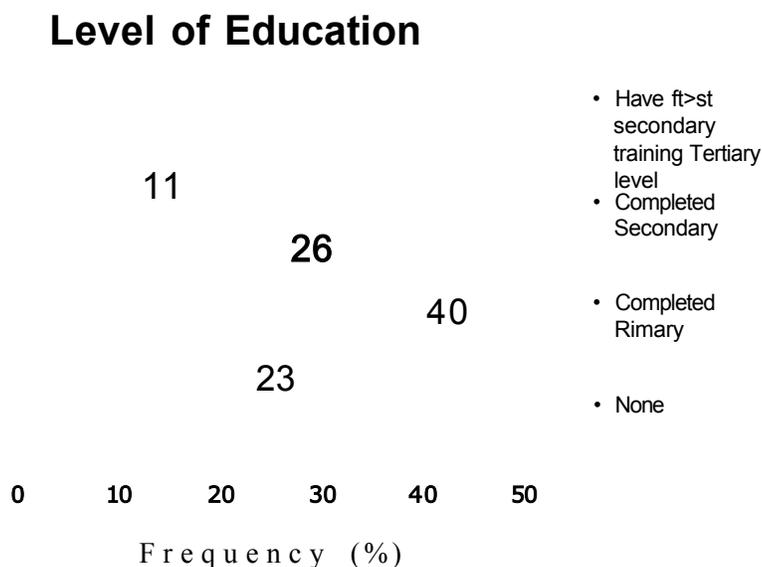
Source: Field work 2006

4.1.1.5 Education

From chart 7, it is apparent that over 77% of the disabled sampled were literate; having attained basic primary education and above. Over 40% had primary education;

26% had secondary education and 11% had post secondary education. Only 23% were illiterate.

Chart 7: Educating Level of the Disabled

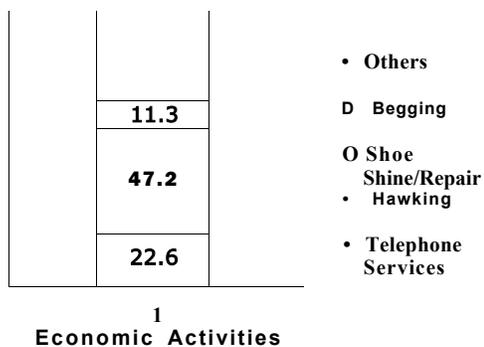


Source: Field work 2006

4.1.2 Economic Characteristics of the Disabled

It had been observed in Chapter One that over 80 % of the persons with disabilities are poor (World Bank, 2005 and UN 1996). It has also been discussed in chapter two that adequate income, by and large, has potential to alleviate as well as 'sooth' most handicaps due to disability. Nevertheless, inadequate income or poverty makes one to face full wrath of the handicaps including being captive to public transit or social exclusivity. Thus, the disabled have been found to make their travels mostly for economic reasons. Over 91% of the respondents travelled to carry out economic activities within and outside the Nairobi CBD; located some distances away from their residences. Chart 8 shows that 22.6% were providing telephone services; 47.2% of the respondents were hawkers; 11.3% were shoe shiners/repairers; while the rest were beggars, those visiting relatives and for Medicare. Plate 1 below shows one of the disabled persons offering telephone services within Nairobi CBD

Chart 8: Economic Activities for the Respondents within the City Centre



Source: Field work 2006

4.1.2.1 Economic Activity against Age and Sex

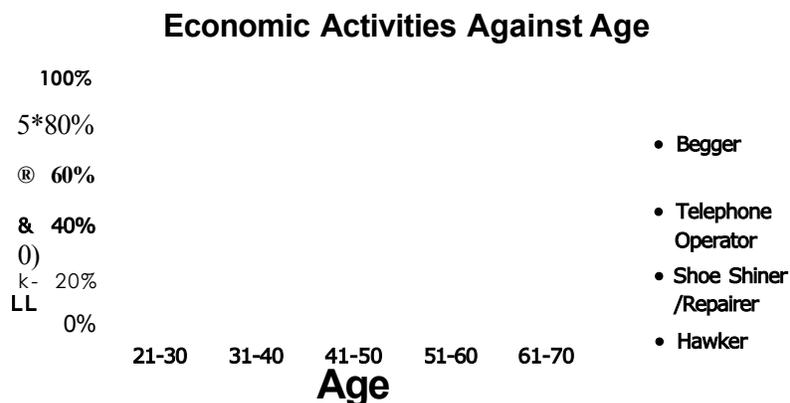
Chart 9 shows that about 75% and 100% within 51-60 and 61-70 years age bracket respectively were beggars. Lack of wheelchair users between this age bracket, within the CBD as shown in Chart 6, and the observation that majority of them are beggars; indicate their inability for active tasks due to their declined physical ability

Plate 1: A Disabled Offering Telephone Services within Nairobi CBD



Source: Fieldwork 2006

Chart 9: Relationship between Economic Activities and Age



Source: Field work 2006

Table 11 shows some variations in the kind of economic activities and sex. Whereas all the female who were sampled were hawkers, their male counterparts were distributed throughout the activities. A cross tabulation between the nature of disability and economic activities, table 12, indicated that the Ambulant and Wheelchair users could undertake any of the activities. Apparently, high proportions of the Wheelchair users were telephone operators than the Ambulant. The mostly likely reason is that their wheelchairs and tricycles have been adapted, as shown in plate 1, to act as platform for the business.

Table 11: Economic Activity against Sex

Economic Activity		Sex of the Respondent		Total
		Male	Female	
Hawker	Frequency	18	11	29
	% of Total	34.0%	20.8%	54.7%
Shoe Shiner/Repairer	Frequency	4	0	4
	% of Total	7.5%	.0%	7.5%
Telephone Operator	Frequency	14	0	14
	% of Total	26.4%	.0%	26.4%
Begger	Frequency	6	0	6
	% of Total	11.3%	.0%	11.3%
Total	Frequency	42	11	53
	% of Total	79.2%	20.8%	100.0%

Source: Fieldwork 2006

Table 12: Relationship between Economic activity and Nature of Disability

Economic Activity		Nature of Disability		Total
		Ambulant	Wheelchair	
Hawker	Frequency	13	16	29
	% within Nature of Disability	61.9%	50.0%	54.7%
	% of Total	24.5%	30.2%	54.7%
Shoe Shiner/Repairer	Frequency	1	3	4
	% within Nature of Disability	4.8%	9.4%	7.5%
	% of Total	1.9%	5.7%	7.5%
Telephone Operator	Frequency	1	13	14
	% within Nature of Disability	4.8%	40.6%	26.4%
	% of Total	1.9%	24.5%	26.4%
Begger	Frequency	6	0	6
	% within Nature of Disability	28.6%	.0%	11.3%
	% of Total	11.3%	.0%	11.3%
Total	Frequency	21	32	53
	% within Nature of Disability	100.0%	100.0%	100.0%
	% of Total	39.6%	60.4%	100.0%

Source: Fieldwork 2006

4.1.2.2 Disability as the Main Cause of Poverty

According to table 13, disability was identified as one of the major causes of poverty. Over 68% and 60 % mentioned poverty and unemployment as the main impacts of disability; both of which touch on income and livelihood of an individual. Mobility limitation ranked third; implying that even though they experience mobility limitations, their main concern is that disability impedes achievement of their livelihood. Social exclusion and illiteracy were mentioned as other impacts of disability. Chart 7 above shows that over 77% were literate, however, only 11 % have post secondary education and or training: thus, limiting their chances of formal employment.

Table 13: Main Impacts of Disability

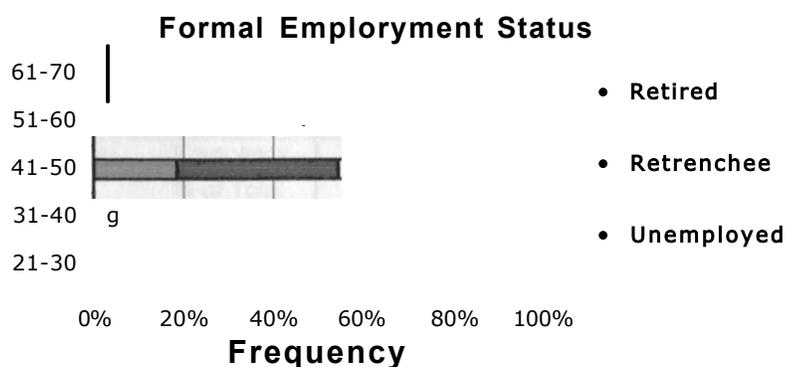
Disability Impacts	Frequency (of 53)	Percentage (of 100%)
Poverty	36	68
Unemployment	32	60
Mobility limitations	24	45
Social exclusions	20	38
Illiteracy	9	17

Source: Field work 2006

4.1.2.3 Current formal Employment Status of the Disabled

Chart 10 indicates that all the disabled were not in any formal employment by the time of interview. Almost all within the ages between 21 and 40 had been jobless as far as formal employment is concerned. Ages 41 and above comprise mainly retired, retrenched (before 50), and unemployed. This confirms what is in table 13 that ranked disability as their main cause of unemployment.

Chart 10: Formal Employment Status of the Disabled



Source: Field work 2006

4.1.2.4 Perception of Better Life in Nairobi

Spontaneous rural-urban migration experienced in Kenya is mostly in search of better economic opportunities: with Nairobi recording 17% in-migrants according 1999 population

census.¹¹ The disabled are not left out either. 83% of the respondents were born and grew outside Nairobi. Over 53% of them come from Central province, perhaps due to its proximity to Nairobi. Table 12 shows that 51% and 19% migrated to Nairobi for livelihood and job search respectively. This implies that over 70% had perceived migrating to Nairobi would guarantee them better livelihood than where they were before. Table 12 also indicates that 8% came to visit relatives, 4% came for medical services while 2% for training, but has since resort to live in the city and carry out some economic activities. A cross tabulation between reasons for coming to Nairobi and their current economic activities show that majority are hawkers and telephone operators.

Table 14: Economic Activities and Reasons for Coming to Nairobi

Reasons for Coming to Nairobi		Economic Activity				Total
		Hawking	Shoe Shiner/Repairer	Telephone Operator	Begging	
Job Search	Frequency	6	0	2	2	10
	% of Total	11.3%	.0%	3.8%	3.8%	18.9%
Medicare	Frequency	0	0	0	2	2
	% of Total	0%	.0%	.0%	3.8%	3.8%
Visit relatives	Frequency	2	0	2	0	4
	% of Total	3.8%	.0%	3.8%	.0%	7.5%
Livelihood	Frequency	17	3	5	2	27
	% of Total	32.1%	5.7%	9.4%	3.8%	50.9%
Training	Frequency	0	0	1	0	1
	% of Total	.0%	.0%	1.9%	.0%	1.9%
	Frequency	4	1	4	0	9
	% of Total	7.5%	1.9%	7.5%	.0%	17.0%
Total	Frequency	29	4	14	6	53
	% of Total	54.7%	7.5%	26.4%	11.3%	100%

Source: Fieldwork 2006

4.1.2.5 Lack of Support for basic needs by the Disables

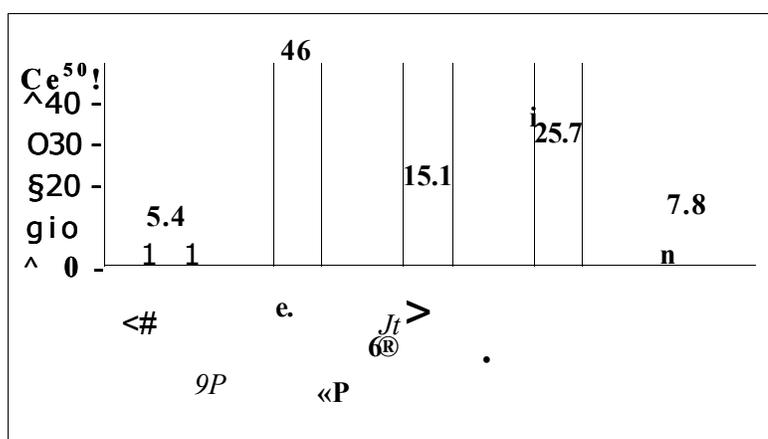
Asked of any aid /help that they receive from elsewhere, 28% said none, 66% admitted receiving help on mobility aids 59% being tricycle / wheelchair, the rest

Republic of Kenya (1999). National Populations and Housing Census: Analytical report on migrations. Vol III 1999. CBS. Ministry of planning and national development, Nairobi

being orthopaedic aids; mostly from APDK. They also receive Medical, Training and rehabilitation from various NGO's, Catholic Church, Red Cross, Kabete hospital among others. However, the kind of support they get does not cover day to day household needs, which they have to foot on their own.

Moreover, from the Alliance for Disabled Vendors Association (ADVA) registration records, it was found that 49% of the members have either both or one of their parents dead, who they should have been providing some support; 25% being fathers, 15% being both and only 8% being mothers as shown in chart 11. Evidently, this hinders their support from closest relatives. Furthermore, some complained of being discriminated by their very relatives.

Chart 11: Parent died or alive?



Source: ADVA Records 2005

4.1.2.6 Income Generated by the Disabled

Majority of the disabled own their businesses but some are employed to run them for a pay. There are some physically disabled who employ others to help them run their economic activities. From the economic activities carried out by the disabled, whether owning them or not, they realized income varying from 3500 and 30000 monthly: with the mean and standard deviations at 12900 and 10500 respectively. The variations can be explained in terms of education level, age and sex, nature of disability and frequency of travels.

1. Table 15 shows that Wheelchair users have more income than the Ambulant. Over 73 % of the Wheelchair, representing 44% of the total earns more than kshs 10000 monthly, as compared to only 5% of the Ambulant. Over 63% of the Ambulant disabled earn ksh 5000 and below. Under normal circumstances, the Ambulant are expected to earning more because they can walk and use public transport.

Table 15: Relationship between nature of Disability and Monthly Income

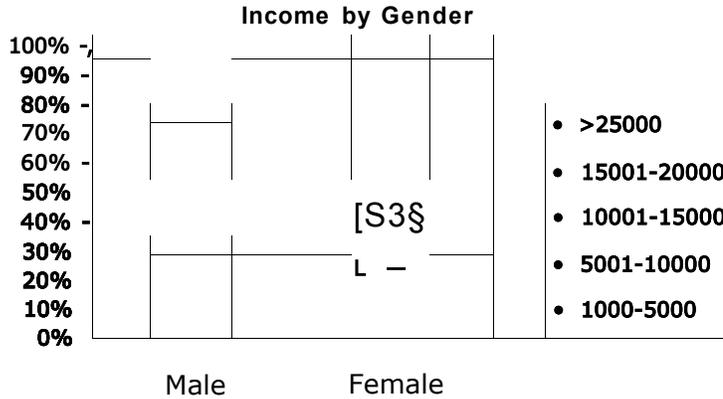
Income Category		Nature of Disability		Total
		Ambulant	Wheelchair	
1000-5000	Frequency	12	4	16
	% within Nature of Disability	63.2%	13.8%	33.3%
	% of Total	25.0%	8.3%	33.3%
5001-10000	Frequency	6	4	10
	% within Nature of Disability	31.6%	13.8%	20.8%
	% of Total	12.5%	8.3%	20.8%
10001-15000	Frequency	1	11	12
	% within Nature of Disability	5.3%	37.9%	25.0%
	% of Total	2.1%	22.9%	25.0%
15001-20000	Frequency	0	3	3
	% within Nature of Disability	.0%	10.3%	6.3%
	% of Total	.0%	6.3%	6.3%
>25000	Frequency	0	7	7
	% within Nature of Disability	.0%	24.1%	14.6%
	% of Total	.0%	14.6%	14.6%
Total	Frequency	19	29	48
	% within Nature of Disability	100.0%	100.0%	100.0%
	% of Total	39.6%	60.4%	100.0%

Source: Fieldwork 2006

2. Income by individual disabled apparently varies with gender. It is observed in chart 12 that no female earned more than ksh15000 as compared to male counterparts with over 25% earning over 15000.
3. Age of the disabled and the income levels has been found to have a weak negative relationship. A bivariate two-tailed Pearson Correlation, at 95% confidence level, showed that age and income had a correlation coefficient of - 0.211. A partial two-tailed Pearson Correlation produced correlation coefficient of 0.908 at the same confidence level indicating that age is not the only factor influencing income for the disabled. Across tabulation in table 16

indicates that those falling within 51-70 year hardly earn more than ksh 5000. This may be attributed to their economic activities which have been shown in chart 9 as predominantly begging.

Chart 12: Income level by Gender



Source: Fieldwork 2006

4. Apart from begging, other types of economic activities generate income that is distributed within the range of 3500 and 30000. The determination to achieve economic independence for the disabled overrides existing travel disutilities that may exist. This may be explained in terms of their frequency of travel to City Centre.

Table 16: Age and Income levels

Income Category		Age Category					Total
		21-30	31-40	41-50	51-60	61-70	
1000-5000	Frequency	6	4	2	2	6	4
	% of Total	12.5%	8.3%	4.2%	4.2%	12.5%	8.3%
5001-10000	Frequency	4	6	0	0	4	6
	% of Total	8.3%	12.5%	.0%	.0%	8.3%	12.5%
10001-15000	Frequency	0	7	4	1	0	7
	% of Total	.0%	14.6%	8.3%	2.1%	.0%	14.6%
15001-20000	Frequency	0	1	2	0	0	1
	% of Total	.0%	2.1%	4.2%	.0%	.0%	2.1%
>25000	Frequency	4	2	1	0	4	2
	% of Total	8.3%	4.2%	2.1%	.0%	8.3%	4.2%
Total	Frequency	14	20	9	3	14	20
	% of Total	29.2%	41.7%	18.8%	6.3%	29.2%	41.7%

Source: Fieldwork 2006

5. Education seems one of the major reasons for increase in income from whatever economic activity. A cross tabulation between income and levels of educations, in Table 17, shows that 58% of the disabled with post secondary education earn more than 15000 compared to 25% with secondary education, 6 and 17% with primary and those with none.

Table 17: Relationship between levels of education and income

			Income Category					Total
			1000-5000	5001-10000	10001-15000	15001-20000	>25000	
Level of education attained	None	% within Level of education attained	58.3%	8.3%	16.7%		16.7%	100.0%
		% of Total	14.6%	2.1%	4.2%		4.2%	25.0%
	Completed Primary School	% within Level of education attained	50.0%	27.8%	16.7%	5.6%		100.0%
		% of Total	18.8%	10.4%	6.3%	2.1%		37.5%
	Completed Secondary School	% within Level of education attained		16.7%	58.3%		25.0%	100.0%
		% of Total		4.2%	14.6%		6.3%	25.0%
	Post Secondary Training	% within Level of education attained		33.3%		33.3%	33.3%	100.0%
		% of Total		4.2%		4.2%	4.2%	12.5%
Total		% within Level of education attained	33.3%	20.8%	25.0%	6.3%	14.6%	100.0%
		% of Total	33.3%	20.8%	25.0%	6.3%	14.6%	100%

Source: Fieldwork 2006

4.2 Travel Characteristics of the Disabled

This section touches on the nature and frequency of trip making, trip purpose and modal choice for the target group. It also encompasses origin and destination of the trip makers. For the sake of this study, a trip to CBD, very much as a trip to work according to Daniel (1990), was selected among possible trips due to importance of CBD as has been outlined in chapter three. Therefore this section presents an analysis of the trip from residential to destinations in CBD by the disabled persons.

4.2.1 Origin and Destinations of the Disabled

The disabled originate from within Nairobi and from the surroundings: their regular destination being Nairobi CBD. About 75 % are residents of Nairobi while 25% reside within settlements adjacent to Nairobi as shown in Map 4. From the Alliance of Disabled Vendors Association registration records, it was established also come from Kiambu, Athi River, Kitengela, Ongata Rongai, Ruiru, Kikuyu as well as other rural settlements surrounding Nairobi, within Nairobi they stay in Dandora, Kibera, Kariobangi, Githurai, Kahawa West, Kangemi, Dagorette Kayole, Mathare, etc (See appendix II). However, others have no residence live on the streets because of poverty. Their regular destinations within the CBD are mostly along transport streets, near transport terminal, pedestrian walkways, and other areas where they are people they can serve (near entertainment places, learning institutions, office blocks, public buildings).

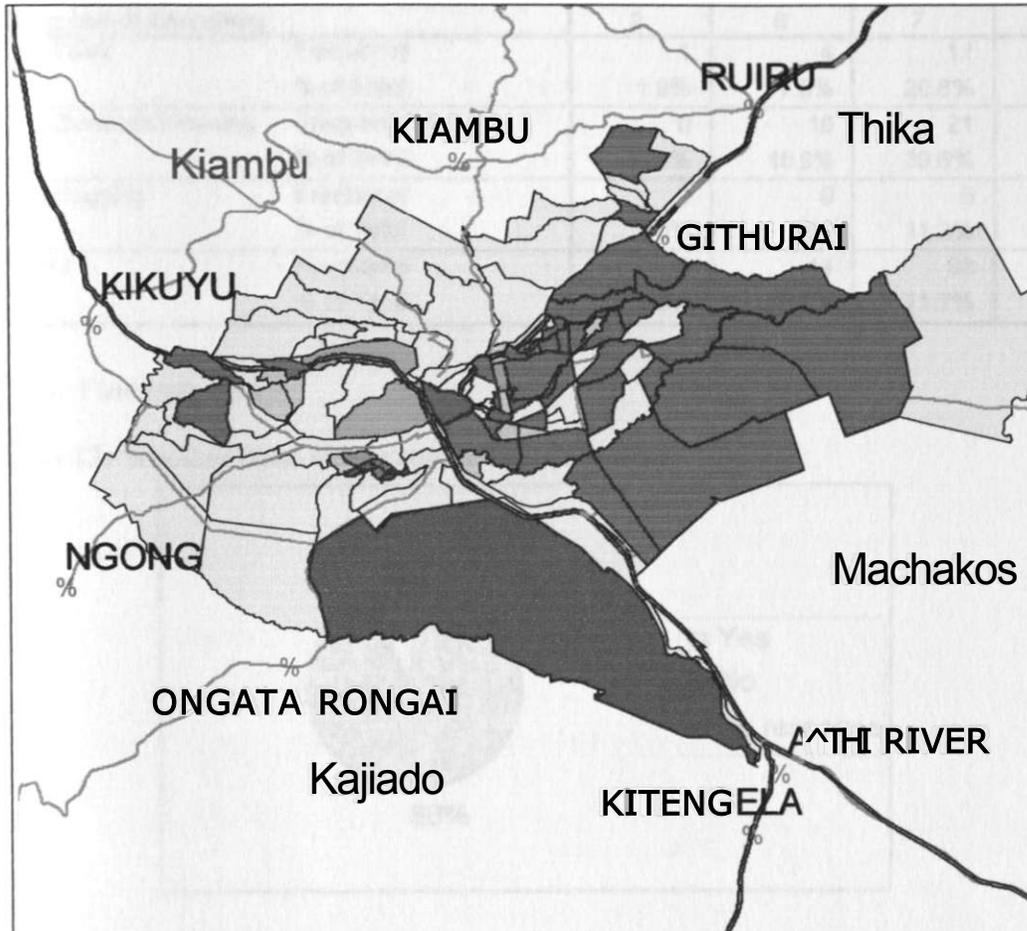
Proximity analysis by Arc View GIS revealed that geographical distance from Nairobi CBD to the residences covers a radius of to 25 kilometres. They live in mostly high density residential estates and informal settlements within the city, which may be attributed to their low economic levels. Others living outside the City may be attributed to cheaper housing. However, for economic reasons, they still depend on Nairobi, particularly, the CBD for their income.

4.2.2 Frequency and Reasons for Travel to CBD

Table 18 shows that over 90% of the respondents are making 6 to 7 trips to CBD every week. The table shows that they come to the CBD to earn their livelihood through working, doing business and begging. Chart 13 shows that over 88% of the physically disabled who were sampled believe that the needs for which they come to CBD cannot be met elsewhere. Just as the normal able-bodied, they have to overcome travel disutilities such as distance, time, money and inconveniences of travel. However their physical limitations make them quite vulnerable to bear greater sufferings of travel disutilities. This has been discussed into greater details under mobility limitations.

Map 5: Trip Generation areas for the Disabled

RESIDENTIAL LOCATIONS OF THE DISABLED



LEGEND

- 0/0 Urban Residences
- Sub-Loc of Residence
- / \ y Communication Routes
- % Urban Settlements
- IH Nairobi CBO
- Smj industrial Area
- Upper hill
- d I Westlands
- I Nairobi National Park

N

w

Scale: 1:250000

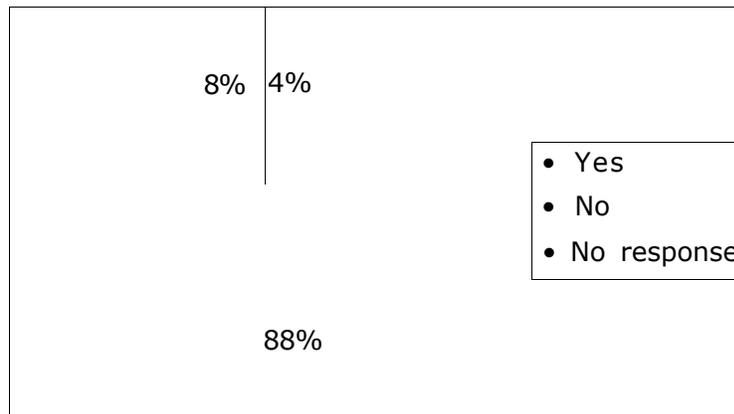
Compiled by Ouma S. N

Table 18: How often the respondent travels to town in a week

Purpose of Travelling		Frequency of travel to CBD per Week			Total
		2	6	7	
Work	Frequency	1	4	11	16
	% of Total	1.9%	7.5%	20.8%	30.2%
Business/Hawking	Frequency	0	10	21	31
	% of Total	.0%	18.9%	39.6%	58.5%
Begging	Frequency	0	0	6	6
	% of Total	.0%	.0%	11.3%	11.3%
Total	Frequency	1	14	38	53
	% of Total	1.9%	26.4%	71.7%	100.0%

Source: Fieldwork 2006

Chart 13: Whether these Needs can be met elsewhere



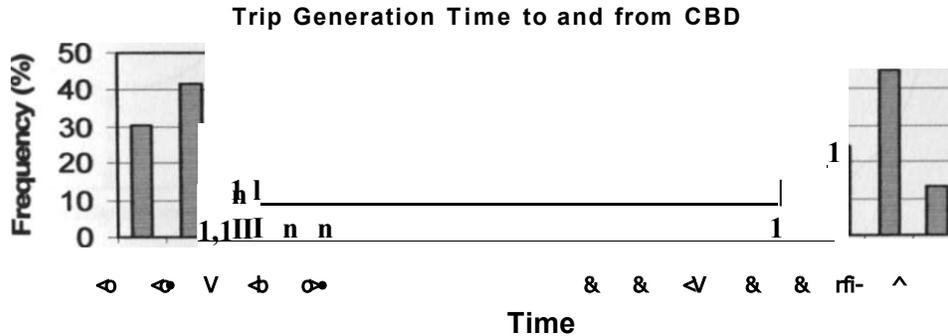
Source: Fieldwork 2006

4.2.3 Trip Generations time to and from CBD

Chart 14 indicates that about 75% of the disabled begin their trip to CBD between 5.00 and 6.00 am. About the same proportion set for home between 7.00 and 8.00 pm. From 10.00 am to 6.00 pm, there is no trip generated either way by the disabled, this confirms what Mwaniki (2001) found out that more than 75% stay within the CBD for over 14 hours in a day. They were found to dedicate the greatest fraction of their time to economic activities; and they are determined to stay within CBD as long as there are customers for their goods and services. Avoiding congestions, avoiding competition and maximizing profits are interrelated reasons given

for the travel times. They all have to do with accessing transport means and or reaching the destinations early.

Chart 14: Trip Generations time to and from CBD



Source: Field work 2006

Chart 15: Reasons for the Travel Times



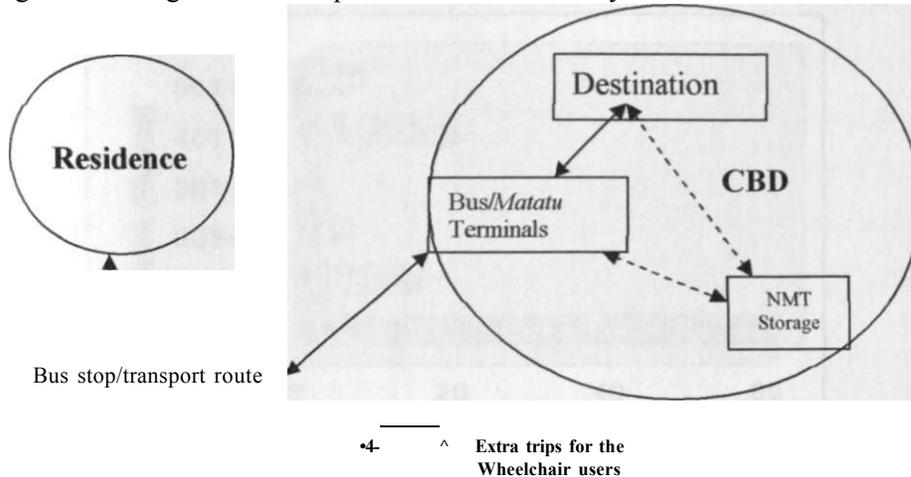
Source: Field work 2006

4.2.4 Multi - Modal Trip to CBD

The trip from places residence to and from CBD has been found to be made using both Automobile and Non-Motorized Transport (NMT); and entails three to four sub-trips to reach the final destinations. They include

- I. Trip to nearest bus stop (or transport route) via walking or crawling.
- II. Trip from the Bus stop to CBD using public transport vehicles
- III. Trip from bus terminus within CBD to final destinations or to NMT storage via walking/crawling.
- IV. For the wheelchair user, the final trip is via tricycle or wheelchair

Figure 8: Diagrammatic representation of Journey to CBD

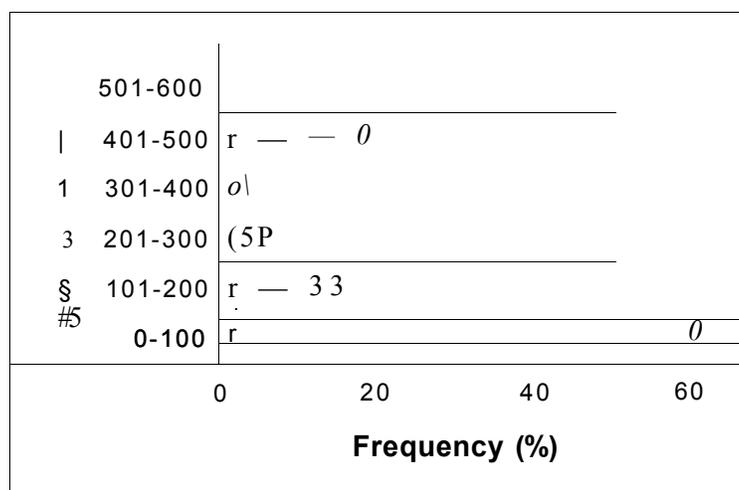


Source: Interpretation by the researcher

i). Trip to nearest bus stop from residential

it is a trip which ranges between 50 meters to 600 meters (see chart 16). Over 72% interviewed live within 200 metres range from nearest transport route and the rest up to 600 metres range. This distance reveals how nearness to transport routes is one consideration they make in deciding their residences. 87% acknowledged that they are comfortable moving that distance, however, those who crawl (the wheelchair dependent) may be facing a lot of difficulty. The stipulated distance is a maximum of 50 metre from nearest bus stop for the Wheelchair users (UN 2004), which was met by only 11% of the sampled persons as indicated in table 19. Thus, this first sub-trip represents one of limitations to over 90% of the disabled who live beyond this distance not only with regards to distance but also the discomforts and inconveniences faced by those who crawl or use their knees to move. This is because, as it will shown later in the next chapter, public service vehicles (PSV) operators are reluctant to carry mobility Intermediate Means of Transport (NMTs) modes (tricycle which most own).

Chart 16: Distance To Nearest Transport Route from Place of Residence



Source: Fieldwork 2006

Table 19: Distances to the nearest Transport route versus Nature of Disability

Distance to the nearest PSV transport route * Nature of Disability Crosstabulation

Distance to the nearest transport route (m)		Nature of Disability		Total
		Ambulant	Wheelchair	
50-100	Frequency	18	13	31
	% of Total	34.0%	24.5%	58.5%
101-200	Frequency	0	7	7
	% of Total	.0%	13.2%	13.2%
201-300	Frequency	0	2	2
	% of Total	.0%	3.8%	3.8%
401-500	Frequency	2	8	10
	% of Total	3.8%	15.1%	18.9%
501-600	Frequency	1	2	3
	% of Total	1.9%	3.8%	5.7%
Total	Frequency	21	32	53
	% of Total	39.6%	60.4%	100.0%

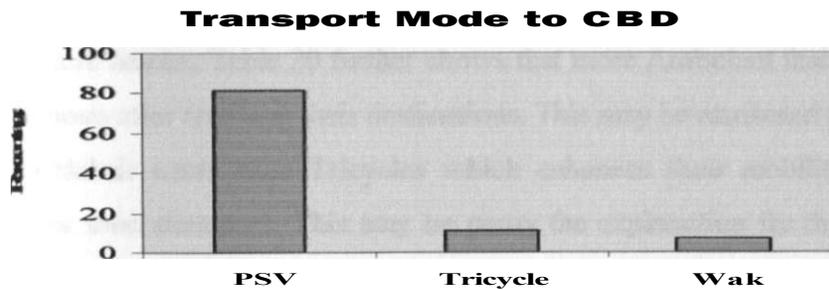
Source: Field work 2006

ii). Trip to CBD by Passenger Service Vehicle (PSV)

Modal split for this trip shows that 81 % use PSV, 11 by tricycle and 8% walk. About 88% and 71% of the Wheelchair users and Ambulant respectively use public transport to CBD as shown in Table 20 and Chart 17 below. Those who walk and those who

cycle mostly live within the CBD town or just immediate vicinity. Across tabulation between the mode of transport to town and nature of economic activity, age group, gender, distance to the nearest public transport, frequency of travel; does not reveal any significant influence on the mode of transport to town. The distance to their residences from CBD, time of travel (mostly either at dawn or sat dusk), and their physical inabilities necessitates their use of motorised transport. Since their income cannot allow for private automobile, the, they are public transit captives.

Chart 17: Modal Split to Town



Source: Fieldwork 2006

Table 20: Nature of Disability and Mode of transport to CBD

			Nature of Disability		Total
			Ambulant	Wheelchair	
Transport means to town	Public transport (Road)	% within Nature of Disability % of Total	71.4% 28.3%	87.5% 52.8%	81.1% 81.1%
	NMT (Tricycle/wheelchair)	% within Nature of Disability % of Total	9.5% 3.8%	12.5% 7.5%	11.3% 11.3%
	Walk	% Within Nature of Disability % of Total	19.0% 7.5%	.0% .0%	7.5% 7.5%
Total		% within Nature of Disability	100.0%	100.0%	100.0%
		% of Total	39.6%	60.4%	100.0%

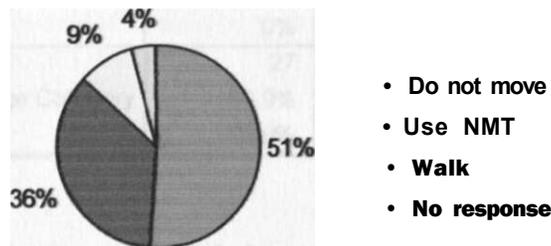
Source: Fieldwork 2006

iii). Walk /Crawl to the final destinations or to NMT storage from bus terminals
 Even though only 11% uses tricycle to town, over 60% own them with exception of 40% of the respondents. This implies that the 49% have to move to the storage places for NMT (wheelchair/ tricycle) before they reach their final destinations.

4.2.5 Mobility after Reaching Destinations

According to Obiero (1992) is related to trips in the course of work. For the disabled, it represents trips in the course of business. Chart 18 indicates that more than 50% of the respondents do not move after reaching the destination. Whereas 36% use NMT (Wheelchair and Tricycle) and 9% walk in order to access other destinations, perhaps for more stocks. Table 20 further shows that more Ambulant than the Wheelchair do not move after reaching their destinations. This may be attributed to the fact that most Wheelchair users have Tricycles which enhances their mobility and accessibility within short distances. This may be partly the explanation for the higher income by the Wheelchair users than Ambulant that is shown in table 12.

Chart 18: Movement within CBD



Source: Fieldwork 2006

A cross tabulation between gender and mobility within the CBD shows that 100% of female do not move after reaching their destinations. A cross tabulation between age category and mobility within the CBD, in table 21, revealed that mostly those falling between ages 21 and 50 move either do not move or use Mobility aids (Tricycles and wheelchair) to move. Beyond the age bracket, either does not move or walk to access

places within the CBD. The income earned does not seem to be dependent on whether one moves or not. Furthermore the type of economic activities carried out does not seem to influence whether one moves or not. The wheelchair users use mobility aids, mostly tricycle, to move along and across carriageway; but access their destinations by crossing over to the pavement by wheelchair as shown in plate 2. The ambulant mostly walk along pavements.

Table 21: Age Category and Mobility within the CBD

Age Category		How do you move within the city?				Total
		Do not move	Use NMT	Walk	N/A	
21-30	Frequency	6	7	0	2	15
	% within Age Category	40.0%	46.7%	.0%	13%	100.0%
	% of Total	11.3%	13.2%	0%	3.8%	28.3%
31-40	Frequency	14	7	1	0	22
	% within Age Category	63.6%	31.8%	4.5%	.0%	100.0%
	% of Total	26.4%	13.2%	1.9%	.0%	41.5%
41-50	Frequency	6	5	0	0	11
	% within Age Category	54.5%	45.5%	.0%	.0%	100.0%
	% of Total	11.3%	9.4%	.0%	.0%	20.8%
51-60	Frequency	1	0	2	0	3
	% within Age Category	33.3%	0%	66.7%	.0%	100.0%
	% of Total	1.9%	.0%	3.8%	.0%	5.7%
61-70	Frequency	0	0	2	0	2
	% within Age Category	.0%	.0%	100.0%	.0%	100.0%
	% of Total	.0%	.0%	3.8%	.0%	3.8%
Total	Frequency	27	19	5	2	53
	% within Age Category	50.9%	35.8%	9.4%	3.8%	100.0%
	% of Total	50.9%	35.8%	9.4%	3.8%	100.0%

Source: Fieldwork 2006

The following observations may be made in respect to mobility of the disabled within the CBD

1. More disabled may not be moving because they are tending for their sources of livelihood
2. Use of tricycles yield more mobility and accessibility within shorter distances than walking for the disabled

3. Women and those whose ages are above 50 years have declined mobility perhaps due to their physical inabilities and higher perception of risks due to unfavorable mobility environment.
4. All disabled using public transport have to move from and to bus terminus; irrespective of the destinations, gender, age and nature of disability

Table 22: Mobility within Town between Ambulant and Wheelchair Users

How the Disabled Move within the city		Nature of Disability		Total
		Ambulant	Wheelchair	
Do not move	Frequency	14	13	27
	% within Nature of Disability	66.7%	40.6%	50.9%
	% of Total	26.4%	24.5%	50.9%
Use NMT	Frequency	2	17	19
	% within Nature of Disability	9.5%	53.1%	35.8%
	% of Total	3.8%	32.1%	35.8%
Walk	Frequency	5	0	5
	% within Nature of Disability	23.8%	.0%	9.4%
	% of Total	9.4%	.0%	9.4%
No Response	Frequency	0	2	2
	% within Nature of Disability	.0%	6.3%	3.8%
	% of Total	.0%	3.8%	3.8%
Total	Frequency	21	32	53
	% within Nature of Disability	100.0%	100.0%	100.0%
	% of Total	39.6%	60.4%	100.0%

Source: Fieldwork 2006

Plate 2: A Disabled Cyclist Crossing Road



Source: Fieldwork 2006

4.4 Summary

The utility of any trip is judged by the activity it is going to make possible and how the individual value the activity.¹² The physically disabled have been found to make regular trips to CBD because of the benefit they derive from it. They value it and they cannot avoid it, because, it means their livelihood. The journeys they regularly make may be classified as journeys to and from work and journeys in the course of work (Obiero 1992); which comprises essential trips. This confirms what Webster et al (1986) and Hansen (1976) identified that the major trip purpose in world cities as journey to and from work.

The study shows that disabled live in places as far as 25 kilometres, both within and immediately outside Nairobi and mainly use public transport to overcome that distance to CBD. However, it has been observed that less than 50% make other trips in the course of work (business). The Ambulant, the female and those beyond 50

¹² Falcochio and Cantilli (1974)

years of age hardly make such trips after reaching their destinations. The mobility within the CBD is achieved using mobility aids and assistive devices like tricycles, wheelchairs, clutches, walking stick as well as orthopaedic aids (artificial legs and arms). Tricycles seem to encourage mobility for the wheelchair users within the CBD.

Their frequency to and the length of stay within the Nairobi CBD implies that the disabled have little time for other things but achieving their livelihoods. Moreover, their main reasoning behind migrations to Nairobi and their association of disability with poverty and unemployment provide enough indicators that their priority is in meeting their basic needs which are their most pressing challenges. The study has also revealed that the disabled have social obligations to support their families and other dependants¹³; lacks support on basic needs and are within the active labour force age bracket. These social traits push them to do what they can in order to meet their social and economic objectives.

Nairobi CBD presents the disabled with a rare opportunity to carry out their economic activities for income. Werner (1985) noted that individual trip making behaviour depends not only on the attractiveness of the intended destination, purpose and distance that has to be overcome to get there, but also on the availability of opportunities elsewhere, opportunities that are competitive and can satisfy the purpose of the planned trip. Thus, the disabled despite their physical limitation have to make regular and longer trips to CBD because of lack of alternative opportunity places nearby. The CBD ensures a heavy presence of people who become their customers. The average income they realize is about kshs12000. Therefore with an average household size of 3.17; most of the disabled carrying out economic activities within the CBD lives beyond absolute poverty line.¹⁴ However, the wider range in income, which falls between kshs 3500 and 30000; is attributable to the level of

The sampled physically disabled have average household size of 3.17

¹⁴ **Absolute poverty line in Kenya is kshs 2648 per adult person in urban areas as defined by Welfare Monitoring Survey (1997)**

education, age and sex. Begging earned the least compared to the other income generating activities.

From the discussion in this chapter, it may be concluded that mobility is very necessary for the disabled to achieve their livelihoods. This is so because they have to move to the CBD to realize some income. This is in tandem with the fact that transport is a derived demand that helps to satisfy a need by accessing opportunity areas (Banks 1998 and Kasuku 2005). The distance between the residential area and opportunity areas necessitated use of motorized transport but accessibility in the course of work may be achieved by Non-motorised transport. UN (2004) in their *Manual for Barrier-Free Environment* reiterated that the more an individual travels the more the opportunities. This is the ideology the disabled seems to exploit to the maximum by their frequent travels to Nairobi CBD.

CHAPTER FIVE: MOBILITY LIMITATIONS FOR THE DISABLED

5.0 Overview

The previous chapter has highlighted the role of mobility in achievement of economic and social ends. It has also described the travel characteristic of the disabled in the study area. This chapter is charged with identifying limitations experienced during their trips to and within the city centre in regard to the transport modes they use, the transport infrastructure and the public attitude. The concept of the trip chains, advanced by Lung Suen (2005), has been applied in identification of limitations at each chain (sub-trip)¹⁵. The limitations have been presented here in four sub-heading, namely:

- Road and terminal facilities
- Passenger transport vehicle operation and design
- Non-Motorized transport
- Public attitude

5.1 Road and Terminal Facilities

Travel patterns of the physically disabled has revealed that they travel by passenger service *vehicles* (PSVs) up to bus terminals within the CBD; when they *resort to* either walking/crawling or using Tricycle/Wheelchair for mobility within the town. The responses from the disabled and field observations identified the following physical barriers to mobility along and across the road carriage ways, road pavements and as well as at the terminal facilities:

- Poor conditioned surface of the terminals;
- Lack of sheltered seats and secured parking for mobility aids at terminal facilities;
- Narrow road width occasioned by design considerations and obstructions;

A typical trip consists of many links (for example, home to curb, curb to vehicle, ride in vehicle, transfers, vehicle to curb, curb to entrance of building, entrance to destination). If any one link is not accessible, then the journey becomes impossible. Every link in the chain must be considered and improved as necessary

- Inadequate and unresponsive traffic calming facilities at pedestrian crossings;
- Lack of roadside resting facilities
- *Competing* uses for road and pavements
- Inadequate provisions for transfer facilities (e.g. kerb ramps)
- Lack of inter-modal interface at the bus/Matatu terminals

Table 23 below contains some of the varied responses from the respondents on limitations to mobility on the roads and terminal facilities

Table 23: Mobility Limitations on the Roads and terminal facilities

Limitations	Percent (of 100%)
Safety concern	67.7
Road width	60.4
Competing and conflicting road uses	45.3
Drivers	28.5
Parking	11.3
Potholes	10.1
Topography	7.6

Source: Fieldwork 2006

5.1.1 Terminal facilities

A survey of five *bus/matatu* terminals located within the CBD revealed that either there was lack of sheltered seats or those which were there could not serve the disabled well. For instance, at the Railway station, there was no single shelter. Plate 3 shows shelters with no seats at all At Globe Cinema Round About: which are only meant for taking cover against agent of weather while standing. Wherever there were shelters with seats, they were dusty and few. Often, the able-bodied passengers compete for these seats. Since the disabled persons have been said to take longer time waiting to board PSV compared to their 'normal counterparts' in Nairobi, they are bound bear greater inconveniences and discomforts due to their physical conditions.

From table 23. 11% of the respondents mentioned lack of parking facilities for their mobility aids at the terminals. Ideally, it may not be just parking as such: it is lack of parking can storage facilities. The wheelchair dependent has to crawl or walk with difficulty to wherever they store their wheelchairs/tricycle from bus terminus before heading for their final destinations. This shows lack of inter-modal interface between passenger service vehicles and non-motorized modes of transport within the study area.

Plate 3: Shelter without Seats at Globe Cinema Round About



Source: Fieldwork 2006

More over, in all bus terminals except Bus station were earth surfaced. Some of them are muddy and water logged during wet weather. They may be rough and dusty during dry weather. This makes their accessibility difficult and tiresome for the disabled. Plate 4 shows a waterlogged bus terminus located at Railway terminus. Similarly, the location and the environment around some terminals, especially Globe Cinema round about and Railway terminus, causes them to be isolated, secluded, inaccessible and insecure especially at night.

.Plate 4: A Waterlogged Earth Surfaced Railway Bus Terminus



Source: Fieldwork 2006

5.1.2 Road Design

5.1.2.1 Road Carriage Ways

The design of road carriage ways were meant for use only by automobile. Yet the wheelchair users cycle alongside the motorists. This compromises their safety. Table 23 above shows that about 60% of the respondents, identified road width as one of their mobility challenges; their main concern being safety, as identified by over 68% of them. This is worsened by road-side parking; obstructing and reducing the effective usable road width. Plate 5 shows a disabled sandwiched between two vehicles.

Plate 5: A Disabled Cyclist Sandwiched Between Vehicles



Source: Fieldwork 2006

5.1.2.2 Pedestrian crossings and Kerb Ramps

The existing pedestrian crossings were neither designed to cater for the Ambulant slower walking speed nor the Wheelchair users. The design of the pedestrian crossings as well as the provisions and operations of traffic calming facilities either deterred ease of crossings or compromised safety of the disabled. Observation revealed that many pedestrian crossings lack conspicuous markings, lack kerb ramps for the Wheelchair crossings and have refuge islands that obstruct crossings by mobility aids. The traffic calming facilities such as bumps are lacking. Traffic lights were not only inadequately provided but also largely meant for the able-bodied not the disabled who are slower in walking.

Most roads within the CBD were observed to have roadside Kerbs; however, there were negligible number of kerb ramps to enable smooth transition between the surface of the road and pavements. Kerbs are usually between 0.15 and 0.25 metres, but this height means a lot to the disabled, especially those using wheelchairs. It was observed that kerb ramps were particularly lacking at most critical points such as pedestrian crossings. Thus, the disabled cyclists rarely achieve 90° crossings and

obstructive road islands. The results were long manoeuvres and interrupted movements as well as time wastage. (See Plate 6)

Figure 9: The Cross-Sectional Design of the Crossings barring Disabled Cyclist

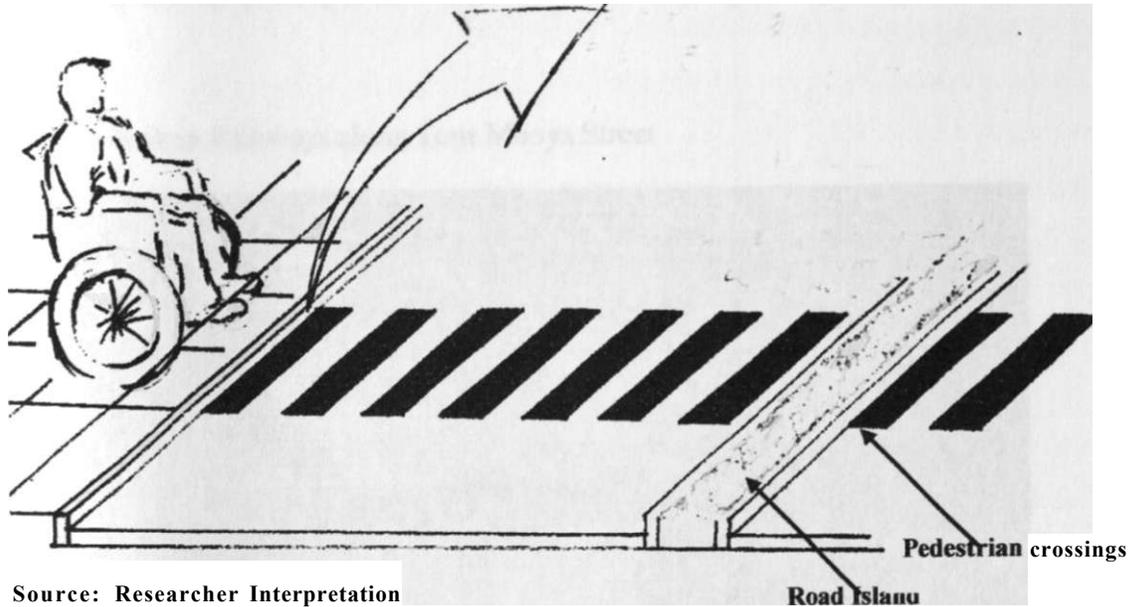


Plate 6: Disabled Cyclists Making Long Manoeuvres to Cross the Road



Source: Fieldwork 2006

5.1.23 Pathways and pavements

Obstructions by small scale traders (hawkers) and heavy pedestrian traffic, especially during peak hours, was observed to affect mobility along pedestrian paths and pavements mobility. In some areas, pavements and pathways were of poor surface condition; uneven and unpaved. Plate 7 shows a broken pathway along Tom Mboya Street.

Plate 7: Broken Pathways along Tom Mboya Street



Source: Fieldwork 2006

5.1.24 Obstructions and Conflict in Road Usage

This has been discussed above, however, not in details. Generally, there were many illegal road uses that resulted in obstruction either compromising safety or impeding mobility. Obstructions included unprotected road and earthworks, garbage bins, flower bases, advertising signs and traffic signs. Hawkers and parked vehicles have also been identified as obstructing paths of travel.

5.1.2.5 Road furniture

Pathways lack road furniture that can be used for resting by persons with disabilities when they feel tired and need some rest, before they proceed with *their journey*.

5.2 Passenger Transport Vehicle Design and Operation

In the previous chapter, 81% of the respondent use public transport from residential to CBD. When they were asked to comment on the performance of the public transport, 94% were dissatisfied and only 6% had no problem with public transport performance. Their problem areas have been summarized as services and coverage, vehicle design, operations and public attitude; which were found to prevent or discourage the disabled from accessing and enjoying public transport services.

5.2.1 Fixed Route Public Transport Service

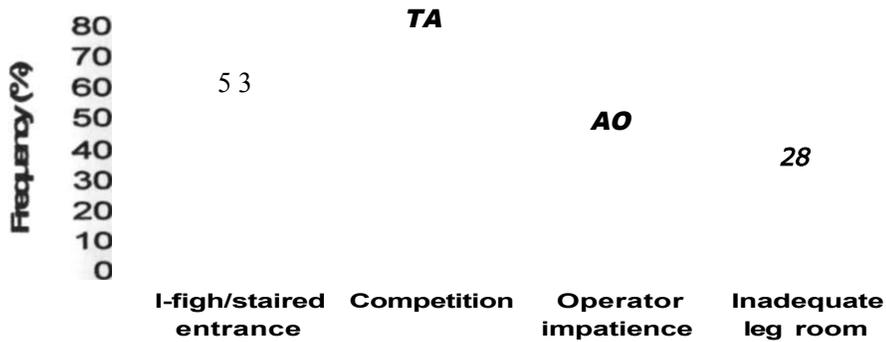
One of the assumptions in this study was that persons with disability in the study area entirely depend on public transport services due to their economic situation, which seems to be true for the target group. Public transport in Nairobi operate on fixed routes, thus, are inflexible and cannot provide door-to door services that is provided by private modes of transport. Hence, they have to walk/crawl between 50 and 600 metres to and from nearest transport facilities to their residential places, as shown in table 19, and to their final destinations or storage places for mobility aids within the CBD

5.2.2 Unresponsive Passenger Service Vehicle (PSV) Design

The study revealed that all PSVs operating within the study area lacks transfer facilities *into and out of the* vehicles. Over 91% of the respondents said they experience problems during alighting and boarding of PSV. Chart 19 shows the problems as high and stepped entrance; inadequate legroom; competition by able-bodied public; and impatience of the PSV operators (conductor and drivers). Observations shown that they generally suffer from poor peak hour services, when many people are jostling to be served.

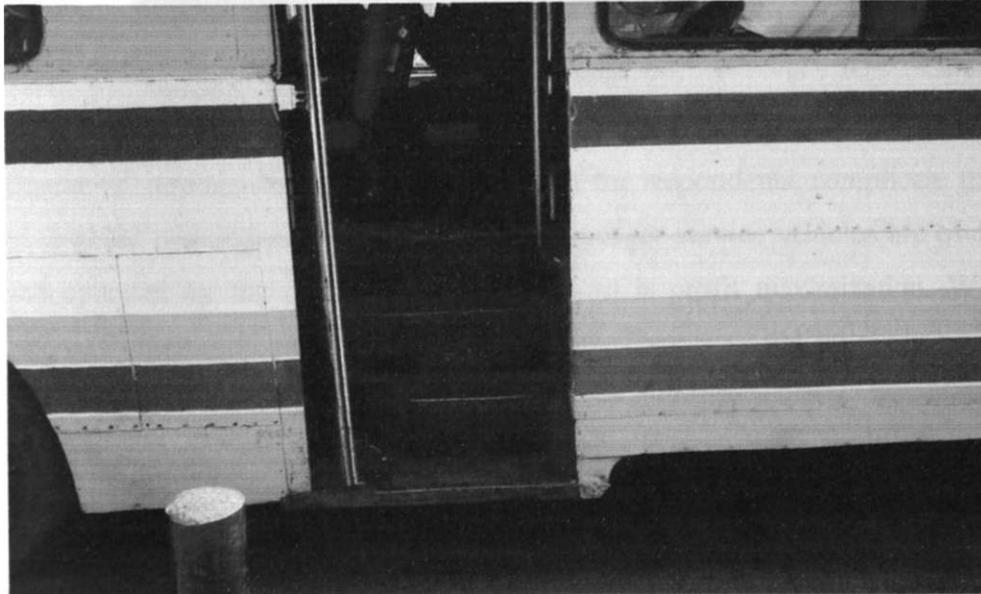
In Chapter III, the passenger Service vehicles operating in Nairobi were classified as 14-seater, 25-seater and above 25-seater. Whereas it was acknowledged that the 14-seater relatively had lower floors and enabled ease of boarding and alighting,; they still registered discomfort during travels due to inadequacy of legroom. On the same note, other PSVs had problems of higher stepped and narrow doors, as shown in plate 8. sometimes in addition to insufficient legroom.

Chart 19: Limitation with Design and Operations of PSV



Source: Fieldwork 2006

Plate 8: High and Stepped Entrance into PSV (Bustract Ltd) Buses



Source: Fieldwork 2006

5.2.3 Competition and PSV Operators Impatience

From chart 19, it has been shown that competition for PSV was ranked highest, with 74%, among the limitations associated with Public transport. The disabled by definition suffer from reduced body function.¹⁶ It is more likely that they will lose any competition pitting them against the able-bodied. Apparently the general public were not giving priority to the disabled to board PSV. Plate 9 shows passengers jostling for PSV during peak period, with a disabled woman bowing out.

Plate 9: A Disabled Person Bowing Out to Competition during Rush Hour



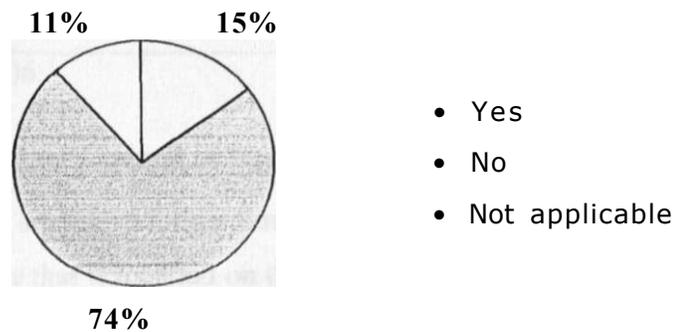
Disabled Woman

Operators' impatience, mentioned by 40% of the respondents, complicate the plight of disabled passengers further. Since, the passenger service vehicles are owned, run and operated by the private sector, their focus is profit maximization. With such business orientation attitude, "time is money". They may not be ready to wait for longer for the disabled to board or load their mobility gadgets, especially when demand is high. Mwaniki (2001) found out that they may take between 3-4 hours longer. This partly explains why they begin their trips to CBD very early and start their return trip relatively late. It perhaps also explains why about 74% of the

¹⁶ WHO (1999)

respondents said that the PSV operators either do not carry their mobility aids or carry them at exorbitant cost; the cost ranging between KSh 50 and 100, which may be beyond normal fare for passengers. (See chart 20). Consequently, the disabled experienced poor public transport services during peak period owing to public attitude that denied them access to transport services

Chart 20: Whether PSV operators readily accept to carry mobility gadgets



Source: Fieldwork 2006

5.3 NMT (Wheelchair / Tricycle)

The study found out that acquisition of NMT mode of transport was not a problem for all disabled who could use them. Association of Persons with Disability of Kenya (APDK), in attempt towards reducing poverty levels amongst them, in collaboration with Ministry of Social Services and other organizations give them freely. However, disabled cyclists experience various limitations. Table 24 outlines the limitations as harassment by CCN; lack of storage; transport for the mobility gadgets; efforts required to use them; their limited range; safety concerns; repair and maintenance.

Table 24: Mobility Limitations Associated with NMT in Nairobi

Limitations	Percent (of 100%)
Harassment by CCN	77.3%
Lack of storage	60%
Transport for the gadget	52%
Effort required in cycling	13.3%
Limited range	9.6%
Safety	9.5%
Repair and maintenance.	5.5%

Source: Fieldwork 2006

5.3.1 Harassment by City Council of Nairobi (CCN)

It ranked the highest among mobility limitations for non-motorized transport. This was attributable to fact that it touched on their livelihood; the main reason they make frequent trips to Nairobi CBD. The tricycles and wheelchairs have been fabricated to help the disabled carry out their income activities. However, CCN policy on decongesting the CBD from hawkers had seen some them either confiscated or vandalised by CCN *Askaris*. Table 24 indicates that of the 32 respondents who once owned NMT (Tricycle and Wheelchairs), about 23% had had them confiscated, 4% broken or stolen.

There were disabled who had opted not to go for them because of fear CCN *Askaris*. Once the tricycles or wheelchairs were confiscated, they are not only ferried to a distant storage place (Dagoretti) but chances of getting them in good conditions were said to be very low. The victims have complained of vandalism and or deflations of their mobility gadgets and sometimes sold as scrape metal by CCN. A focus group discussion revealed mostly they have to corrupt their ways to have them back.

Table 25: Current Ownership State of NMT Means

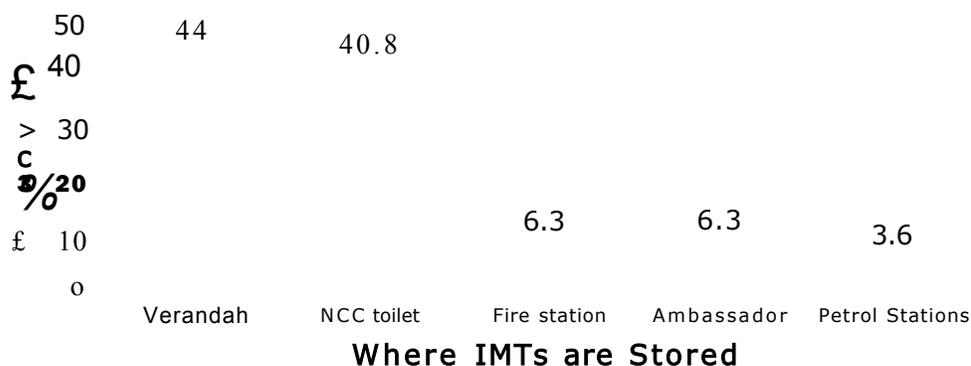
	Frequency	Percentage of 32
Confiscated by CCN	7	22.6
Broken	1	3.8
Fear of harassment	1	3.8
Stolen	1	3.8
In good condition	22	66.0
Total	32	100

Source: Fieldwork 2006

5.3.2 Storage Challenge within Ilie (HI)

The study found out that there was lack of secured storage of tricycle and wheelchairs at bus *Imalalu* terminals. Thus they were stored at illegal and unsecured places, where the wheelchair users frequently had to pay between Kshs 20 and 30 daily for security of the mobility aids to guards at adjacent facilities. More over, since the storage places are open, the mobility aids were subjected to rapid wear and tear due to weather agents. The storage becomes so critical because, as it has been shown carrying NMTs using PSV is a problem. Again, within the CBD, they are used for mobility, accessibility and for carrying out business during the day.

Chart 21: Where the Mobility aids are Stored within the CBD



Source: Fieldwork 2006

5.3.3 Safety Concerns for the Disabled Persons

The study revealed that respondents however aware of accident risks they were exposed *to during* their mobility, negligible number had taken initiatives the risks. For instance, only one respondent was found to put on light-coloured cloth (yellow jacket) for safety and also had life insurance cover. A focus group discussion revealed that 5 disable cyclists had lost their lives in road accidents in a span of two months prior to the study, both within and outside the CBD. The most vulnerable were those who cycle outside the CBD where vehicles move at high speed. This may be attributed to limitations in the PSV discussed above in conjunction lack of fare for the PSV.

Responses on how they ensured their safety included: avoiding walking /cycling in unsafe areas by 76%, 44% cross the roads when it is safe and signalize drivers when in danger, 25% avoid rush hours and 5.7% by wearing yellow jackets. These measures, however commendable, are susceptible to delays and vulnerability to risks. They also seem to be adaptive mechanism by the disabled, owing to lack of adequate and responsive traffic calming facilities and design barriers of pedestrian crossings and desegregated cycle paths as has been discussed above.

5.3.4 Other limitations

The following were other limitations in addition to transport for the gargets which have been discussed above:

- All tricycles and wheelchairs were manually operated. Thus (Tricycle and Wheelchairs) despite their declined abilities. This even worsens when the movement is against slopes.
- Limited range of the mobility aids, which still stem from the fact that they are human-powered and difficult mobility environment for the disabled.
- Frequent Repair and maintenance cost, which is worsened by attacks by CCN *Askaris*, lack of secure and protected storage leading rapid wear and tear.

Plate 10: A tricycle Taken for Repair



Source: Fieldwork 2006

5.4 Summary

The mobility limitations have been observed to traverse throughout their journey from residential to Nairobi CBD. According to the concept of trip chains advanced by Lung Suen (2005), a problem in any one chain presents limitations in the whole mobility system. The nature and extent of limitations was observed to depend on: time of travel, trip chain, mode of transport and nature of disability. Table 26 outlines limitations by each trip chain as was identified in the study. The limitations may be described as

1. Physical and structural barriers such as unsuitable structural design of passenger service vehicles and roads; lack of or inadequate provisions for non-motorised transport such as transfer facilities, responsive design of pedestrian crossing and traffic calming facilities, resting facilities, pathways and pavements; obstructions; lack of sheltered seats and storage for mobility aids at the terminals.

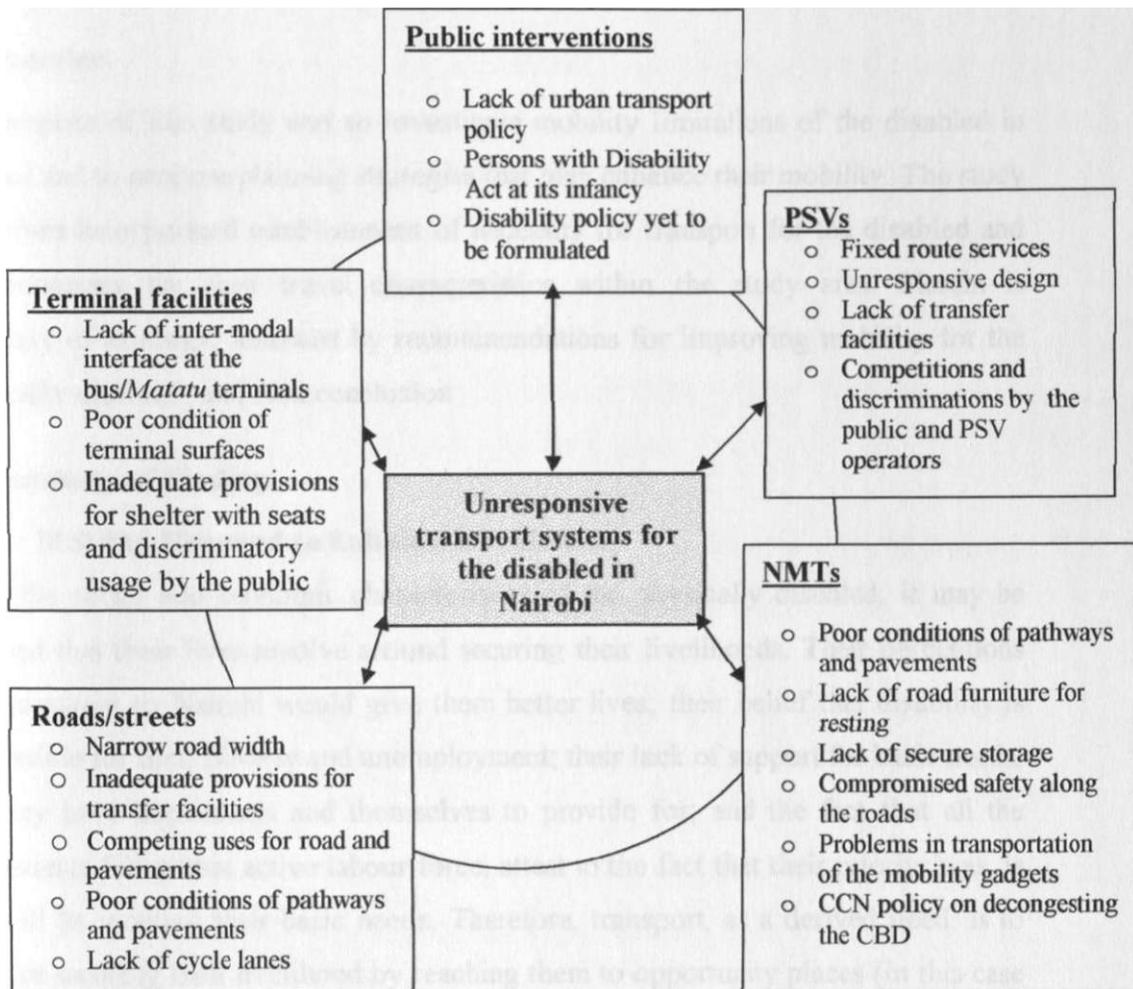
2. Operational barriers, owing to ownership and operation of passenger service vehicles by private sector that is business-oriented, and at terminals and pedestrian crossings.
3. Public attitudes that discriminate against the disabled in accessing transport services.

The presence of mobility limitations in Nairobi's urban transport system may be attributable to lack of past attempt to identify the limitations and improve the transport system for the disabled. Thus, a combination of physical, operational, legal, attitudinal, and lack of public interventions policy culminated into the limitations that have been discussed herein, as shown in Figure 10.

Table 26: Limitations Inherent in Each Trip Chain

	Trip chain	Limitations
1	To and from nearest transport route from residential areas	Difficulty in covering between 50 and 600 metres by walking/crawling. This is because: <ul style="list-style-type: none"> • Lack of door to door services by public transport • PSVs operators denial to carry mobility gadgets
2	Accessing the Public Service Vehicles (PSV)	Difficulty in accessing PSVs by 91% due to: <ul style="list-style-type: none"> • High and stepped entrance • Lack of transfer facilities like retractable ramps • Competition with able-bodied • Impatience of the operators • One doorway whereby as passengers alight other struggle to gain entrance • Longer waits
3	During travels with PSVs	Inadequate legroom owing to their disabilities mentioned by 28%
4	At the transport terminals	Difficulty in alighting due to <ul style="list-style-type: none"> • Height <i>and</i> design of doors • Lack of transfer facilities like retractable ramps • Operators often not disembarking disabled passengers on road kerbs to reduce effect to lower clearance • One doorway whereby as passengers alight other struggle to gain entrance Inconveniences and discomfort due to Lack of sheltered seats Difficulty in accessibility due to poor surface conditions of some terminals and insecurity at especially at night
	Trip to destinations	Limitations in reaching destinations and accessibility within the CBD due to: <ul style="list-style-type: none"> • Lack of inter-modal interface which see many wheelchair users crawl to where they store their tricycles/ wheelchairs • Narrow roads widths • Obstructions by hawkers, flower bases, etc • Inadequate provisions of ramps • No resting facilities • Unresponsive pedestrian crossings facilities • Poor surface conditions of pathways and pavements

Figure 10: Unresponsive Urban Passenger Transport System in Nairobi



Source. Researcher interpretation of the findings

CHAPTER SIX: CONCLUSIONS, INTERVENTIONS AND RECOMMENDATIONS

6.0 Overview

The purpose of this study was to investigate mobility limitations of the disabled in Nairobi and to propose planning strategies that may enhance their mobility. The study objectives incorporated establishment of necessity for transport for the disabled and determinations for their travel characteristics within the study area. Herein is summary of findings; followed by recommendations for improving mobility for the physically disabled; and then conclusion.

6.1 Summary of Findings

I. Mobility Required to Enhance Livelihoods

From the social and economic *characteristics* of the physically disabled, it may be deduced that their lives revolve around securing their livelihoods. Their perceptions that migrating to Nairobi would give them better lives; their belief that disability is responsible for their poverty and unemployment; their lack of support for basic needs, yet they have dependants and themselves to provide for; and the fact that all the respondents fell within active labour force, attest to the fact that their priority was, is and will be meeting their basic needs. Therefore, transport, as a derived need, is to enhance securing their livelihood by reaching them to opportunity places (in this case Nairobi CBD). A two-tailed test of spearman's rho correlations found out a positive correlation coefficient of 0.5, between frequency of travels to CBD and monthly income, at 95% confidence level, the coefficient could have been stronger were it not to depend on other such as age, sex and education level. Hence, the physically disabled requires mobility for their livelihoods; which is one of the hypotheses formulated in this study. The following were some of the findings that led to that conclusion:

- Over 83% of the respondent were born and grew outside Nairobi, over 70% of the respondents had perceived migrating to Nairobi would guarantee them better livelihood than where they were before
- 68% and 60 % respectively of the respondents believed that their main cause of poverty and unemployment is disability
- Almost all within the ages between 21 and 40 had been jobless as far as formal employment is concerned. Ages 41 and above comprise mainly retired, retrenchees (before 50), and unemployed
- They lack support for their basic needs. Family support could not be guaranteed as some of the respondents were either discriminated by their relatives or had lost them, over 49% of the ADVA members either had both or one of their parents dead
- Most of the respondents had dependants to provide for. Their average household size is 3.17. 91% of the sampled disabled women were found to be unmarried but have children to support.
- All the respondents were found to fall within the active labour force age bracket. Indicating that they can still engage in some kind of income generating activities.

II. Travel Patterns are Dictated By Place of Residence and Nature of Activities

The study has established that the respondents were residing within a radius of about 25 kilometres from Nairobi CBD. Whether disabled or not, motorized mode of transport is most appropriate to overcome such a distance. A part from the respondents who lived within the streets of Nairobi CBD, 81% were using motorized public transport even within less than 5 kilometres. This comprised about 88% and 71% of wheelchair and ambulant respectively. Thus the mode of transport to CBD was mainly influenced by distance but not the nature of disability.

Over 90% of the respondents were found to make 6 to 7 trips weekly to Nairobi CBD. It has been found that the CBD provided them with opportunities to meet their basic

needs, by engaging in hawking, offering telephone services and shoe shinning and repairs. Their income ranges between kshs 3500 and 30000. Arguably, the more they frequent the CBD and the more they are in contact with their clients, the more they are likely to earn more income. More than 70% of the respondents said that they leave for CBD by 6.00 a.m. and begin their return trip by 7.00 p.m, with the average period they stayed at the CBD being 13.5 hours. Over 80% said that one of the reasons for travelling at such time was to maximize profits. Avoiding congestions and avoiding competition, which were advanced as other reasons, are closely linked to maximizing profits. Both would ensure that they reach the CBD early so as to begin interacting with their customers. Thus, it may be concluded that the frequency and time of travels to CBD is a function of nature of activities the disabled are engaged in within the CBD

Within the CBD, 50% of the respondents do not move after reaching the destination. Whereas 36% use NMT (Wheelchair and Tricycle) and 9% walk in order to access other destinations. The Ambulant walks while the wheelchair users cycles within the CBD. Their nature of disabilities influences the means of non-motorised transport they use for mobility and accessibility within shorter distance.

Therefore, the travel characteristic of the physically disabled is dependent the distance from place of residence and activities of individuals at the destinations. The nature of disability determines mode of mobility over short distances, especially for accessibility at the destination. It has also been observed that the physically disabled mostly make essential trips; which are economic related trips.

III. The Physical Disabled in Nairobi are Public Transport Captives

It was stated, in Chapter III, that the impact of mobility limitations on the disabled can be ameliorated by higher income. This is because they may acquire private cars as well as hire assistance when they are able to pay. The kind of income they generate is not only unstable but also cannot afford private automobile. Due to their low education, they are not in a position to get meaningful formal employments that can earn them enough to alleviate mobility problems. Over 64% only have primary education and below. Thus the physically disabled in Nairobi are public transport captives. They comprise over 77% of the households that do not own private cars in Nairobi.¹⁷

IV. The Urban Transport System in Nairobi is Not Responsive to the Disabled

Figure 10 and Table 26 in the previous chapter has shown that mobility limitations exist for the disabled throughout their journey from residential to City centre. The mobility limitations for persons with disabilities has been attributed to past transport paradigm that did not apply 'user perspective' in transport planning. It is a problem that faced even the developed countries. It may be viewed as one of the negative impacts in the cause of evolution of transport systems. The worst limitation is its perpetuity; after noting that it deprives certain segments of the society of the opportunity to travel. As for Nairobi, a combination of physical, operational, legal, attitudinal, and lack of public interventions have perpetuated the *status quo*. Thus hypothesis that the current urban public passenger transport system in Nairobi is unresponsive to the mobility needs of the disabled gets support.

Consequences of the limitations discussed in Chapter V were found to vary with the nature of disability and mode of transport as summarised in Table 27:

⁷ According to JICA (2004), Household car ownership was only 23% in Nairobi in 2004

Table 27: Consequences of Mobility Limitations to Mobility of the Physically Disabled

	Consequences of mobility limitations	The Affected	Mode of transport
1.	Necessitating long manoeuvres in crossing roads	The Wheelchair users	NMT
2.	Causing interrupted movements due to obstructions, lack of transfer facilities, design and operational limitations at the crossings	Both Ambulant and Wheelchair	NMT
3.	Compromised safety for the disabled cyclists due to desegregated cycle lanes	The Wheelchair users	NMT
4.	Causing unsafe mobility owing to inadequate and unresponsive traffic calming facilities at crossings and <i>narrow</i> roads/streets	Both Ambulant and Wheelchair	NMT
5.	Inconveniences caused by lack of inter-modal interface	The Wheelchair users	NMT
6.	Inaccessibility to transport services due to competitions and attitude of the public and transport operators	Both Ambulant and Wheelchair	PSV
7.	Time wastage in travels	Both Ambulant and Wheelchair	PSV & NMT
8.	Inconveniences and discomforts during travels	Both Ambulant and Wheelchair	PSV & NMT

6.2 Specific Recommendations

6.2.1 Improvement in Existing Public Transport Services

This derives from the fact that may be easier to implement and effect 'incremental changes' than 'radical changes' from the *status quo* of many planning tasks, including transport planning. It is with this background that the strategy proposes ameliorating design and operational barriers to accessing public transport services by the disabled through change of public attitude at the transport terminals, reducing the effects of entrance height and gradual introduction of passenger service vehicles (**PSV**) designed to suit travel needs of the disabled

6.2.1.1 Change in Public Attitude

One of the major challenges identified by the disabled in using public transport is their *discrimination by "their able-bodied colleagues and transport operators"*.

Change of attitude, as was revealed in one of the focus group discussions, to give priority to the Disabled in getting PSV services as well as carry their mobility gadgets to the nearest bus stop to their residences may reduce time wastage and discomforts associated with waiting. The PSVs also should pick passengers at the designated places (terminals) where passengers queue for transport services but not compete for it.

6.2.1.2 Reducing the impact of PSV Design on the Disabled

Over 91% of the respondents said they experience problems during alighting and boarding of PSV. Altshuler and Rosenbloom (1976) in observed increasing door step height from 6 to 8 inches in Canada had resulted in 96% and 58%, of physically handicapped, registering difficulties during boarding and disembarking respectively. Most vehicle entrances heights of PSVs in Nairobi were between 12 to 15 inches. The effect of the heights of the entrance should be reduced by:

- Unloading passengers onto road kerbs which reduces lower clearance (height between the steps/floor of vehicle and the road surface) by about 6 inches
- Using removable ramps

6.2.1.3 Gradual Introductions of Structurally Suitable Passenger Service Vehicle

The Person with Disability Act 2003 sec 23(1), of the laws of Kenya, states that "*all PSV operators shall be required to adapt their vehicles to suit persons with disabilities as may be specified by National Council of Persons with Disabilities (NCPD)*". Sec 23(2) further states that "*all PSV operators shall comply within 2 years from the date the section, on mobility and accessibility becomes effective*The operators may neither have financial capability nor willingness to redesign their PSVs

¹⁸

The discussions revealed that even though buses operated by Bustrack Company limited have high stepped doors, the disabled were happy that their operators took cognizance of their mobility needs. One of the seats by the entrance was always allocated for the disabled. They were also patient to give the disabled time to board as well as to disembark.

to suit the disabled. Adapting over 40000 PSVs in Kenya may involve colossal sums of money and may not be accomplished in 2 years. Basing on past experiences when requirements for seatbelts and speed governors were enforced in 2004 in Kenya, effecting section 23 may see many PSV operators withdrawn from the operations, illicit protests and jeopardize the public transport services for the Nairobi community at large. Rather new PSVs should be designed to suit the disabled, according to design specifications that National Council of Persons with Disabilities (NCPD) is yet to come up with.

6.2.2 Direct Public Intervention in Provisions and Operations of Specialized

PSVs

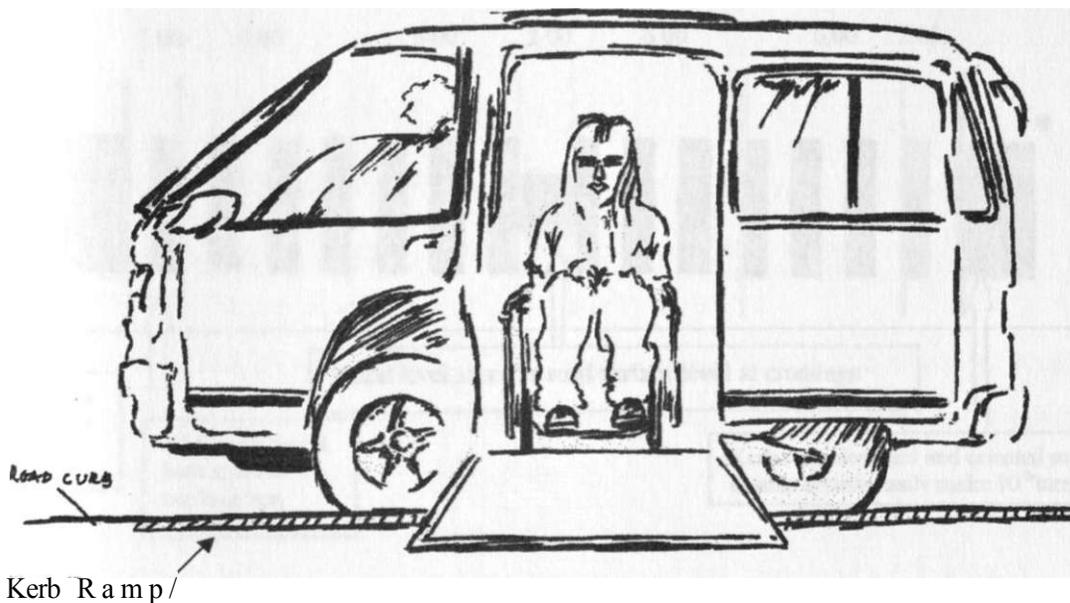
The private sectors comprise entrepreneurs who are driven by profit margins they make. They are business people, and are business oriented in their operations. Their ideology for indulging in passenger transport services conflicts with the social approach required with regards to the disabled. In order to endow PSV with all the travel requirements for the disabled, as provided by NIRE (2005), may be out of reach for many operators. Therefore the government or its agency (e.g. NCPD) should be directly involved in owning, running and operating a specialized PSV for the disabled. The Persons with Disability Act 2003, Sec 32(1) provides for establishment of National Development Fund for Persons with Disabilities which is to be manned by Board of Trustees. Part of the tasks for the fund should be to finance and manage specialized PSVs; designed, equipped and responsive to travel needs of the disabled.

The specialized PSVs should:

- Be fitted with first aid kits and have a health practitioner to attend to any eventualities along the way
- There should be provisions for transfer facilities such as retractable ramps or lifts for ease entrance and exit

- The entrance should be wide for the disabled on wheelchair to enter, preferably same as the recommended width of the kerb ramps, i.e. 0.9 metres according to UN (2004).
- The seats should have adequate legroom
- There should be provision for carrying mobility gadgets
- The specialized vehicles should have time and route scheduled according to trip characteristics for the disabled and trip generation areas respectively. At least two trips per day along each route serving the disabled residences and reach them as close as possible to their destinations.
- The specialized PSVs should also be available for other essential trips such as for Medicare and rehabilitations.

Figure 11: Shows a Sketch of Retractable Ramp that every new PSV Should Have



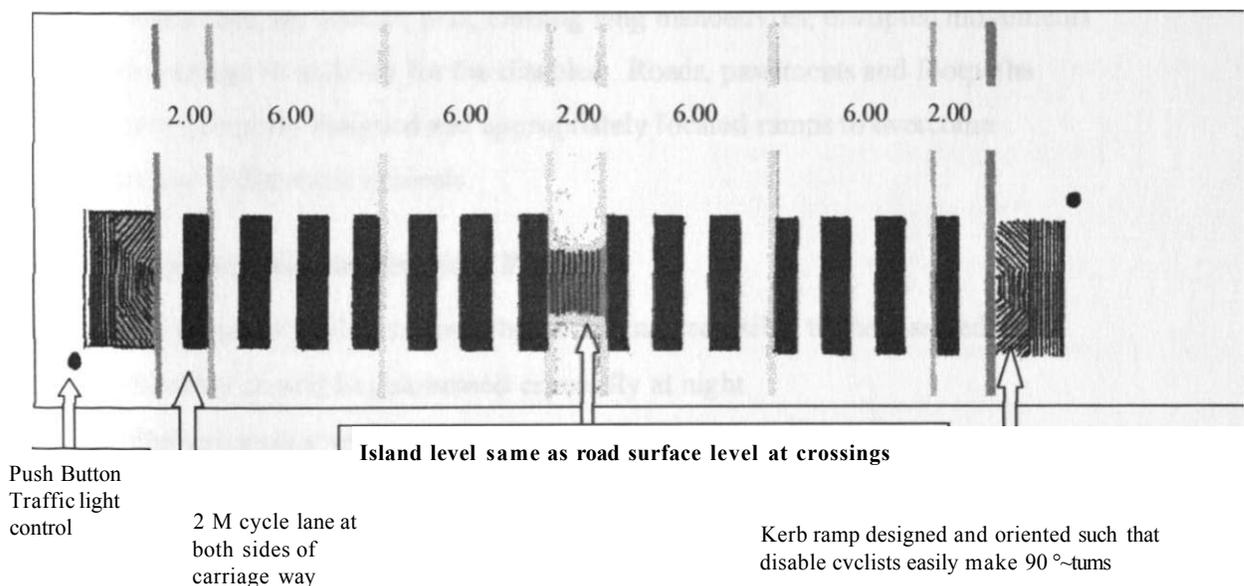
6.2.3 Improvements of Road and Terminal Facilities

The government should provide a barrier-free and disability friendly environment, on roads and *terminal* infrastructure, to enhance safe and convenient mobility and accessibility of the disabled persons. The following are some of the strategies aimed improvements of Road and Terminal Facilities

6.2.3.1 Road Widening and Improvements on Road-Side Environment

Road widening is recommended so as to accommodate cyclist disabled who were not catered for in the initial road designs and construction. This is consistent with the recommendations by JICA (2004) for road widening within the CBD to improve on their capacity. At least 2 metres should be allocated on each side of the carriage ways for the cyclists as shown in Figure 13. This has potentials of reducing the risks of accidents they are exposed to when they are moving alongside the motorists at close proximity. CCN should also enhance road utilization for mobility by prevention of illegal parking, traders, obstructions other illegal activities

Figure 12: Proposed Segregation of Cycle Lanes and Design of Pedestrian Crossings



6.2.3.2 Provisions of Street Resting Facilities

Street resting facilities should be provided at appropriate locations such as main *circulations paths*, at pathway crossings, near *entrance/exit* of major public buildings and recreation places, etc. UN (2004) recommends resting facilities at regular intervals of between 100 and 200 metres.

6.2.3.3 Improvements on Pedestrian Crossings

The government should facilitate safe and independent crossings for the disabled. There should be ramps at both sides of pedestrian crossings as shown in Figure 13. There should be provisions for traffic calming infrastructure, traffic signals, bumps or humps, at pedestrian crossing. In the long term, the traffic signals should have push buttons to delay predetermined timings of traffic lights for the slower disabled to cross safely.

6.2.3.4 Adequate Provisions of Transfer Facilities

Kerb ramps should be provided in order to help overcome changes in levels between the pavements and road surface and also along pedestrian paths and pedestrian crossings. Kerb ramps were found not only to be inadequate but also non-existent in places where they are critical; thus, causing long manoeuvres, disrupted movements and time wastage in mobility for the disabled. Roads, pavements and footpaths should have properly designed and appropriately located ramps to overcome difficulties of differences in levels.

6.2.3.5 Improvements of Terminal Facilities

- All terminal facilities should be paved and accessible to the disabled.
- Security should be guaranteed especially at night
- Shelter/canopy with seats should be provided. In order to avoid competing for the seats with the able-bodied, some seats should be reserved for the disabled by having a visible writing on them.
- Safe and secure storage for the NMT should be provided at the bus terminal in order to facilitate ease of inter-modal interchange for PSV to Tricycle or Wheelchair.

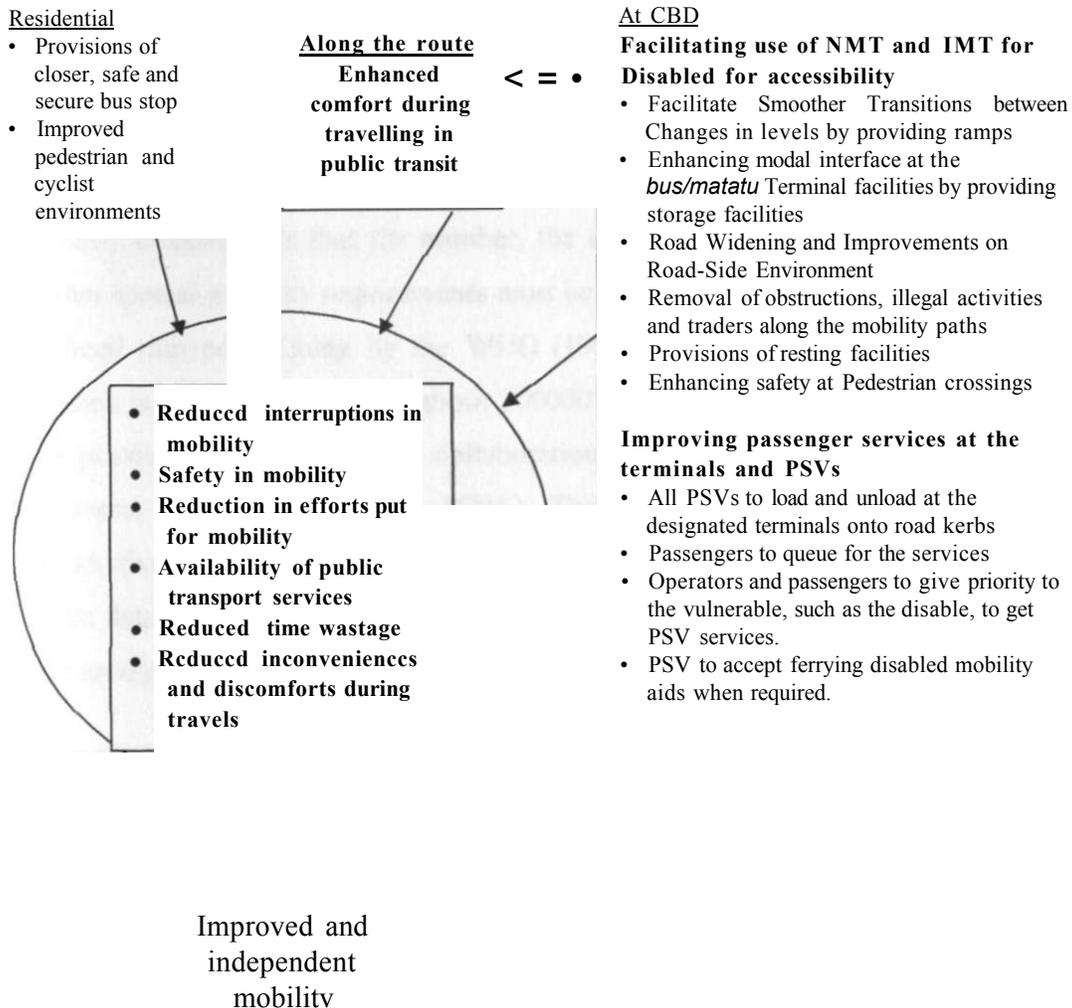
6.2.4 Facilitating Use of NMT and IMT for the Disabled

The study recommends facilitation of Non-Motorized Transport (NMT) as was proposed in the study by JICA in 2004. Improvements on the roads, Terminal facilities and public transport services, by and large, also aims at enhancing NMT. Some of the strategies for facilitating use of NMT include:

- 1 Encourage walking and cycling by improving sidewalks, paths and crosswalks, protection from fast vehicular traffic
- 2 Providing street amenities (trees, awnings, benches, pedestrian-oriented lighting, etc.).
- 3 Improve connections for non motorized travel, such as cycle storage located at the bus terminals.
- 4 Road widening and segregation of cycle paths
- 5 Stopping CCN *Askaris* from confiscating wheelchairs and tricycles of the disable

6.2.5 Intended impacts of the Interventions

Figure 13: Intended impacts of the strategies



Source. Researcher

The interventions which have been proposed above are intended to remove mobility barriers as well as design a responsive public transport service for the disabled. The proposals are intended to have varying impacts regarding the mobility of the disabled from the residential, along the transport routes and at the CBD as shown in the Figure 11.

6.3 General Policy Recommendations

6.3.1 Demographic data on the Disabled

One of the limitations of this study was lack of reliable statistics on the disabled not only in Nairobi but also throughout the country. This is a must for effective and meaningful planning for the disabled. In London, Local authorities were required by law to maintain accurate records of the number and the needs of the disabled in their areas as from 1970.¹⁹ Similarly, there exist social establishments that regularly register the disabled including their residence and transport needs among others.

*>? This study recommends that the number, the residence, trip making characteristics
O ir
- o and other special mobility requirements must be recorded, especially for provisions of
2 J
o specialized transport. Going by the WHO (1996) statistics, only 10% of the total
o population is disabled. Thus, just about 300000 persons are disabled in Nairobi. This
X *
f- C task is possible any time with the collaboration of provincial administration, NCPD
J
:∞ and Central Bureau of Statistics (CBS). The disabled may be registered in all
administrative units, say each sub-location, in special designed forms detailing all
requisite data about them, then forwarded to CBS for analysis. This is more or less
like an arrangement in USA.

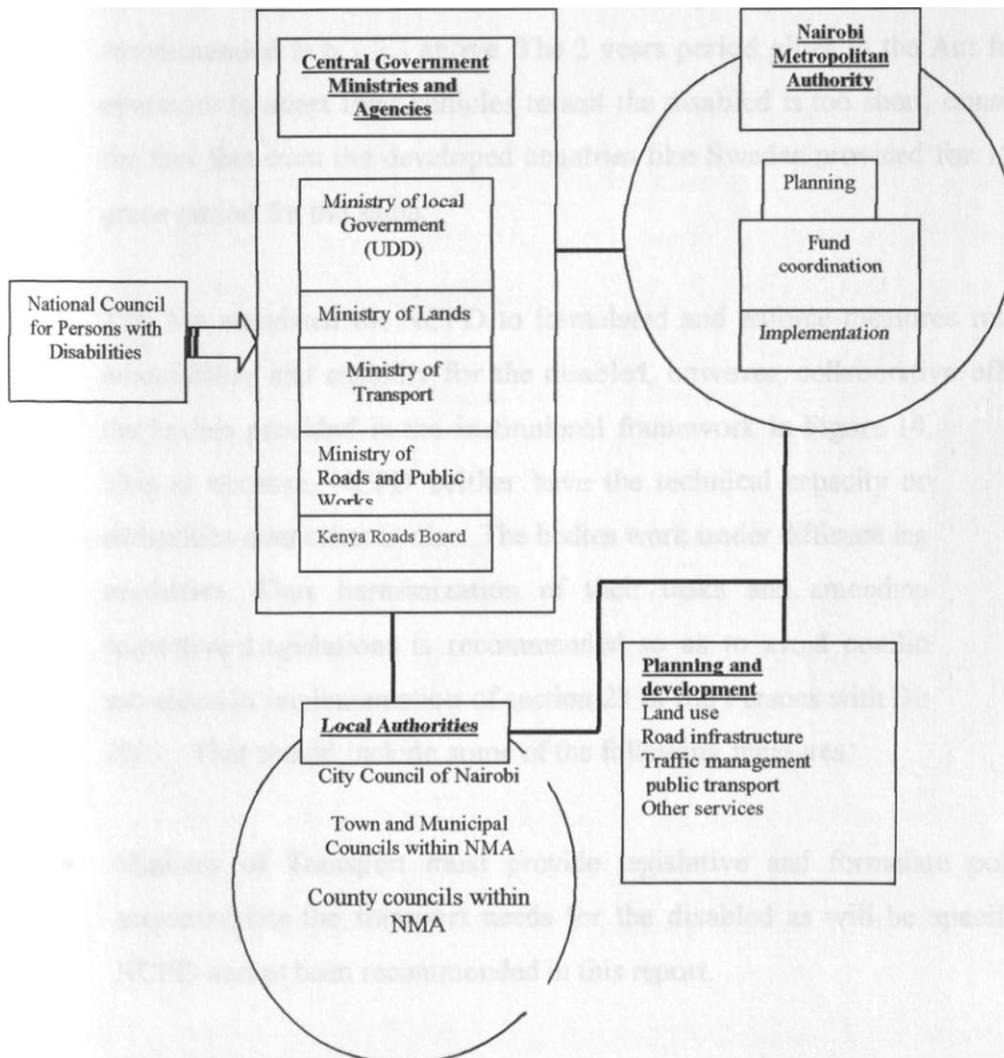
6.3.2 Institutional provisions for Urban Transport System

The research has revealed that the physically disabled come from within Nairobi and its *surrounding urban* centres and settlements located in neighbouring districts under jurisdictions of different local authorities. The study recommends that the institutional framework for management of urban transport system must include National council

Chronically Sick and Disable Persons' Act 1970 as quoted in Walter Felix (1971)

for Persons with Disabilities (NCPD) from the Ministry of Culture, Sports and Social Services. It is the missing link within Government ministries and agencies in the instructional framework proposed by JICA (2004). It is the government agency that has been mandated by law to apply and enforce Persons with Disability Act 2003, which guarantees the disabled barrier-free and disability friendly mobility environments. It is during the urban transport planning stages that requirements on mobility and accessibility are best incorporated so as to ensure their effective implementation. It should be proactive not reactive.

Figure 14: Recommended Institutional provisions for Urban Transport System



Source: Adapted from JICA (2004)

JICA study on *Transport Master Plan For Nairobi Metropolitan Area* had recommended that ideal institutional arrangement for public transport sector in Nairobi is to establish an agency which executes not only planning and coordination functions but also has certain authority to mobilize related entities to harmonize actions to materialize preferred conditions of the sector. Their functions as well as other stakeholders in urban transport planning have been shown in Figure 15

6.3.3 Legal Amendments for Mobility Improvements

1. Amendment to Persons with Disabilities Act 2003, Sec 23, should be done; to allow for gradual introduction of structurally suitable PSVs as has been recommended in 6.1.2.3 above. The 2 years period given in the Act for PSV operators to adapt their vehicles to suit the disabled is too short, considering the fact that even the developed countries like Sweden provided for 15 years grace period for the same.
2. The Act mandated the NCPD to formulate and enforce measures related to accessibility and mobility for the disabled, however, collaborative efforts of the bodies provided in the institutional framework in Figure 14, to succeed. This is because, NCPD neither have the technical capacity nor overriding authorities over other bodies. The bodies work under different legislations and ministries. Thus harmonization of their tasks and amendments to their respective Legislations is recommended so as to avoid conflict but ensure successes in implementation of section 23 of the Persons with Disabilities Act 2003. That should include some of the following measures:
 - Ministry of Transport must provide legislative and formulate policy to accommodate the transport needs for the disabled as will be specified by NCPD and as been recommended in this report.

- TLB which is charged with licensing PSVs; should, in future, only license the PSVs which have complied with NCPD structural requirements for the disabled
- CCN mandated by Local Government Act to provide, operate and maintain public transport infrastructures within their jurisdiction should be involved in planning and implementations of a barrier-free mobility environment for the disabled Local Government Act should be amended so that all local authorities are forced to comply.
- Ministry of Roads and Public Works which is charged with the design and provision of transport infrastructure in the country should provide d for barrier-free transport infrastructure right from the design stages
- Traffic Act should also be amended so that Traffic police, who is charged with law enforcement and direct traffic control, be part of the implementation of sec 23 in Persons With Disabilities Act 2003.
- The Persons with Disabilities Act 2003 should also provide for involvement of public transport providers, local manufacturers and dealer in public transport vehicles and the investors in the industry in formulation and implementation of measures aimed at improving mobility and accessibility for the disabled.

6.3.4 Policy Formulations to Guarantee Livelihood for the Disabled

Transport is a derived demand that aims to help in achieving mostly social and economic objectives. To the disabled, it may be *argued that* irrespective of how *much* a given transport may favour them, it may be of little benefit if trips made does not translate in improving their livelihoods. More than 90% of the respondents have been observed to endure an unresponsive transport, making 6 to 7 trips weekly to city centre, just to secure or improve their livelihoods. As such, as much as improvement of their mobility is important, their livelihood is more important.

The study recommends that the disability policy in the offing should among other things include the following:

- i. The government should formalise the informal sector businesses that most physically disabled were found to engage in. They should not be viewed as illegitimate, since, they guarantee livelihoods for a sizable proportion of the population.
- ii. The City Council of Nairobi in collaboration with National Council of Persons with Disabilities should allocation-designated places where the disabled can carry out their small-scale businesses and offer other services for income within and outside the city centre. It is important that these places must be where they can get customers for the kind of businesses and services they are engage in.
- iii. Guarantee accessibility to micro-economic enterprise loans so that they can engage in formalized businesses. With adequate capital, they can rent premises, to carry out their income activities as well as to repay loan. This is because; they have potentials of servicing loans owing to the nature of income they earn.
- iv. Provide some vocational training to impart some business skills among other field of specialization, to the physically disabled, so as to improve their income opportunities. Those who had high level of educations were found to generate more income from the same kind of income generating activities.
- v. As for the disabled, active labour force age should be 50 years and below. The study found out that the physically disable above the age of 50 years were mainly beggars, could not cycle, and were living on the streets. This was attributed to their relatively faster decline in physical abilities.
- vi. Special attention should be given to disabled women who were found to reside in predominantly woman-headed households with dependants to fend for.

6.3.5 Decentralization of Nodal Points Closer to Residential

One of the main reasons why the disabled are bound to suffer lots of travel limitations is because they have to travel longer distances regularly for livelihood. This implies that they are using more than one mode, take longer time to reach destinations, pay more fare, and therefore suffer more discomforts and inconveniences of travelling using unresponsive transport services. This is because; the CBD of Nairobi has a

strong influence as well as offers opportunities that are not found elsewhere within the vicinity of the city.

The study recommends that in the long term, services and opportunities within the CBD should be decentralised to other small centres closer to residential areas. This should potentially reduce the need to travel to city centre; as people can get most services and other opportunities nearby, and only travel to the CBD for higher order services. Emerging cities should organize their land uses in such way that the need

to travel longer for opportunities is avoided. Alternative opportunity model assumes that people will prefer going for closer opportunities to those, which are further away. The smart growth principle, one of the current concepts in urban planning, advocates for an urban structure that reduces the need for mobility for longer destinations.

6.4 Conclusion

The study has managed to achieve the objectives it had set, therefore successful. It has shown that the physically disabled travels out of necessity to secure their livelihoods. Hence, frequent travels to opportunity areas are indispensable despite unfriendly and barrier ridden mobility environment. The mobility limitations are inherent in vehicular design and public transport operations as well as deficiency in terminal infrastructure; discriminatory public attitude hindering their access to transport services; insufficient pedestrian and cyclists' infrastructure both along the roads and at crossing. The consequences of the limitations include: interrupted movements, compromised safety, inconveniences caused by lack of inter-modal interface, inaccessibility to transport services, time wastage in travels and discomforts during travels

The mobility barrier for the disabled has along history, and may be seen as one of the negative impacts in the course of transport evolutions since it has faced both the developed and developing countries. Based on the unique situation in Nairobi, the study has suggested recommendations to improving mobility for the disabled and

Alternative opportunity model is one of the models used to analyse the demand for travels

general policy on institutional framework for urban transport management, improving the livelihood of the disabled and decentralization of opportunity area in urban land use planning.

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APPENDICES

UNIVERSITY OF NAIROBI
School of Built Environment
Department of Urban and Regional Planning

To the respondent,

Please note that the questionnaire is intended to collect data, which is exclusively for academic purposes. The data is a major requirement for the research, which intends to investigate transport problems of the physically handicapped and propose strategies through which their mobility can be improved in Nairobi. Your voluntary input is highly appreciated.

I: General

A: Respondent attributes

1. Name Sex Age(Yrs)
2. Marital status
3. Place (estate) *of* residence
4. Economic activity_
5. Highest education level
6. When came to Nairobi **Why**
7. Household size
8. Nature of disability/impairments
 Physical/Ambulatory Visual Hearing Mental
9. Onset of the disability
 At birth Just after birth During Adulthood During Old age
10. Causes for impairment
 Illness (polio) Injury (accidents) Age congenital malfunction Other
permanent or temporary incapacity
11. Services received and source

B: Respondent's mobility and reasons

12. Do you move independently? Yes/No

If no, who assists you?

13. Do you have mobility aids/gadgets? Yes/No

If yes, which ones Clutch Wheelchairs Tricycle Others

14. What, in your experience, are the effects of the disability?

Poverty Illiteracy Social exclusion Unemployment

Inability to gain access to public or motor transport Others (specify)

15. If you are in a position to move easily wherever and whenever you wish, do you think this can solve some of these problems? Yes/No

If yes, which ones? (Specify)

C: Public transport usage and constraints

16. How often do you come to town per week?.....(Times)

17. What is the purpose for which you usually travel to town?

Work Business In search of job Education/training Leisure Socialize

Others (specify)

18. Is it possible for you to meet these purposes elsewhere away from town? Yes No

19. Do you use public Transport to Town? Yes/No

a. If no, which means? Tricycle Wheelchair Train Walk,
 Other (specify)

b. If yes, when do you usually begin your trip to and from town?

To.....(am) From.....(pm)

- c. Reason? Avoid congestions Save on fere To begin work early dosing times
 Others (specify)
20. How do you move within the city center? Do not move Use NMT With assistance
 Crawl Other (Specify)
21. How far is the public transport route from the residence?
(KM)
22. Do you find it easy to move that distance?
Yes/No
23. Do you find it easy to board or alight public transport? Yes/No
If no, why?
 Entrance too high Competition Operators impatience
 Others (specify)
24. Do they readily accept your gadgets? Yes/No
25. Are *you satisfied* with the public transport performance in general?
Yes/No
26. In general, what are the problems you are facing when using public transport.
27. What do you think should be improved in public transport?
 Operations Entrance, Space for gadgets Reduce fare Pick people closer to residence Other specify)

D: Private transport

28. Which transport means do you own?
 None Tricycle Wheelchair Car, Others (specify)
29. How did you acquire it/them?
 Personal savings Loan Charity (Church/NGOs/etc) Government donation
 Others (specify)

30. How has ownership of private means boosted your income opportunities?

Yes/No

If yes, how?

31. How much your income monthly/yearly? Kshs

32. What problems do you *faced* ownership and usage of NMT transport?

Police harassments Cost of Repair and Maintenance Weather

Environmental pollution Longer travel time Requires a lot of efforts

Other (specify)

33. How do you ensure *your safety* when using the road?

Yellow jacket/Clothing Cycling/walking in safe areas Avoiding rush hour

Other (specify)

34. Where do you keep your NMT vehicle in town when leaving for home?

E: Road infrastructure

35. Are road conditions and usage a hindrance to your private mobility in Nairobi? Yes/No.

If Yes, why?

Potholes Road Width Safety measures Broken kerbs

Barriers (sign boards, facilities on roads reserve, etc) Competing uses

Dust/Dumping on roads Others (specify)

36. Do you have personal insurance cover? Yes/No

37. What improvement do you recommend on the road

University of Nairobi

Department of Urban and Regional Planning

Interview with APDK

This interview is solely for academic purpose. It is an undertaking in M.A.(Planning) thesis that aims to establish mobility limitations of the disabled in Nairobi and proposed how their mobility can be enhanced. Your responses are confidential and will have a great contribution in making this exercise successful.

General

When was APDK registered in Kenya?

Why was it formed?

What are its main objectives today that it is striving to achieve?

What are some of the organizations that you involve in meeting these objectives?

How does the organization relate with National Council of Persons (NCPD) with Disability

What challenges are you facing in meeting them?

What are the statistics of the disabled in Kenya and Nairobi?

Accessibility and mobility of the disabled

Is accessibility to buildings and transport a major challenge to your members in Kenya?

What are some of the challenges your members face in using public transport?

What has APDK been doing about it?

Which organizations are you consulting with in ensuring accessible public transport?

What are their (the disabled) challenges in acquisition and using NMT?

What have you been doing about it?

When does one qualify for a wheelchair or tricycle from APDK?

Recommendation

What long-term strategies are you working on or do you think should be employed in improving mobility of the disabled in Nairobi?

Appendix III: Structured Interview with National Council of Persons with Disabilities

University of Nairobi

Department of Urban and Regional Planning

Interview with NCPD-DSS

This interview is solely for academic purpose. It is an undertaking in M.A. (Planning) thesis that aims to establish mobility limitations of the disabled in Nairobi and proposed how their mobility can be enhanced. Your responses are confidential and will have a great contribution in making this exercise successful.

What are your roles in abating problems stemming from disability?

What are you doing with regards to transport for persons with disability?

What are some of the challenges you facing in implementing persons with disability Act 2003?

Is lack of disability policy one of the challenges?

Do you involve other organizations carrying out your mandates; especially provision of and ensuring accessible transport for the disabled?

What are some of the strategies do you have in place to ensure access to transport; both public transport and non-motorized transport?

Thank