DESIGN AND ATTITUDINAL BARRIERS INFLUENCING ACCESSIBILITY OF LEARNERS WITH PHYSICAL DISABILITY TO BUS TERMINI IN THE WESTERN PART OF KENYA

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DECLARATION

Student's Declaration

I confirm that this research thesis is my original work and has not been presented in any other university for certification. The thesis has been complemented by referenced works duly acknowledged.

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To the people who inspire me

My parents, Eng. A.J. Ahonobadha and Rhoda Atieno Ahonobadha,

My best friend and husband, Tom Ochieng' Okumu,

And my sons, Kinda, Hera and Geno.

ABSTRACT

Globally, approximately one billion people have disabilities of which 80% reside in developing countries. In order to ensure equitable treatment of people with disability, the Government of Kenya enacted legislations advocating for non-discrimination against people with disability. Despite the existence of an enabling legal framework upholding the right of admission to public spaces by all, bus termini remain inaccessible to learners with physical disability during times they use these facilities in the trip to school. In Kenya, learners with disability who are enrolled in special schools are 35,000. Learners with physical disability who receive special education services in Kenya make up 25% of all students with disability receiving educational services. The main objective of this study was to evaluate design and attitudinal barriers influencing accessibility of learners with physical disability to bus termini in the western part of Kenya. The specific objectives of the study were to: determine the influence of design of circulation paths in bus termini on mobility of learners with physical disability; establish the influence of layout of amenities in bus termini on independence of learners with physical disability; examine the impact of attitudes of other users of termini on spatial inclusion of learners with physical disability. This study used Universal Design Theory which advocates for provision of built environments which enhance access for all. A cross sectional survey targeting learners with physical disability who frequently used bus termini in the western part of Kenya was done. The population of these learners was 1,525 from which 317 respondents were sampled. The study also targeted seventeen key informants drawn from the County Works offices and the National Land Commission. Data was collected using questionnaires, an observation schedule and key informant interviews. The study yielded qualitative and quantitative data. The study found out that the accessibility of the learners was hampered due to: inappropriate maintenance practices and poor design of circulation paths; inappropriate design of washrooms, seating facilities and signage. Negative attitudes were also exhibited by other users of bus termini during instances when the learners had surmounted a perceived design barrier, or when they were locked out of certain spaces due to the presence of a design barrier. The following conclusions can be made: the mobility of the learners was hampered when they made use of circulation paths in the bus termini; the independence of the learners was hampered due to inappropriate design and layout of amenities; presence of negative attitudes enhanced spatial exclusion of learners with physical disability. To enhance access, the following recommendations are made: circulation spaces in the bus termini should be redesigned so that barriers arising due to inappropriate construction practices or wear and tear can be eliminated; there is need for major renovations in bus termini so that the planners and designers can redesign these spaces to conform to a Universal Design template; the Government of Kenya should provide civic education to members of society so as to enable them get rid of their negative view of people with disability.

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OPERATIONAL DEFINITIONS

i. **Accessibility**: The ease with which anyone is able to approach, enter and make use of facilities independently. Accessibility is enhanced by the presence of continuous unobstructed path connecting all barrier free elements and spaces in a building or terminus.

ii. **Ambulant**: Somebody who can walk from place to place without assistance.

iii. **Amenities**: Seating facilities and washroom facilities in bus termini. These are the areas open to the public.

iv. **Attitudinal barrier**: A negative view or opinion that a person has towards people with disability. In this case, focus was on prevailing attitudes exhibited towards learners with physical disability during instances learners encountered a design barrier.

v. **Circulation paths:** Drop offs and pavements in bus termini. Circulation paths are used by travelers at the beginning and end of journeys to get to various points of termini.

vi. **Bus terminus design:** The physical layout and tangible components of the facilities of a bus terminus. It is the final output of the design process.

vii. **Design barrier:** Physical attributes of buildings and bus terminus facilities, which by their presence or absence present unsafe conditions which deter access and free mobility in and around buildings and facilities.

viii. **Drop off point**: Designated locations for passengers to alight from public service vehicles.

ix. **Major bus terminus**: A bus terminus which facilitates interchange between vehicles when travelers go for long distance journeys. A major terminus acts as a transfer station from one vehicle to another.

ABBREVIATIONS AND ACRONYMS

GoK	Government of Kenya
LwPD	Learners with Physical Disability
MDGs	Millennium Development Goals
MUERC	Maseno University Ethics Review Committee
NBR	National Building Regulations
NCPWD	National Council for Persons with Disabilities
PDA	Persons with Disabilities Act
PwD	People with Disabilities
UNCRPD	UN Convention on the Rights of Persons with Disabilities

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CHAPTER ONE: INTRODUCTION

1.1. Background of Study

Statistics from the State of the World Population indicate that more than half of the world's population is below the age of 25 years; while nearly one third of this population is between the ages of 10 and 24 years (United Nations, 2015). The Kenya National Bureau of Statistics suggests further that young persons aged between 15-30 years number about 12 million (Kenya, Republic of, 2010). Within this category of youths, there exists a segment which Mugo, Oranga and Singal (2010) term 'youth at risk'. This category of youths includes those from extremely poor families, school drop-outs, those living on streets, infected with HIV, and those with disabilities. While many research studies have focused on the plight of youth living on the streets in Kenya, as well as those infected with and affected by HIV and AIDS, little attention has been accorded to youth with disabilities (Mugo et al, 2010).

Orthodox medical definitions affirm that impairment is the main cause of disability. This assertion reinforces the view that humans are flexible and adaptable while physical environments are not (Barnes, 2011). Provision of built environments which do not support the spatial needs of a segment of the populace leads to segregation. During instances when certain classes of people are excluded from the built environment, then non-verbal cues are passed out that this class is not welcome to use these spaces. On the other hand, adaptive barrier free environments which consider the requirements of all potential users will uphold access for all.

In 1994, the United Nations launched twenty two rules for achieving equality for people with disabilities (PwDs). The United Nations also identified eight areas of participation that should be recognized by governments when legislating for the integration of PwDs into society. These

areas were accessibility, education, employment, income maintenance, family life, culture, recreation and religion (United Nations, 1994). Five years later, the United Nations recognized that the process of translating the rules into actual policy and practice was a 'major challenge' and in response to this, called for empirical research be carried out into the social, economic and participatory issues affecting the lives PwDs and their families (United Nations, 1999).

Based on this recognition, this study intends to carry out an empirical research on the accessibility of bus termini to learners with physical disability during the trip to school. Access to transportation facilities touches directly on the participation of people with disability. Bus termini have a direct impact on the social, economic and participatory issues of people with disabilities (PwDs). On one hand, accessible termini enable access, while on the other hand, the presence of barriers contribute to on-going discrimination against PwDs.

In the recent past, improving accessibility has emerged as a central aim of Urban Planners and aligned disciplines (Iacono, Krizek and El-Geneidy, 2010). Mont and Nguyen (2013) note further that improved transportation systems lessen the barriers that PwDs face. An initial point of entry in this quest for accessibility entails paying greater attention to the detail of the "journey chain" with access consistently provided throughout, making for seamless journeys (Maynard, 2009). A study in Nigeria by Odufuwa (2007) suggests that accessible transportation creates an avenue for breaking out of the vicious cycle of poverty.

Other than attitudinal barriers, people with disability usually experience a range of barriers manifest in the design and construction of physical infrastructure (Barnes and Mercer, 2004).These barriers lead to hampered access of people with disabilities (We Care Film Fest, 2010). In the context of bus termini, accessibility can be broken down to encompass the design of circulation paths, the layout of facilities therein and the attitude of non-disabled users of bus

termini towards PwDs. These three parameters have a direct impact on how potential users can approach, enter and make use of transportation facilities.

Consideration of the normate template which has a walking and fleshy body at the center of thinking about design. This concept was institutionalized in mainstream architecture by the mid-20th century in technical, quantifiable measures of the 'privileged' users of space. It is rooted, however, in 19th century eugenics-based anthropometry that was originally used to identify and treat bodies that deviated from the norm. Ironically, this same science has been used since the late 20th century to ensure representation of the 'misfit' in the design of built environments (Hamraie, 2012).

Adherence to this template leads to production of living spaces which fail due to lack of consideration of additional space requirements for people who use technologies to navigate space. In order to sustain itself, the normate template relies upon the impression that normates are normal, average, and majority bodies (Hamraie, 2013; Burgstahler, 2012). A possible point of intervention on the debate on access to the built up environment is provided by embracing a Universal Design outlook.

Ronald Mace coined the term 'Universal Design' in the early 1990s (Larkin, Hitch, Watchorn, & Ang, 2015). This approach advocates for provision of built environments which are designed to be as accessible as possible from the outset, to as many people as possible. This approach considers the relationship between users' bodies, assistive devices and the built environment itself (Steinfeld and Maisel, 2012; Hamraie, 2013). Imrie and Hall (2001) explain that the objectives of Universal Design is to hide people's impairment, while avoiding such attention to their impairments and minimizing public tendency to 'social ostracism'. A universally designed environment also addresses diversity through flexible design solutions for users with various

backgrounds and abilities (Gossett, Mirza, Barnds, & Feidt, 2009). This study seeks therefore to establish whether the designs of bus termini in the western part of Kenya ascribe to a normate template or a Universal design one. A Universal Design template will enhance accessibility and usability, while a normate one will lead to formation of design and attitudinal barriers.

Universal Design argues for provision of pavements which do not hinder mobility. These pavements should be of firm, level and non-slip materials. In order to avoid trip hazards, it is important to avoid inadequate design and construction practices and to control natural features of the terrain of pavements (Venter, Savill, Rickert, Bogopane, Venkatesh & Maunder, 2002). Other than pavements, level rest areas with seats are helpful for all commuters, regardless of physical status. Duarte & Cohen (1995) confirm that fatigue interferes with enjoyment of places, and can exacerbate spatial exclusion of individuals. To address the issue of spatial inclusion on seating areas, Solidere (2004) proposes that seats should be provided at regular intervals between 1000 mm and 2000 mm. These seats should be placed with due consideration of existing circulation paths (Solidere, 2004).

In the design of wash room stalls, dimensions of 1500 mm by 1675 mm are recommended to facilitate ease of use, more so by wheel chair users who require up to twice the space used by the ambulant (Peloquin, 1994). This observation is in line with the Universal Design principle which requires provision for approach, reach, manipulation and use of facilities. These provisions enhance equitable access regardless of the body size, posture or mobility of potential users.

Broadly, this study will evaluate the accessibility of bus termini in the western part of Kenya to learners with physical disability (LwPD). Universal Design principles require that facilities should be accessible to all irrespective of age, physical dimension, temporary or permanent disability. Based on this requirement, this study will focus on the unique challenges faced by

LwPD since they are more vulnerable, when compared to people with disabilities who are much older. This sub group faces unique challenges due to their age, physical dimension (assistive devices take up a lot of space) and severity of disability. These learners also tend to use bus terminus facilities when the facilities are very congested since special and regular schools open and close at the same time.

1.2. Statement of the Problem

In the recent past, the Government of Kenya has enacted legislations locally, while ratifying and domesticating international conventions which advocate for equitable treatment of all. Examples include Article 47 of the country's constitution which acknowledges that the state will not discriminate against any of its members on any ground, including disability; Section 21 of the Persons with Disabilities Act (2003) clarifies further that persons with disability are entitled to a barrier free environment while the United Nations Convention on the Rights of People with Disabilities (2000) requires member states to promote, protect and ensure the equal enjoyment of all human rights and fundamental freedoms by all persons with disabilities.

Despite the existence of an enabling legal framework advocating for equitable treatment of all, bus termini remain inaccessible to learners with physical disability whenever they use the facilities in the trip to school. The Ministry of Education released a report which indicated that learners with physical disability are the largest group of learners with disability receiving special education (Kenya, Republic of, 1986). Ndurumo (1993) explains further that learners with physical disability who receive special education services in Kenya make up 25% of all students with disability receiving educational services in Kenya.

Bus termini are therefore obligatory points of passage since special schools are few in number and far removed from the residences of most learners. During instances whenever the learners

use bus termini, they encounter design barriers in pavements and drop offs. The presence of design barriers in pavements and drop offs leads to hampered mobility of the learners. In addition to this, inappropriate layout of signage, seating and washroom facilities hamper the independence of the learners. While navigating over design barriers, these learners also experience attitudinal barriers emanating from other users of bus termini.

A disconnect seems to exist between the prevailing scenario as far as inclusivity of bus termini is concerned and what the country pledges to do. Since the promulgation of a new constitution by the country in 2010, services were devolved from the National government to various County governments. This study therefore seeks to investigate the extent to which Counties are improving access to bus termini, given that the National government has enacted and ratified legislations which advocate for provision of barrier free environments.

1.3. Main Objective

The main objective of this study was to evaluate design and attitudinal barriers influencing accessibility of learners with physical disability (LwPD) to bus termini in the western part of Kenya.

1.4. Objectives of the Study

i. To determine the influence of design of circulation paths in bus termini located in the western part of Kenya on mobility of learners with physical disability.

ii. To establish the influence of layout of amenities in bus termini located in the western part of Kenya on independence of learners with physical disability.

iii. To examine the impact of attitudes of other users of termini on spatial inclusion of learners with physical disability.

1.5. Research Questions

i. How do the designs of circulation paths affect mobility of learners with physical disability during instances they use bus termini?

ii. How does the layout of amenities impact on independence of learners with physical disability when they use bus termini?

iii. What effect does the attitude of non-disabled users of termini have on spatial inclusion of learners with physical disability?

1.6. Significance of the Study

The Bill of Rights of the Kenyan Constitution advocates for provision of an inclusive society which ensures that all are integrated into mainstream society. The information from this study will form a knowledge base on the components of accessible bus termini which in turn promote visibility of disabled persons. Inaccessible termini relegate disabled persons into being second class citizens since the spaces therein enhance spatial exclusion. Inappropriate layout further passes out non-verbal cues which welcome those who can "fit" while excluding those who experience difficulty accessing these spaces. This study also presents a platform through which discriminatory spaces in bus termini are highlighted with a view to ensuring that design and attitudinal barriers are eliminated.

The information generated from this study will also build up onto the Social Pillar of the Vision 2030 flagship project which advocates for equity and poverty reduction. Further, this study promotes equality as is envisioned in the Sustainable Development Goal which focuses on equity and equality since accessible termini provide an avenue for breaking out of the vicious cycle of poverty. Further, the right of vulnerable people to the built environment is articulated. This study provides a basis for critiquing the design and layout of the built environment so that people who are excluded spatially get an avenue for exposing barriers which present disabling conditions. In

this way, public spaces of bus termini will enhance all inclusivity of potential users, regardless of physical stature. Equitable access to drop offs, pavements, seating facilities and washrooms of bus termini will also enhance the self-esteem of people with disability.

This study is also of import to planners and designers since it presents a concise evaluation on the uptake of Universal Design parameters in the layout and design of components making up a bus terminus. The findings from this research will highlight the negative attitudes of other users of bus termini towards LwPD during instances the learners encountered design barriers. In conclusion, the findings from this study presents a platform on which bus termini can be made to be more inclusive and agreeable for all regardless of age, size or disability.

1.7. Scope and Limitations of the Study

The study evaluated major bus termini located in Kisumu, Bungoma, Kakamega and Kendu Bay. Special schools for learners with physical disability are located around these bus termini, hence the volume of LwPD making use of these termini is large, more especially when schools open or close. The study focused on the design of circulation paths, seats, washroom design and the prevailing attitudes of non-disabled users of termini towards LwPD whenever the learners encountered design barriers.

The circulation paths of bus termini were evaluated so as to establish whether periodic maintenance was carried out to eliminate barriers arising from wear and tear. In addition to this, planners and designers were required to ascertain whether Universal Design parameters had been incorporated in the bus termini which were evaluated. The scope of the study did not extend to vehicles making use of the major bus termini or minor bus termini located in the western part of Kenya. Adjacent pavements and streets to bus termini in the study area were also not covered.

The study did not cover social or economic issues influencing access of LwPD to termini, yet

these may have an effect on the way in which LwPD access termini. LwPD who are from families which are stable economically may be able to afford the cost of having someone to accompany them to school and help them navigate over potential design barriers, while those who experience financial constraints may not afford this privilege. As a result, LwPD who have escorts may not experience the same barriers as those without. In the selection of respondents, the researcher therefore screened out respondents who were escorted to school and concentrated only on those who traveled unaccompanied.

While carrying out the study, some respondents (especially the 11-13 year olds) were particularly shy. To mitigate this, the researcher, in conjunction with the teachers in the special schools gave motivational talks so as to boost the self-esteem of the LwPD in the study area. In addition to the talks, the researcher self-administered questionnaires to the respondents. This enabled the researcher to clarify ambiguities to the learners.

1.8. Theoretical Framework

In the evaluation of the components of the bus termini, the study will use Universal Design Theory. Within the Universal Design paradigm, accessibility indicates not only the degree to which a location or facility is reachable by someone with an impairment, but also includes other factors, such as the usability of the facility and the attitudes in the social environment (Rattray, Raskin and Cimino, 2008). D'souza (2004) explains that the beginnings of Universal Design catered for people with diminished abilities such as physical impairment, retardation, advanced age and pregnancy, the current trend provides for the needs of the majority.

Universal Design Theory advocates for provision of built environments which are designed to be as accessible as possible from the outset, to as many people as possible regardless of age, stature, size or disability. The focus of Universal Design Theory is that the built environment should be

designed in such a way that it will not require future retrofitting or alteration. When designing the built environment, designers are required to take into account aging, gender, size and health of potential users (Steinfeld and Maisel, 2012). The tenets of Universal Design Theory propose that environments should be accessible to all regardless of age, disability, dimension or physical stature. The principles advanced by Universal Design Theory can be applied in the evaluation of existing designs, in guiding the design process and in the education about characteristics of usable products and environments (Centre for Universal Design, 1997).

The seven principles of Universal Design encompass equitable use of designs, flexibility of designs in use, provison of simple and intuitive designs, perceptible information, tolerance for error, low physical effort, size and space for approach (Centre for Universal Design, 1997). Principle one advocates for equitable use of designs. Designs are required to be useful to people with diverse abilities. Principle two stresses on flexibility of designs while they are in use. Designs should accommodate a wide range of individual preferences and abilities. The third principle stresses on the provision of designs which encourage simple and intuitive use. Focus is on the provision of designs which are easy to use, regardless of the user's experience or current concentration level (Center for Universal Design, 2008).

The fourth principle emphasizes on the need to provide perceptible information in any given set up. Designs provided are required to communicate necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities. The fifth principle proposes that designs should have an inbuilt tolerance for error. In this way, designs are required to minimize hazards and the adverse consequences of accidental or unintended actions. Principle six emphasizes the need to ensure users of a design expend low physical effort while making use of a given product or layout. Ideal designs can be used efficiently, comfortably and with minimum

fatigue. The seventh principle highlights on the provision of adequate sizes and spaces to facilitate approach, reach, manipulate and use of a given design layout regardless of the body size, posture or mobility of potential users (Center for Universal Design, 2008).

The seven principles of Universal Design will be used in the evaluation of circulation paths, signage, seating facilities and washroom layouts of selected bus termini located in the western part of Kenya. The design and layout of drop offs and pavements will be evaluated in order to establish whether their layout enhances mobility. This study will also ascertain whether the circulation paths promote flexibility in use by the ambulant, ambulant disabled and wheel chair users. Signage will be evaluated in light of the principle advocating for tolerance of error, while washroom design and layout will be evaluated in light of the principles advocating for low physical effort, equitable use and provision of adequate space which enhances approach to the components of a washroom.

1.9. Conceptual Framework

Figure 1.1 presents a conceptualization of the components of a bus terminus. Interaction of the components highlighted can either enhance accessibility to a bus terminus or enhance exclusion from the facility (Figure 1.1).

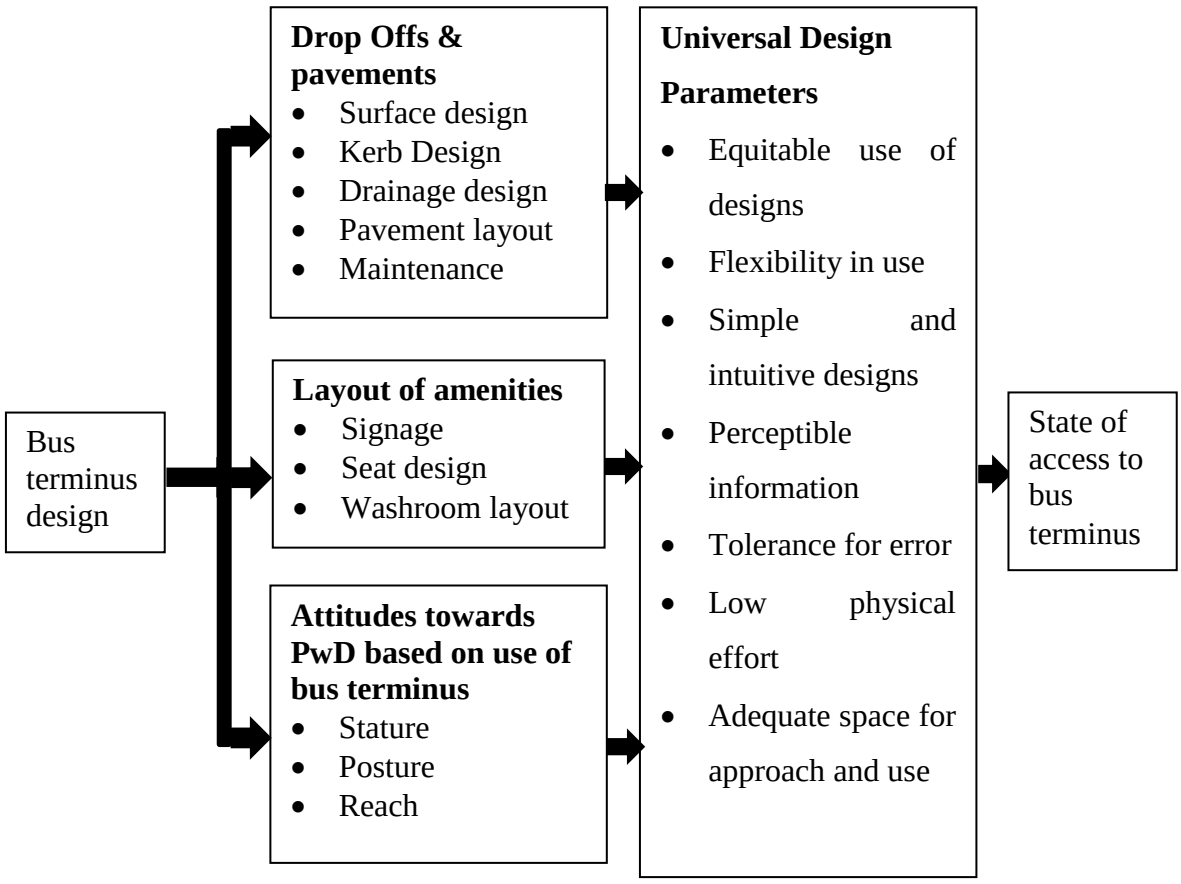


Figure 1.1: Conceptual Framework (Self Conceptualization)

The components of a bus terminus illustrated in the conceptual framework include the circulation paths, layout of amenities and the attitude of other users of termini towards LwPD. Whenever LwPD make use of bus termini, their personal factors interact with circulation paths and amenities to either enhance access or deter access. Adherence to Universal Design parameters in

the design of drop offs and pavements will enhance the mobility of commuters. In addition to this, adherence to Universal Design in the layout of buildings housed in termini will ensure independence of users. The layout of washrooms will ensure independence of users while the design of seats and signage will promote spatial inclusion if the prevailing design is responsive to the spatial needs and requirements of users.

When applied to circulation paths, the first principle highlights the need for provision of drop offs and pavements which can be used by all LwPD, regardless of whether they use wheel chairs, are ambulant, or ambulant disabled. Principle two stresses on provision of alternate but equivalent use of facilities in a bus terminus. Examples would include provision of ramps next to a staircase. Principle three encompasses removal of conditions which enhance slip or trip hazards arising from uneven surfaces. Principle four covers the provision of adequate signage and way finding features. Principle five, six and seven would give rise to accessible seating and washroom facilities. During instances when the principles are disregarded, then a given bus terminus facility would end up being inaccessible to LwPD. The conceptual framework also brings to light the possibility of attitudinal barriers existing in termini. These barriers may be displayed by other users of termini when they observe how LwPD navigate over design barriers.

CHAPTER TWO: LITERATURE REVIEW

2.1 Overview

This chapter covers literature based on the following three objectives of the study: determine influence of features of circulation paths on mobility of learners with physical disability in bus termini; establish influence of layout of amenities in bus termini on independence of learners with physical disability; and examine impact of attitudes of non-disabled users of termini on spatial inclusion of learners with physical disability.

2.2 Design of Circulation Paths and Mobility of Learners with Physical Disability.

The experience and competence of all users, especially people with disabilities is vital to the accomplishment of true Universal Design (Haugeto, 2013). Provision of drop offs and pavements in bus termini which are accessible to a wide range of people will promote Universal Design since these spaces will enhance mobility of all potential users.

A study conducted in the United Kingdom by Lacey (2004) established that buildings which are designed or adapted with the access needs of people with disability in mind are likely to be more flexible. This study revealed that since access audits give a 'snapshot' of an existing facility at one point in time, they are a useful starting point in assessing the current state of accessibility and usability of existing buildings (Lacey, 2004). During instances when access audits of circulation paths assume a Universal Design approach, they become useful tools in identifying potential barriers to mobility. This study will therefore evaluate circulation paths in bus termini located in the western part of Kenya so as to establish whether they enhance mobility for LwPD.

Post-Occupancy Evaluation (POE) from a Universal Design perspective describes a user-centered approach to informing built environment design. The approach involves evaluating buildings which are currently in use, to learn how the current users interact with the building

(both from a functional and a user-satisfaction perspective). This evaluation can subsequently inform future building design (Corry, 2001). Within bus termini in the western part of Kenya, a fusion between Post occupancy evaluation and Universal design will be done so as to evaluate the drop offs and pavements of bus termini. The view of LwPD will be sought since they frequently use the circulation paths during school trips.

The design of the pedestrian environment has a direct bearing on the accessibility of any given terminus (Wu, Gan, Cevallos and Shen, 2011). Within bus termini in the western part of Kenya, the pedestrian environment comprises of vehicle drop off points and pavements. On one hand, accessible drop offs and pavements enhance access, while the presence of barriers enhance spatial exclusion. Presence of barriers in the pedestrian environment would pass out non verbal cues to users that they were not welcome to use the spaces.

A study conducted in South Africa revealed that barriers in pedestrian pathways can result from inadequate design and construction practices or the presence of natural features of the terrain (Venter et al, 2002). The study which is to be conducted in the western part of Kenya will evaluate whether the prevailing conditions of circulation paths in the bus termini have an influence on the mobility of LwPD. On one hand, absence of design barriers ensures that potential trip and slip hazards are non-existent; while the presence of design barriers leads to impaired mobility.

One feature of accessible drop offs and pavements is that they are clearly separated from vehicular routes and free of obstacles (Accessibility design guidelines, 2004). A safer and more functional pedestrian environment results when the clear path of travel is given top priority in all layouts (Rebus, Taylor, Kenny, Earl, Bellchamber and Edey, 2000). In order to avoid trip hazards, inadequate design and construction practices should be avoided (Venter et al, 2002). In

addition to design and construction practices in drop offs and pavements, this study will establish whether maintenance of circulation paths is done periodically with a view to eliminating barriers arising from wear and tear.

During most instances, pedestrian traffic is usually ambulatory. However, a significant and growing number of pedestrians have restricted mobility due to disability or age. This group includes people using walkers, scooters and wheelchair users (Rebus, Taylor, Kenny, Earl, Bellchamber and Edey, 2000). Accessible pedestrian environments are beneficial to a wide range of people and not just wheel chair users. Traditionally, studies evaluating the built environment have only focussed on wheel chair users. The study to be conducted in the western part of Kenya intends to broaden the categories of people evaluating the drop offs and pavements. The scope will cover wheel chair users, special boot users, crutch users, walking stick users and those who have mild neurological disorders. LwPD with mild neurological disorders suffer from nerve injuries which greatly interferes with their strength and dexterity while navigating over drop offs and pavements.

A distinguishing feature of accessible drop offs and pavements is that they should be clearly separated from vehicular routes and free of obstacles (Accessibility design guidelines, 2004). Segregation of pedestrian routes from vehicular traffic helps minimize conflict while enhancing safety of pedestrians. This study will ascertain whether clear pedestrian routes which enhance movement have been provided in bus termini located in the western part of Kenya. Presence of clear routes also benefit commuters when there is an interchange of vehicles.

More specifications enhancing mobility entails provision of surface materials which are firm, durable and slip-resistant. Undulations on these surfaces should not exceed 3mm under a 1m straight edge for formless materials such as tarmac or concrete Lacey (2004). This study will

establish the existence of clear paths of travel which have firm, durable and slip resistant surfaces. Drop offs and pavements having these features ensure accessibility to all, regardless of physical stature.

Additional barriers to pedestrian access include unpaved sidewalks, poorly maintained sidewalks and geographical features such as sandy pavements and steep slopes (Savill, Maunder, Stone and Venter, 2003). Drainage channels which are not flush with the paving also present mobility barriers since these channels have not been designed to avoid trapping walking aids and wheels (Lacey, 2004). In the elimination of barriers from circulation paths, the following principles of mobility may act as a general guide: avoidance of level changes wherever possible, provision of non-slip finishes, good grip, sure footing on all surfaces and elimination of protrusions onto the circulation path (Rebus et al, 2000). The specifications set forth will be used in the evaluation of circulation paths in the study area so as to determine the extent to which the paths enable pedestrian mobility of the LwPD.

Avoidance of materials which deter mobility will encourage safe and easy access for ambulatory, semi ambulatory and non-ambulatory people (Cullen, 2006). Circulation paths which have the outlined features would improve mobility for all people. This study therefore intends to investigate the extent to which LwPD can make use of drop offs and pavements. In addition to this, an evaluation of the connectivity between drop offs and pavements will also be evaluated so as to establish whether circulation paths enhance access to all, including LwPD.

2.3 Layout of Amenities and Independence of Learners with Physical Disability

2.3.1 Seating and Signage Facilities

The experience and competence of all users, especially people with disabilities is vital to the accomplishment of true Universal Design. It enhances independent living since more people will

be able to reduce their need for help, assistance and care (Haugeto, 2013). Although Universal Design is an evolving concept, it is often known as a set of design principles. When viewed through a research lens, it becomes an amalgamation of philosophy, strategy, methodology and process. The flexibility of Universal Design is such that it can also be used as an approach to appropriate design, a means of identifying design deficiencies, a method of innovation and a way to achieve social inclusion (Dong, 2013). Within bus termini, the parameters set forth by Universal Design will be used in the evaluation of seating and signage in bus termini so as to establish whether their layout enhances independence of LwPD.

Access audits set a platform for access plans or access strategies to be implemented. Access plans can be used to ensure that information gathered and recommendations made in the access audit are effectively used. The plan or strategy should include regular monitoring and updating of the audit. Access plans or strategies take a long-term view of improving access and identify opportunities for change, demonstrating a serious commitment to making buildings more accessible for everyone (Lacey, 2004).

Universal Design argues for the importance of making the so called weak component in the society as strong as every other part through design. Indeed, Universal Design is a concept that not only extends beyond issues of accessibility of the built environment, but also covers the social, and cultural issues which are major influences in uniting people who have different physical, mental or psychological abilities. It is an approach that values and celebrates human diversity (Balaram, 2001). Universal Design parameters will therefore become a useful tool in the articulation of spatial needs of LwPD as far as signage and seating facilities are concerned.

Duarte and Cohen (1995) confirm that fatigue can exacerbate social and spatial exclusion of individuals. Provision of level rest areas with seats are beneficial to all commuters, regardless of

physical status. Seats should therefore be provided at regular intervals between 1000 mm and 2000 mm. These seats should be placed with due consideration of existing circulation paths. To enhance usability of the seats, they should be mounted on a firm and level base. Further, these seats should be 460 mm above floor level, with backrests at 450 mm above floor level. Back supports and arms should be fixed onto benches so as to allow for easy transfers (Solidere, 2004). The parameters set forth will be used in the evaluation of seats in the study area so as to verify whether appropriately designed seats which enhance independence have been provided or whether poor seat design and layouts exist in the bus terminus. Poor design and layout enhance spatial exclusion of people who are not able to use facilities independently.

A study in Lebanon established that orientation difficulties usually result from illegible directional signs, street names and numbering or the lack of them (Solidere, 2004). To mitigate this problem, accessible routes should be clearly signed, and may include landmarks for orientation. Facilities designed with a logical layout can directly assist in way finding. As a result, signs and their location should be part of the process of planning a building or a facility. Signs should be short, consistent, easily understood and obviously identifiable (Lacey, 2004). This study intends to evaluate signage in bus termini located in the western part of Kenya. In addition to the specifications set forth, it will be established whether signs are of a matt finish or a glossy finish. Signs having a glossy finish tend to be source of refracted or reflected glare, thereby negating the reason they were put up in place.

Provision of signs adheres to the principle of Universal Design which advocates for perceptible information. The goal of this principle is to ensure legibility of essential information. In addition to this, adequate signage enables communication of necessary information to the user, regardless of ambient conditions or the user's sensory abilities (Centre for UD, 1997). In areas that are

likely to be crowded, Lacey (2004) proposes that these signs should be positioned at high levels. Appropriate signage is also in line with the principle of Universal Design which advocates for tolerance for error. Adequate signage will ensure that designs minimize hazards and the adverse consequences of accidental or unintended actions (Centre for Universal Design, 1997). The basis of Universal Design principles is the provision of environments which are usable by all people, to the greatest extent possible, without the need for adaptation or specialized design (Lafferty, 2007).

2.3.2 Plan of Washroom Facilities

The infrastructure of a terminus has a direct bearing on its accessibility (Hunter-Zaworski, 2007). Within the study area, an evaluation of the layout and design of washrooms will be conducted so as to establish whether LwPD can make of use of the facilities independently. Accessible layouts enhance independence, while inaccessible spaces enhance spatial exclusion. Adoption of a Universal Design concept in evaluation of washroom designs will be used as a platform for establishing whether these spaces are accessible.

The design of entrances can encourage or inhibit access. Possible barriers in doorways include high thresholds, narrow doorways, inappropriate door hardware and heavy door leaves (Solidere, 2004). In the provision of accessible doorways, Douglas (2002) notes that a clear minimum width of 900 mm should be provided so that potential users can manoeuvre within the doorway without any difficulty. Another factor to be considered in the design of doorways is that thresholds should be gently bevelled and not exceed 13 mm in height (Accessibility design guidelines, 2004). The parameters set forth will be used in evaluating the entrances of washroom. Thresholds are important components of door entrances especially when there is a change in level. The presence of appropriately designed thresholds enhances independence for all potential

users including ambulant, ambulant-disabled and wheel chair users. Ambulant disabled includes people making use of crutches, walkers, special boots and walking sticks. The category of ambulant includes people who are able to move from place to place without requiring support.

In deciding the direction of the door swing, the water closet compartment door should open outwards and provide a clear opening of at least 1220 mm. It is important however to ensure that this door does not open onto a circulation path so as to ensure privacy of users (Accessibility design guidelines, 2004; Pagel and Harris, 2002). Since washroom layout has a direct impact on accessibility, or lack thereof, appropriate door swing would ensure provision of privacy. This study will evaluate the door sizes and swing of washroom doors so as to ensure whether the swing enhances privacy of LwPD when they use the facilities.

In the provision of accessible toilet seats, Pagel and Harris (2002) confirm that heights between 430 mm to 460 mm are acceptable. To ensure the usability of the toilets, grab bars should be provided so as to ensure stability of users in areas where maintaining balance is a problem (Ochieng', Onyango and Oracha, 2010). The preferred side grab bar is the reversed "L" shaped type with a clearance space of 38mm between the wall and the grab bars. This type of grab bar helps ensure stability in maintaining balance for lifting, since most people brace their fore arms between supports and walls to give them leverage. This clearance would thereby provide adequate gripping room, while acting as a safety clearance that prevents injuries resulting from arms slipping through the openings (Pile, 1988).

Provision of a small wash-hand basin installed at a height of 740mm enables reach by a person seated on a wheel chair. The sink should allow for a knee clearance of 450mm minimum (Pagel and Harris, 2002). This study intends to evaluate the layout and design of washrooms based on the components outlined. In this way, it will be established whether spaces in washrooms are all

inclusive or segregatory. Washrooms are basic components of the built up area. Through this study, it will be ascertained whether the existing washroom designs enable usability by all, including LwPD

2.3.3 Incorporation of Universal Design Parameters in the Design Process of Termini

Universal Design makes the way buildings are designed explicit so as to hold designers accountable for what appears to be disability-neutral design. It shows that neutrality is a constructed form of ignorance. Since the normate template keeps a walking and fleshy body at the center of thinking about design, buildings often fail to consider space requirements for people who use technologies to navigate space (Hamraie, 2013). This observation squarely places the issue of accessibility, or lack thereof on planners and designers. This study will investigate whether the designs of bus termini in the western part of Kenya have adhered to a normate template or a Universal Design one. Adherence to the normate template gives rise to environments which lock out LwPD. The converse is true since adherence to Universal Design ensures that the built up environment is accessible to all, regardless of physical ability.

Bus terminus designs present a visible and tangible proof of the view of planning institutions and designers towards those who cannot operate within the 5^{th} and 95^{th} percentiles. This study will investigate whether the existing bus terminus designs in Kenya lock out LwPD or whether designs are all inclusive. On one hand, segregatory spaces pass out negative non-verbal cues to the segment of the populace which cannot operate in the spaces set forth. Since designers have an impact on bus terminus design, this study intends to evaluate whether the existing bus terminus designs adhere to a Universal Design template or a normate template.

Transport planning literature contains many measures largely restricted to motorized modes and to a handful of destination activities. There is need to explore issues related to the development

of accessibility measures for non-motorized modes, namely bicycling and walking (Iacono, Krizek, and El- Geneidy, 2010). One facet of improving accessibility which will be utilized by this study is the evaluation of the specific components of a transport terminus to commuters during instances they became pedestrians. The components which this study will consider will be the circulation paths and layout of seating and washroom facilities.

Prevailing attitudes towards disability and how it is understood in a society can be represented in the construction process and the product of its built environments. Inaccessible built environments act to reinforce the social marginalization faced by disabled people. (Sawadsri, 2011). This study will establish whether the existing designs in bus termini enhance access for all or are active agents of social exclusion due to their segregatory nature. Bus termini designed after a normate template would enhance this exclusion, while one designed with a Universal Design outlook would enhance inclusivity of all, including PwDs.

Within the societal set up, investments are usually done in areas which are considered valuable, while areas not considered valuable are not located substantial resources. Although designers do not create these social categories, they play a key role in providing the physical framework in which the socially acceptable is celebrated and the unacceptable is confined and contained. Thus when any group that has been physically segregated or excluded protests its second-class status, its members are in effect challenging how designers practice their profession (Hamraie, 2013). Urban planning is both a technique and a method of observation and analysis of spatial, material and human relationships. (Bolay, 2015).

This study will establish whether elements enhancing access were captured while design specifications of bus termini in the study area were being drawn out. In this way the mind set of the people directly involved in the design of bus termini will be evaluated to establish their view

towards those Universal Design. On one hand, lack of compliance to Universal Design requirements would lead to construction of inaccessible facilities. Adherence to Universal Design requirements on the other hand, would lead to the formation of environments which benefit all segments of the society, including LwPD.

Value-explicit design does not privilege expert knowledge, but rather provides a framework within which designers can be held accountable for the types of environments that they produce. Universal Design is an approach to value-explicit design that critiques the false value-neutrality of inaccessible environments. Environments that are not universally usable are not value-neutral; on the contrary, they are value-implicit. Value-explicit designs have the capacity and flexibility to meet the spatial requirements of specific types of embodiment in ways that also acknowledge a range of embodiments (Hamraie, 2013). In the context of this study, Universal Design parameters present a framework within which the built environment of bus termini will be evaluated to establish whether building forms support all users regardless of physical status.

Building forms reflect how a society feels about itself and the world it inhabits (Hamraie, 2013). Universal design has the power to lift the human spirit, especially when environments are designed to truly meet the needs of people who use them. Universal design encompasses inclusive and non-discriminatory design of architecture, urban environments and infrastructure. The principles advanced by Universal Design can be related directly to control mechanisms common in planning such as building codes, zoning regulations and design review (Preiser, 2007).

2.4 Attitudes of Other Users of Bus Termini and Spatial Inclusion of Learners with Physical Disabilities.

Attitudes are composed of personality, emotions, cognition and behaviour. Looking at the cognitive dimension, an attitude is a view or opinion that a person has towards a certain state of existence, of an object, an idea, of another person, or of other people. (Reiter and Nelson Bryen, 2010). Attitudinal barriers can be manifest whenever PwD need assistance when travelling. If not accompanied by an escort who may be a family member, friend or paid escort, PwD usually rely on assistance from staff or other passengers. PwDs have reported that problems are encountered when requesting help since other commuters would offer help in a patronizing or demeaning way (Venter et al, 2002). This study will examine whether other users of bus termini exhibit negative attitudes towards LwPD whenever the learners encounter design barriers.

Attitudinal barriers can be manifested in various ways. Inferiority is expressed when PwD are viewed as ineffective while pity occurs in instances when those without a disability feel sorry for the person with a disability. Hero worship is prevalent when someone with a disability who lives independently is considered to be brave or "special" for overcoming a disability while ignorance exists when people with disabilities are dismissed as incapable of accomplishing tasks (Orissa State Audit, 2005).

Spread effect occurs when other people assume that an individual's disability negatively affects other senses, abilities or personality traits, while backlash is manifested when people believe individuals with disabilities are given unfair advantage. Lastly, fear occurs when non-disabled people are afraid that they will "do or say the wrong thing" around someone with a disability (Orissa State Audit, 2005). Anderson and Kitchin (2000) explain that in most modern societies, PwD are commonly portrayed as abnormal, child-like, unattractive, dependent, in need of

protection, a danger unto themselves, an object of pity, unproductive, anti-social, and tainted by ill-health.

These representations have been fed in the main by ideas of deviancy from the norm and supposed inferiority and danger. Labels such as `invalid', `cripple', `spastic', `handicapped' and `retarded' all imply both a functional loss and a lack of worth and perpetuate and legitimate offensive responses by non-disabled people including horror, fear, anxiety, hostility, distrust, pity, over-protection and patronizing behaviour. A suggestion put forth by Venter et al *(*2002) is that attitudinal barriers are perpetuated by a general lack of awareness among the public of the needs of people with disabilities. Within the transport sector, the attitude of transport staff and other passengers create barriers for PwD. More specifically, transport staff tend to play an important role as the interface between the passengers and the service (Venter et al, 2002).

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Overview

This chapter provides an overview of the research design used for the study. The study area was major bus termini located in Kisumu, Kakamega, Bungoma and Kendu Bay. The study population was drawn from learners with physical disability, officials in charge of maintenance of termini, planners and designers of termini. Data was collected from primary and secondary sources. A breakdown of the research design, study area, population, sample selection, research instruments, data collection and data analysis procedures are presented herein.

3.2 Research Design

The study was conducted through a cross sectional survey design. This was accomplished through evaluation of the design of bus termini in the western part of Kenya at a given point in time. The cross sectional survey design was considered ideal for this study since it enabled the researcher to collect data at a given point in time on the accessibility of major bus termini to LwPD. The parameters the study focused on included the influence of circulation path design on mobility of LwPD, the influence of layout of amenities on the independence of LwPD and the impact of attitudes of other users of bus termini on spatial inclusion of LwPD. Data was collected through the use of questionnaires, observation schedules and key informant interviews.

3.3 Study Area

The major bus termini in the western part of Kenya most frequented by LwPD in the trip to school were located in Kisumu, Kakamega, Bungoma and Homa Bay Counties. These four counties have the highest prevalence of physical disability when compared with the rest of the Republic (Kenya, Republic of, 2008). In addition to this, these Counties have the highest distribution of special schools in Kenya has been presented in Table 3.1.

Table 3.1: Special Schools in Kenya for Learners with Physical Disabilities

School	Town/ City of Location
Joytown Primary School	Thika
Joytown Secondary School	Thika
Mombasa Secondary	Mombasa
Port Reitz Special School	Mombasa
Masaku Primary School	Machakos
Joyland Primary School	**Kisumu**
Joy Valley Primary	**Bungoma**
Nyaburi Special School	**Kendu Bay**
Joyland Secondary	**Kisumu**
Daisy Children Centre	**Kakamega**
Nalondo Primary School	**Bungoma**
Nalondo Secondary School	**Bungoma**
Nyamunga Special School	Mbita
Ol Kalau School	Ol Kalau

Source: Handicap International, 2010

Table 3.1 presents the distribution of special schools in Kenya. Kenya has the thirteen special schools for LwPD of which seven are located in the study area. The special schools in the western part of Kenya includes Nyaburi Primary, Daisy Primary, Joy valley Kamatuni, Nalondo Primary, Nalondo Secondary, Joyland Primary and Joyland Secondary. During the trip to school, LwPD in these schools utilized the major bus termini located in Kisumu, Bungoma, Kakamega and Homabay Counties (Figure 3.1).

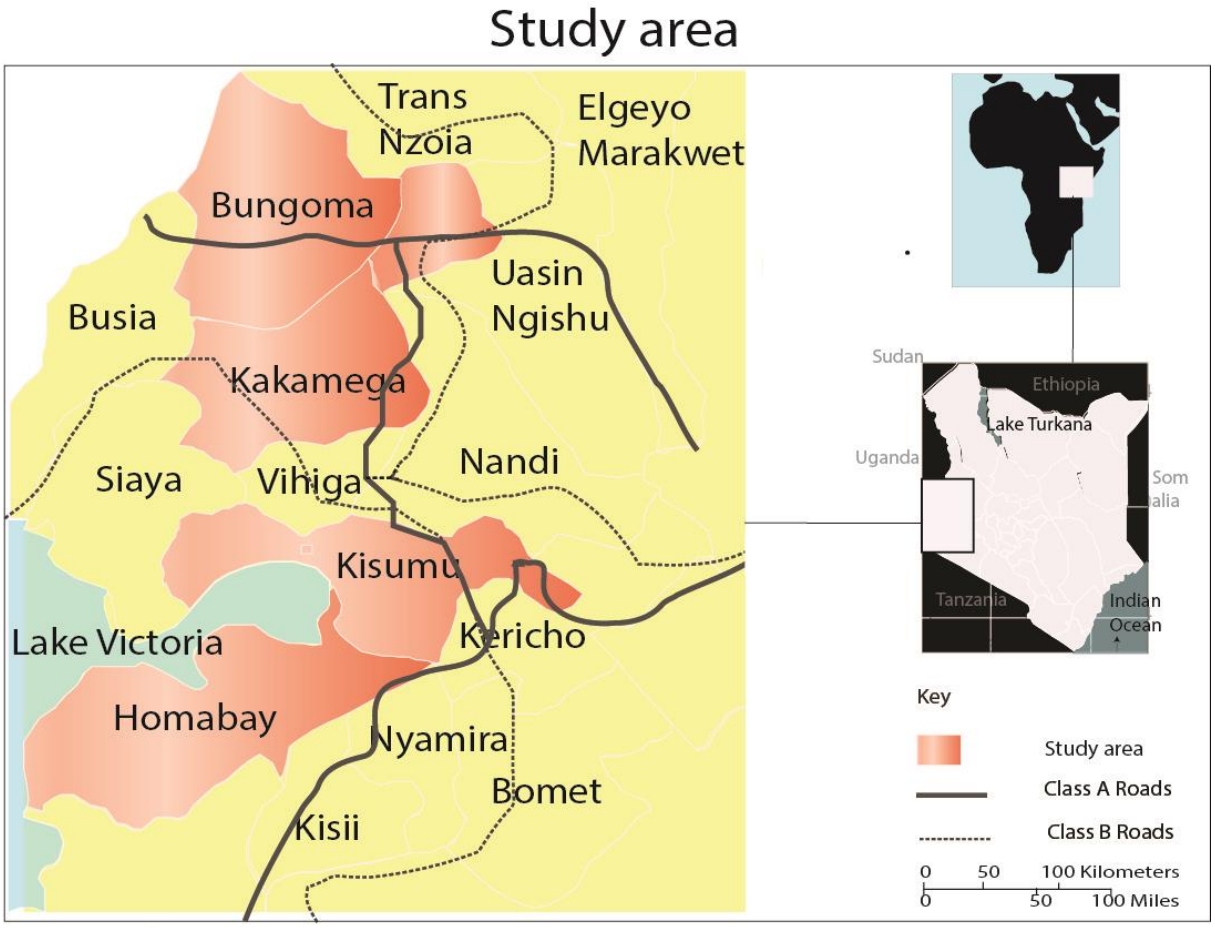


Figure 3.1: Study Area

Figure 3.1 highlights the study area which comprised of the major bus termini located in Bungoma, Kakamega, Kisumu and Homabay Counties. Bungoma County and Kakamega County were surrounded by Nzoia, Marakwet, Uasin Gishu. Nandi, Vihiga, Siaya and Busia. Kisumu

County and Homabay County were surrounded by Kisii, Nyamira, Kericho, Nandi, Vihiga and Siaya. The catchment area for the schools in the study area extended across the neighbouring Counties. The major bus termini in the western part of Kenya most frequented by LwPD in the trip to school were located in Kisumu, Kakamega, Bungoma and Kendu Bay.

The map of Bungoma terminus has been presented in Figure 3.2.

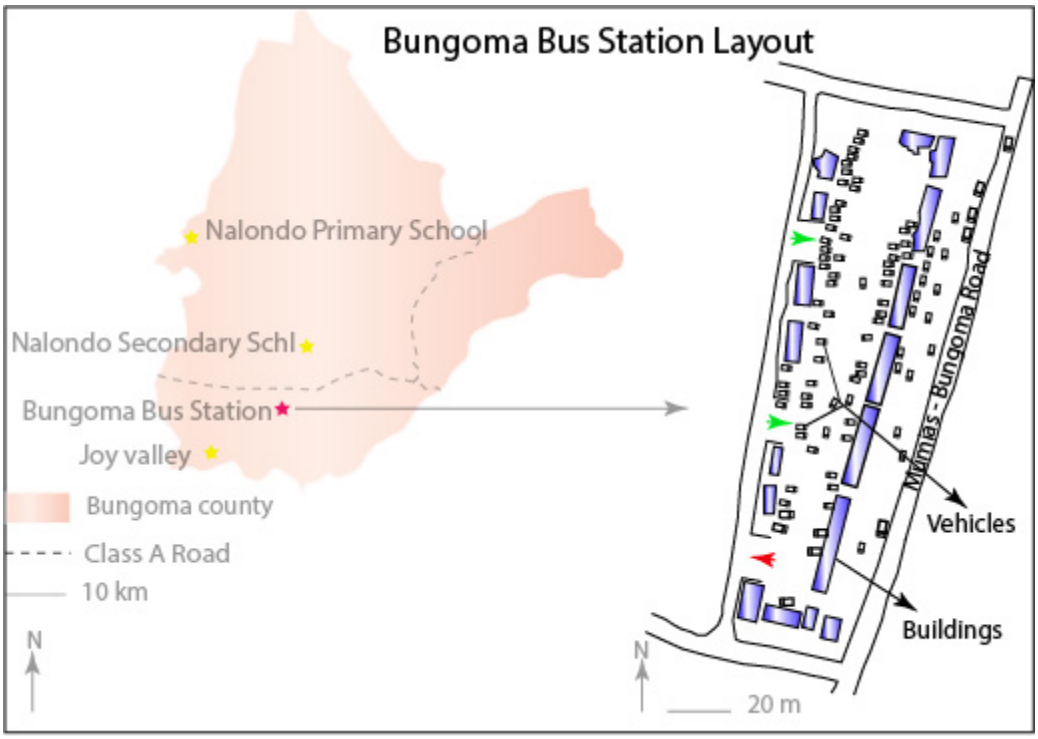


Figure 3.2: Bungoma Bus Terminus

Bungoma terminus is situated in Bungoma town. Bungoma is a town in Western Province of Kenya, near the Kenya-Uganda border. It is the headquarters of Kenya's Bungoma County. The town's history dates back to the construction of the Kenya Uganda Railway in the 1920s. Its recent growth however is attributed to its location in the Western Sugar belt with both Nzoia and Mumias sugar factories. The town is located 450 km from the Kenyan capital Nairobi, on the Great North road to Kampala in Uganda at an altitude of 1,385 m above sea level (Khaemba,

2014). This bus terminus acted as the last major terminus for students learning at Nalondo Primary, Joy valley Kamatuni and Nalondo Secondary school. It also acted as the origin point for LwPD who learnt in other Counties, yet resided in Bungoma.

The other terminus in the study area was Kisumu terminus (Figure 3.3).

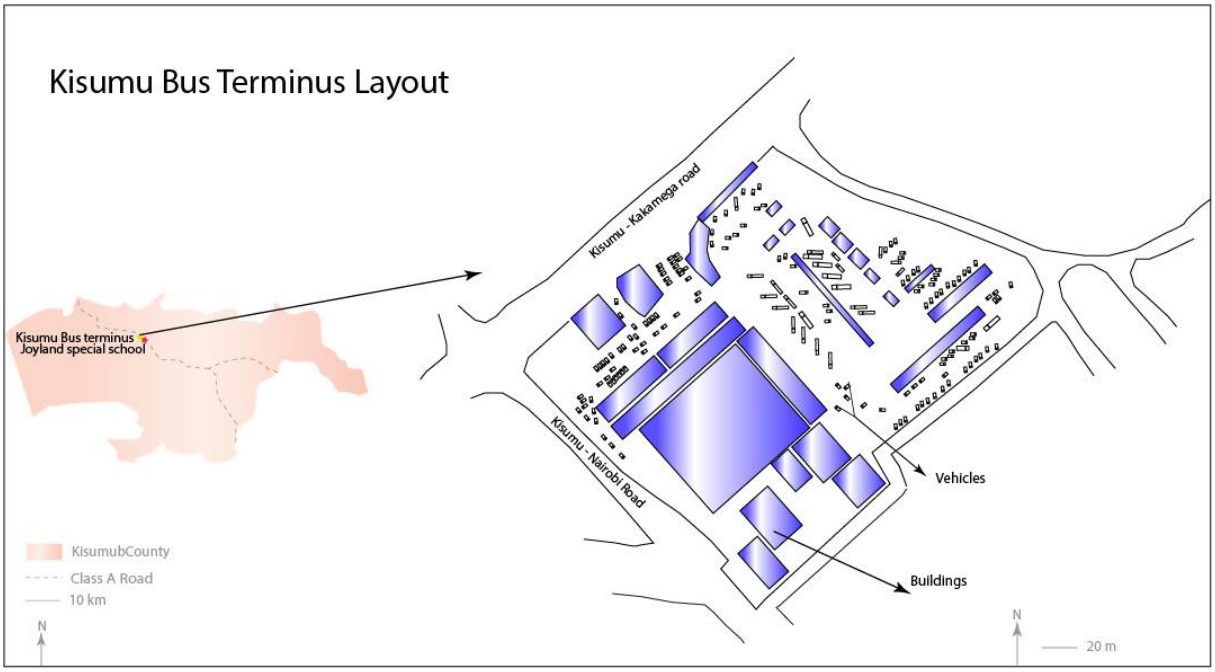


Figure 3.3: Kisumu Bus Terminus

Kisumu terminus is located in Kisumu which is a port city in the western part of Kenya. Its coordinates are 0°6′S 34°45′E at an altitude of 1,131 m (3,711 ft.), with a population of 968,909 (2009 census). Kisumu is the third largest city in Kenya, the principal city of the western part of Kenya, the immediate former capital of Nyanza Province and the headquarters of Kisumu County. Kisumu is the largest city in Nyanza region and second most important city after Kampala in the greater Lake Victoria basin. It is the largest city in the Nyanza region and second most important city after Kampala in the greater Lake Victoria basin (Kisumu County Council,

2012). Kisumu terminus is adjacent to Kisumu Kakamega highway and Kisumu Nairobi highway. This terminus borders Jubilee Municipal market to the West. Kisumu terminus acted as the last major terminus to students enrolled in Joyland primary school and Joyland secondary school.

The study also evaluated the design of Kakamega terminus (Figure 3.4).

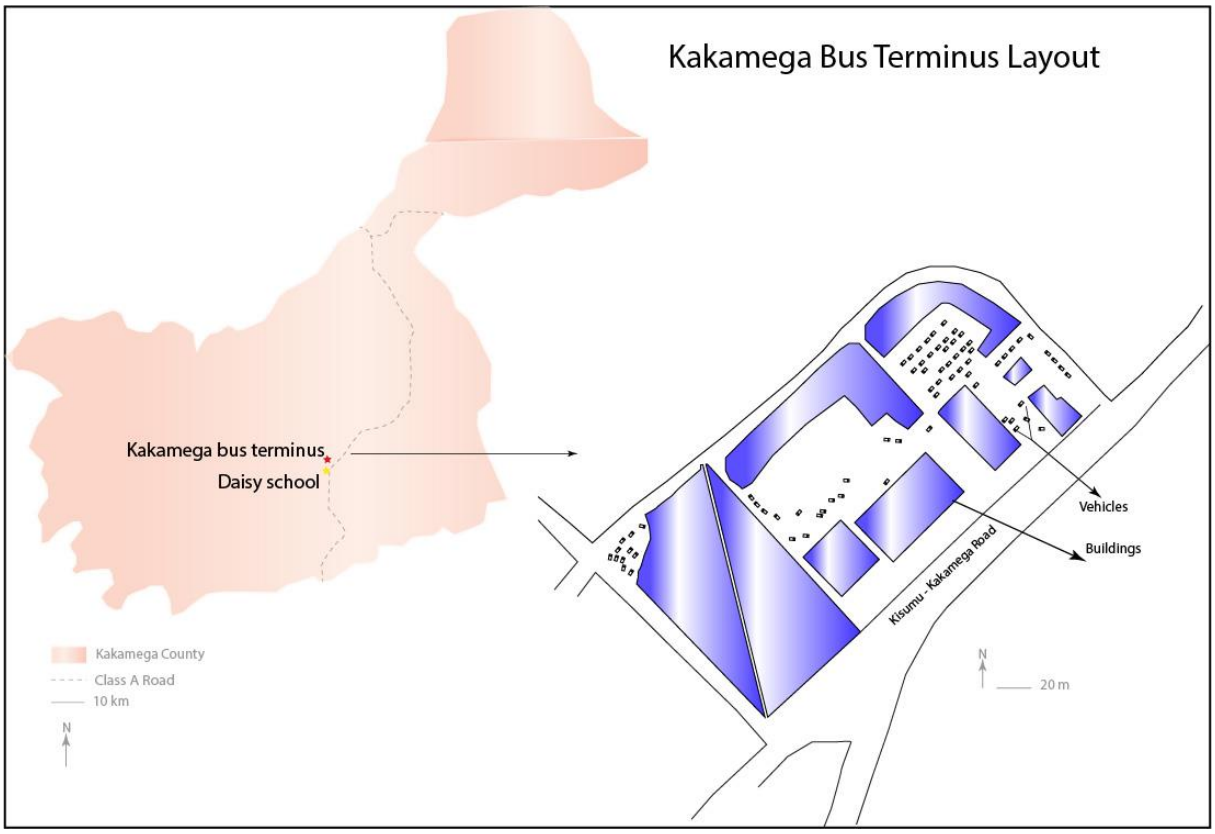


Figure 3.4: Kakamega Bus Terminus

Figure 3.4 presents the location of Kakamega terminus. This bus terminus is located in Kakamega which is a town in western Kenya lying about 30 km north of the Equator. The average elevation of Kakamega is 1,535 meters. Kakamega County lies within an altitude of 250 - 2000m (Counties in Kenya, 2012). Kakamega terminus is sandwiched between Kisumu-Kakamega Road and Kakamega- Webuye Road. This terminus acted as an end point to students

who were enrolled in Daisy school. It also acted as an intersection point for students on their way to Bungoma or Kisumu. This terminus also acted as the origin point for LwPD who resided in Kakamega yet studied in other Counties.

Kendu Bay terminus was also used for this study and its location has been presented in Figure 3.5.

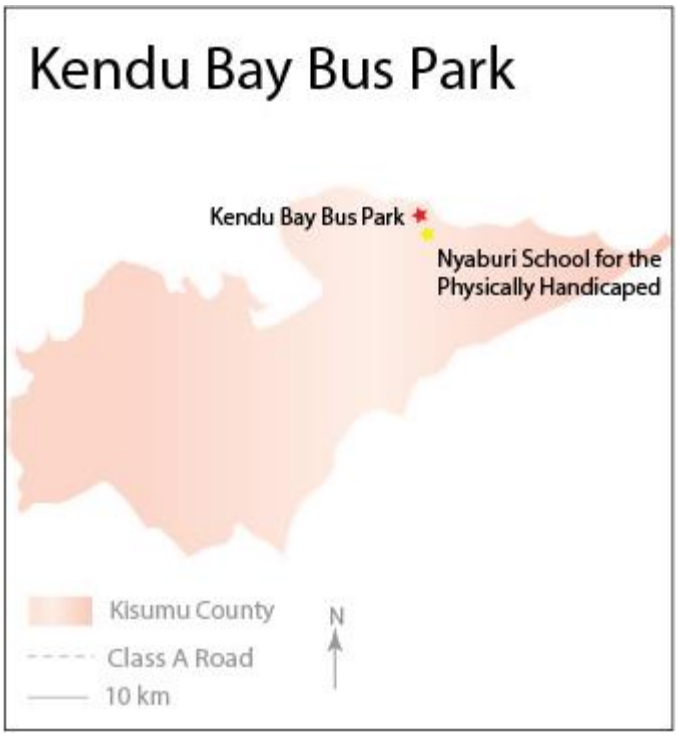


Figure 3.5: Kendu Bus Terminus

Figure 3.5 presents the location of Kendu Bay bus terminus. This terminus is located in Kendu which is a bay and town in Kenya. This town is located in Rachuonyo District of Homa Bay County. Kendu Bay terminus is located along Katito Homa-Bay road. This terminus served as an end point for learners learning at Nyaburi while acting as an origin for learners who learnt at Bungoma, Kisumu or Kakamega. These termini served up to 1, 525 LwPD at the beginning and end of every school term.

3.4 Study Population

The target population for this study consisted of registered learners in special schools for learners with physical disability in the western part of Kenya. Universal Design principles require that facilities should be accessible to all irrespective of age, physical dimension, temporary or permanent disability. LwPD fit this description perfectly due to their age, physical dimension (assistive devices take up a lot of space) and severity of disability.

A reconnaissance visit revealed that in the study area Special schools integrated a small percentage of non-disabled learners. In addition to this, the schools served both day scholars and boarders. This study screened out the LwPD who were day scholars since they did not make use of the major bus termini. Other categories who were excluded from the sample were learners who did not have any disability and LwPD who did not use public transport in the trip to school. The study focussed on the learners who travelled unaccompanied to school, as opposed to the learners who had escorts. The population for this study comprised of LwPD who utilized the major bus termini in the study area (Table 3.2).

Table 3.2: Study Population

Bus Terminus Evaluated	**Schools in Study Area**	**Population of LwPD per School**
Kakamega	Daisy Primary School	209
Bungoma	Nalondo Primary School	390
	Nalondo Secondary School	65
	Joy valley Primary School	60
Kendu Bay	Nyaburi Primary School	400
Kisumu	Joyland Primary School	210
	Joyland Secondary School	191
Total		**1,525**

Source: Field Data, 2015

Table 3.2 presents the distribution of LwPD based on the major bus termini used in the trip to school. The LwPD were required to evaluate the last major terminus they used in the trip to school. Respondents enrolled in Daisy Primary school terminated their trip at Kakamega bus terminus, while those enrolled in Nalondo Primary, Joy Valley Primary and Nalondo Secondary terminated their trip in Bungoma terminus. Learners enrolled in Nyaburi terminated their trip in Kendu Bay major terminus while those enrolled in Joyland Primary and Secondary school terminated their trip in Kisumu major terminus. Kisumu, Bungoma and Kendu Bay served up to 400 LwPD while Kakamega served 209 respondents.

3.5 Sampling

Stratified sampling was employed by the study in the selection of LwPD from the seven special schools in the study area. Based on a margin of error of 5%, confidence level of 95% and a target population of 1,525, the following calculation was used to calculate the sample size of LwPD.

$$n = \frac{N}{1 + N(e)^2}$$ (Yamane, 1967)

Whereby n= sample size

N= Population (1,525)

e= margin of error (0.05)

$$n = 1{,}525$$

$$1 + 1{,}525(0.05)^2$$

= 317 Respondents

The distribution of respondents in the study area has been presented in Table 3.3.

Table 3.3: Sample Frame

Terminus Evaluated	**No. of Respondents**	**Schools in Study Area**	**No. of Respondents per School**	**% of Respondents per school**
Kakamega	43	Daisy School	43	**14%**
Bungoma	107	Nalondo Pry	81	**26%**
		Nalondo Sec.	14	**4%**
		Joy valley Pry	12	**4%**
Kendu Bay	83	Nyaburi	83	**26%**
Kisumu	84	Joyland Pry	45	**14%**
		Joyland Sec	39	**12%**
Total	**317**		**317**	**100%**

Source: Field Data, 2015

Table 3.3 presents the distribution of respondents across the study area who were boarders in their respective schools and also used public transport in the trip to school. To ensure equitable representation across the strata of schools, stratified sampling was used. Respondents who evaluated Kakamega terminus constituted 14% of the total (43 respondents). Respondents evaluating Bungoma major terminus were drawn from drawn from Nalondo Primary school

(26%), Nalondo Secondary (4%) and Joy Valley primary (4 %). Respondents who evaluated Kendu Bay terminus were all drawn from Nyaburi Primary, while respondents who evaluated Kisumu terminus were drawn from Joyland Primary (14%) and Joyland Secondary (12%).

Since the target population for this study consisted of learners who were boarders, the researcher utilized respondents in class six, seven and eight, while for secondary schools; respondents were drawn from all the classes. Boarding facilities were available for learners in these classes as opposed to learners who were in lower classes who were all day scholars(Class 1 -5).

3.6 Data Collection

Data was collected using observation schedule, questionnaire schedule and key informant interview. These three approaches served complimentary roles allowing for triangulation. Details on the three methods have been explained below.

3.6.1 Student Interview

A structured questionnaire consisting of open and closed ended questions was used to collect data on the three objectives. The questionnaire enabled respondents to conduct an accessibility audit of bus termini in the study area. It had four sections of which section one contained questions on the socio demographic profile of the respondent; section two assessed the influence of design of drop offs and pavements on mobility of LwPD in bus termini. Section three established the influence of layout of seating, signage and washroom facilities in bus termini on independence of LwPD. Section four evaluated effect of attitudes of other users of bus termini on spatial inclusion of LwPD.

3.6.2 Observation Schedule

The researcher used non-participant observation to cross check answers given by respondents. Observation was done on how LwPD navigated over pavements, drop offs and kerbs. In addition

to this, observation was done on how the respondents accessed seating facilities in the study area. Specific attitudinal barriers exhibited by other users of bus termini was also observed. While carrying out observation, the researcher was able to gain first-hand information on access issues of LwPD. Photographs of barriers identified by respondents were also taken and these have been presented in the section dealing with results.

3.6.3 Key Informant Interview

Key informant interviews were used to gather information on objective two which evaluated influence of layout of amenities in bus termini on independence of learners with physical disability. The key informant interviews were instrumental in establishing the specific point at which Universal Design features were incorporated into the design of washrooms and seats in the bus termini in the western part of Kenya. Focus was on the design of circulation paths and the layout of amenities.

In order to establish the design parameters considered in the design of drop offs and pavements in the study area, four engineers were interviewed. Four architects were also interviewed so as to establish whether Universal Design requirements were considered in the layout of buildings in the bus termini. The engineers and architects were drawn from the County Works Offices in Kisumu, Kakamega, Homa Bay and Bungoma. One key informant was also drawn from the National Land Commission so as to establish whether the onus of access to bus termini had been placed on County governments.

An additional four key informants were drawn from the Planning offices in the study area. Planners in the four Counties were interviewed so as to establish whether Universal Design parameters were considered in the planning approval process of the four bus termini. Lastly, an additional four key informants were drawn from personnel in charge of the management of the

termini. These informants provided information on the trend of maintenance of circulation paths, outdoor amenities and facilities of bus termini. The distribution of respondents was such that four key informants were drawn from each County where the termini were housed. The total number of key informants used for this study was seventeen.

3.7 Ethical Considerations.

Clearance was sought from the Maseno University Ethical Review Committee (MSU/DRPI/MUERC/00251/15). Parents of the learners and teachers in the special schools were informed of the research during a scheduled meeting about the proposed study. Learners whose parents objected to the study were not included in the sample frame. Before commencement of administration of questionnaires, teachers in the special schools were required to provide group parental permission for the learners since they acted as guardians in the absence of the parents.

The teachers and parents were required to give verbal consent to allow the learners participate in the study. The assent of the learners was also sought before they participated in the study.The learners were informed that their participation was voluntary. The learners, teachers and parents were all given information on the purpose, duration, risks and discomfort which may be experienced in the course of questionnaire administration. Confidentiality and privacy of information was provided since the respondents did not append their names to the questionnaires.

3.8 Reliability and Validity

In order to ensure validity of the instruments used in the study, the researcher availed the research instruments to a panel of experts familiar with accessibility audits. These experts highlighted ambiguous questions in the questionnaire. These questions were then reworded to avoid ambiguity. To ensure reliability of the research instruments, the researcher conducted a pilot study targeting 10% of the respondents. Survey questionnaires were administered to LwPD

who used the four major bus termini in the study area. A total of 32 respondents were used for the pilot study. These learners were later on not included as respondents. A correlation coefficient of 0.7 was used as the measure of reliability.

3.9 Data Analysis

The researcher conducted an accessibility audit of termini in the study area so as to establish the effect of the existing facility design on the accessibility of LwPD. The research was conducted based on the three objectives of the study. Objective one yielded quantitative data on the drop off and pavement design and their effect on mobility of LwPD. The variables in objective one were drop off profile, design of drainage gratings, ramp profile, connectivity between drop offs and pavements, pavement profile, and size of circulation paths. Objective two yielded quantitative data on seating facilities, signage, washroom design and layout.

The variables in objective two were seat backrest height, seat height, seat width, signage design and location, washroom doorway design, thresh hold height, washroom stall layout, grab bar design and sink design. Objective two also yielded qualitative data on incorporation of Universal Design parameters in the design and layout of the major bus termini evaluated by the study. Objective three yielded both quantitative and qualitative data on attitudes of non-disabled users towards LwPD during instances when these learners encountered attitudinal barriers. The variables for this objective were types of attitudinal barriers, sources of barriers and coping strategy of LwPD in the face of negative attitudinal barriers. Quantitative data was presented using descriptive statistics while qualitative data was presented using content analysis method.

CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND DISCUSSION

4.1 Overview

This section presents information on data collected from the field based on the three objectives of the study. Objective one determined influence of circulation path design on mobility of learners with physical disability in bus termini; objective two established influence of amenity design on independence of learners with physical disability in bus termini; while objective three examined the impact of attitudes of non-disabled users of termini on spatial inclusion of learners with physical disability.

4.2 Socio Demographic Profile of Respondents

4.2.1 Gender and Age of Respondents

The target population for the study was 1,525 LwPD from which 317 respondents were sampled. The ages of the respondents varied between 11 years and 17 years. A presentation of the gender and age of respondents has been presented in Table 4.1.

Table 4.1: Gender and Age of Respondents

	Age of Respondents			**Total**
	11-13 Yrs.	14-16 Yrs.	17-19 Yrs.	
Female	18.9%	28.4%	3.5%	**50.8%**
Male	16.7%	25.6%	6.9%	**49.2%**
Total	**35.6%**	**53.9%**	**10.4%**	**100%**

Source: Field Data, 2015

Respondents across the study area were between 11 to 19 years. Most of the respondents were between 14 to 16 years. The disparity of ages across the study area can be attributed to the fact

that respondents were drawn from both primary and secondary schools. In the study area, there is a critical drop of respondents aged 17-19 attending formal educational institutions since they only constituted 10.4%, yet respondents aged 14-16 were 53.8%. It seems therefore that as learners get older, they tend to quit school.

4.2.2 Assistive Devices Used by Respondents.

Respondents in the study area used assistive devices to substitute to some extent the missing or disabled limb. These devices also helped the learners to be independent since they enhanced movement from one place to another. Table 4.2 presents the distribution of assistive devices in the study area.

Table 4.2: Assistive Devices Used by Respondents

Device	**Terminus Utilized**				**Total**
	Bungoma	Kisumu	Kendu Bay	Kakamega	
None (Mild Neurological disorders)	2.2%	15.5%	16.1%	7.6%	**41.3%**
Wheel chair	26.5%	4.7%	1.9%	0.3%	**33.4%**
Walking Stick	0.3%	0.6%	0.6%	0.6%	**2.2%**
Crutches	3.5%	5.4%	5.4%	3.2%	**17.4%**
Special Boots	1.3%	0.0%	2.5%	1.9%	**5.7%**
Total	**33.8%**	**26.2%**	**26.5%**	**13.6%**	**100%**

Source: Field Data, 2015

Across the study area, level of disability differed amongst the respondents who could either be classified as wheel chair users or people with ambulant disabilities. Those with ambulant disabilities included those who had mild neurological disorders (they did not use any assistive

device), walking stick users, crutch users and special boot users. Both the wheel chair users and ambulant disabled made use of the four termini in the study area. Two thirds of the respondents were in the ambulant disabled category, while a third were wheel chair users. Wheel chair users tend to use up to twice the space used by ambulant disabled. All the respondents who did not use any assistive device in the study area had neurological disorders which greatly reduced their strength. By extension, the dexterity with which this group maneuvered within bus termini was significantly reduced.

This study evaluated the extent to which the design of bus termini in the study area enhanced spatial inclusion, mobility and independence of LwPD. Universal Design requirements hold that once space requirements of wheel chair users and people with ambulant disabilities have been taken into account, other members of the public will be able to use the same spaces, regardless of their physical status.

4.3 Influence of Circulation Path Design on Mobility of Learners with Physical Disability in Bus Termini Located in the Western Part of Kenya.

Circulation paths consisted of drop offs, pavements and areas followed by respondents in the transition from drop offs to pavements. The variables under evaluation included regular drop off surface, nonslip drop-offs, smooth transition from drop-offs to pavements and absence of obstacles in pavements. Drop offs marked the first points of interaction of the LwPD with the termini.

While evaluating the design of drop-offs, respondents were required to outline their level of agreement with a statement which read: “The design of drop offs enhances mobility”. In the evaluation of pavements, respondents were required to outline their level of agreement to a

statement which read: “The design of pavements enhances mobility”. Possible responses included: Strongly disagree, Disagree, Undecided, Agree and Strongly Agree.

For generalization purposes, responses were reduced to “Disagree”, “Undecided” and “Agree”. Interpretation of results would be such that: a mean of between 1 to 2.9 would mean that respondents disagreed with the statement, a mean of 3 to 3.9 would mean that respondents were undecided, while a mean of 4 to 5 would mean that respondents agreed with the statement. The mean posted by the results on whether drop off enabled mobility was 1.8. This shows that respondents across the study area disagreed with the statement which read “The state of drop off enables mobility”. The existing situation of drop offs in the study area did not enable the mobility of the respondents. The mean posted for mobility over pavements was 2.41. Respondents disagreed with the statement which read “The state of pavements enables mobility”. Outlined in the sections following is a breakdown of the specific barriers encountered in drop offs and pavements.

4.3.1 Drop Off Surface Design

Respondents were required to evaluate the drop off material they encountered in bus termini. The results have been presented in Table 4.3.

Table 4.3: Drop Off Material

Bus Terminus	Drop Off Material	Properties of Drop Off	
		Slippery	Non Slip
Kisumu	Concrete Paving Bricks	0%	8.8%
	Tarmac	5.4%	12%
Bungoma	Tarmac	5.7%	11%
	Murram	9.1%	7.9%
Kakamega	Tarmac	6.6%	4.1%
	Murram	1.9%	0.9%
Kendu Bay	Tarmac	15.5%	11%

Source: Field Data, 2015

Across the study area, drop-offs consisted either of concrete paving bricks, tarmac or murram. Tarmac drop offs were the most common in the study area since they were present across the four bus termini. Murram drop offs were present in some sections of Bungoma and Kakamega while concrete paving bricks were present in some sections of Kisumu terminus. The different drop off materials in the study area presented varied conditions to respondents since there were instances when tarmac and murram drop offs were slippery. Concrete paving bricks however did not report any incidence of being slippery.

Tarmac drop offs across the four bus termini presented different conditions in terms of their slip resistance. Incidences of slippery tarmac drop offs was reported by slightly less than a third of the respondents making use of Bungoma (5.7%) and Kisumu (5.4%). Slippery tarmac drop offs

were also experienced in Kendu Bay as indicated by more than half of the respondents (15.5%), while more than half of the respondents making use of Kakamega terminus confirmed that slippery tarmac drop offs were common (6.6%).

Bungoma and Kakamega bus termini had some sections which had murram drop offs. In Bungoma, murram drop offs were slippery more than half of the times they were used (9.1%), while in Kakamega, murram drop offs were slippery almost all the time (1.9%). A pictorial representation of a drop off section in Bungoma terminus has been presented in Plate 4.1.

Plate 4.1: Drop Off Section Having Puddles of Water (Bungoma Terminus)
Source: Field Data, 2015

Some drop off sections in Bungoma terminus had puddles of water (Plate 4.1). The drop off presented in the plate sections of murram and tarmac. Evident in Plate 4.1 is the abundance of pebbles on the murram. Respondents pointed out that wet drop off sections were prevalent during the rainy season and over sections where food vendors poured water. The presence of water on tarmac or murram drop offs gave rise to slippery conditions. Drop offs in the study area

therefore presented varying conditions of slip resistance, depending on whether they were wet or dry.

Respondents who had mild neurological disorders indicated that whenever they came across slippery sections, they would request passers-by to hold their hand and help them cross over the slippery sections. Wheel chair users and crutch users stated that in most cases, people would offer to help them navigate over the slippery portions. Some special boot users explained that they tended to avoid sections of murram or tarmacked drop offs onto which food vendors had poured water. As a result, special boot users tended to use a longer route whenever they spotted areas onto which food vendors had poured water. Respondents pointed out further that whenever there was a downpour, they relied on motor bike riders to pick them immediately they exited from the public service vehicles. Respondents explained that they avoided using drop offs whenever it rained.

Uneven surfaces such as cobbles and bare earth and surfaces such as loose gravel and sand should be avoided. These are difficult and uncomfortable for many people to cross and may present a tripping hazard (Peloquin, 1994). To mitigate the problem posed by slippery drop-offs, Accessibility design guidelines (2004) note that the top surface of drop-offs should be of a rough texture or ground pattern so as to make them detectable and slip-resistant.

The following Universal Design principles acted as a guideline in the evaluation of the surface of drop offs, tolerance for error and low physical effort. The principle on tolerance for error states that “designs should minimize hazards and the adverse consequences of accidental or unintended actions”. In order to comply with this principle, elements in any set up should be arranged in such a way that hazards and errors will be minimized. Elements which are frequently used should be most accessible. In addition to this, hazardous elements should be eliminated, isolated

or shielded (Center for Universal Design, 2008). Drop offs in the study area did not comply with the highlighted principles. As a result, drop offs presented a slip hazard to the LwPD. In order to comply, the tarmac and murram drop offs could be replaced with concrete paving bricks which provided a good grip to users regardless of whether its surface is wet or dry.

The principle on low physical effort states that "designs should be used efficiently, comfortably and with minimum of fatigue". In order to comply with this principle, the designs are required to enable users to maintain a neutral body position while using designs (Center for Universal Design, 2008). The findings from the study reveal that the surface designs of drop offs went against this principle. While navigating over drop offs, the respondents expended a lot of effort in a bid to stay upright. Some respondents explained that they would sometimes have to take a longer route when avoiding sections onto which vendors had poured water.

4.3.2 Height between Drop Offs and Pavements

Respondents were required to evaluate the ease with which they were able to traverse between drop offs and pavements. The transition around washrooms, seating areas and shops was evaluated. Respondents in the study area confirmed that there were sections in the bus termini where a smooth transition from drop-offs to pavements was lacking as has been presented in Table 4.4.

Table 4.4: Smooth Transition from Drop off to Pavements in Termini

	Terminus				**Total**
	Bungoma	Kisumu	Kendu Bay	Kakamega	
No	30.3%	19.6%	26.5%	13.6%	**89.9%**
Yes	3.5%	6.6%	0.0%	0.0%	**10.1%**
Total	**33.8%**	**26.2%**	**26.5%**	**13.6%**	**100.0%**

Source: Field Data, 2015

Almost all the respondents making use of Bungoma terminus (30.3%) and Kisumu terminus (19.6%) noted that a smooth transition from the drop off to pavements was lacking. In Kendu Bay terminus (26.5%) and Kakamega terminus (13.6%), all the respondents noted that a smooth transition from drop offs to pavements was lacking. These responses reveal that lack of a smooth transition from drop offs to pavements was a major barrier. The researcher noted that the height of kerbs present in the termini varied as is presented in Figure 4.1.

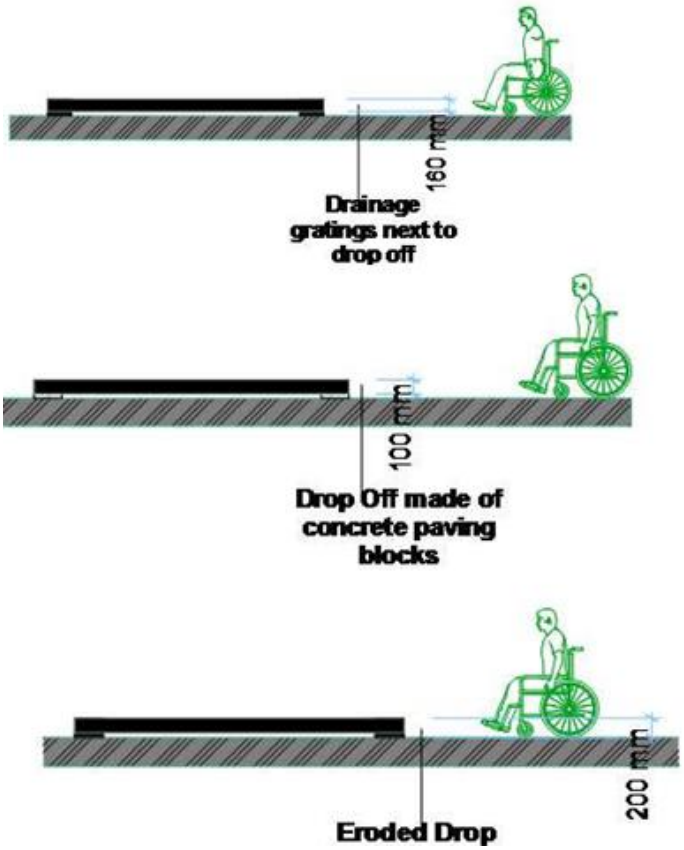


Figure 4.1: Variation in Heights of Kerbs

Figure 4.1 indicates that there was a vaiation in height of kerbs in the study area. This variation was dependent on drop off surface material and whether drainage grills were placed adjacent to

the kerbs. Kerbs adjacent to drainage grills presented a height of 160 mm, while kerbs adjacent to drop offs whose surface was of concrete paving bricks presented a height of 100 mm. In addition to this, kerbs adjacent to eroded drop offs preseted a height of between 175.5 mm to 200 mm. Presence of exaggerated heights were reported in Kendu Bay bus terminus as is evidenced in Plate 4.2.

Plate 4.2: Eroded drop off next to kerb (Kendu Bay Terminus)
Source: Field Data, 2015

Plate 4.2 presents a section of an eroded drop off in Kendu Bay terminus. As a result, the mound of concrete exaggerated the height at this crossing point. In an ideal situation this mound of concrete would be covered with tarmac or paving bricks. Respondents who made use of this bus terminus indicated that they would avoid high crossing points where the drop offs ad been

eroded. Crutch users, walking stick users indicated that they would have to walk along areas having high crossing points until they got to an area where they could cross without their assistive devices getting caught in the kerbs. Wheel chair users on the other hand indicated that they would request for help to cross over the high points since they faced a trip hazard when they wheeled their device over the eroded drop off portions.

The presence of high kerbs was also reported in Kisumu terminus as is presented in Plate 4.3.

Plate 4.3: Tricycle User unable to Access Pavement due to High Kerb (Kisumu Bus Terminus). Source: Field Data, 2015

Plate 4.3 shows a tricycle user who could not manage to navigate from the drop off to the pavement due to the presence of high kerbs. Such a scenario posed a mobility barrier since the high kerbs acted as checkpoints for admitting those who could use the spaces independently, while locking out LwPD who could not navigate over the spaces. Respondents across the study area noted that whenever they came across high kerbs they would have to request help from other passers-by. Across the study area, designated crossing points did not exist. As a result,

respondents experienced difficulty whenever they wanted to access the pavements from the drop offs.

Presented in Figure 4.2 is a representation of how high kerbs influenced the mobility of PwD.

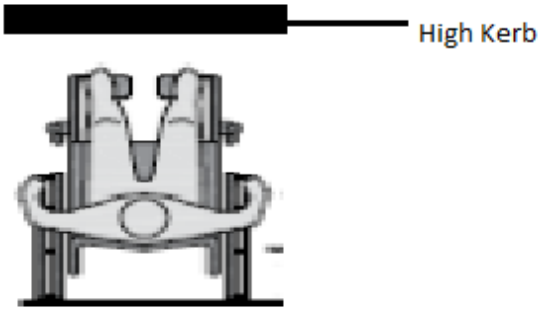


Figure 4.2: Aerial view of a Wheel chair user encountering a high kerb

Source, Field Data, 2015

Figure 4.2 illustrates an aerial view of a wheel chair user encountering a high kerb in the path of travel. Presence of the high kerb in essence meant that the wheel chair could not proceed unless he was assisted to cross over the barrier (high kerb). Within the study area, wheel chair users could not access pavements from drop offs unless they were assisted to wheel their assistive device over the barrier (high kerb). Respondents with mild neurological disorders pointed out that although they managed to cross over the high kerbs, they would expend a lot of energy on their part. In most cases, this category pointed out that they would also request for help from other passers-by. Crutch users explained that the exaggerated heights at crossing points presented a trip hazard. This category of respondents explained that crossing areas having high kerbs entailed a delicate balancing of crutches between the drop off and the pavement.

The presence of high kerbs in the study area violated two Universal Design principles. Principle five requires designs to minimize hazards and adverse consequences of accidental or unintended actions. Principle six proposes that designs should be laid out in such a way that they can be used efficiently, comfortably and with minimum fatigue. Within the study area, the high kerbs posed a trip hazard and respondents had to request for help from other passers by to navigate over the kerbs.

The findings of this study are in line with the observations of Maynard (2009) who established that raised kerbs are a common feature in the urban landscape since they provide an indication on the span of a pavement. On the other hand, Matthews, Beale, Picton and Briggs (2003) indicate that high kerbs make the built environment hostile and distorted especially to wheel chair users since the kerbs present an insurmountable obstacle. Kirby and Ackroyd-Stolartz (1995) established that up to 48% of wheel chair injuries occur when traversing on or near drop offs.

Encountering a pavement lacking a dropped kerb is, for a wheel chair user, much like a non-disabled person encountering an impassable brick wall along their route (Maynard, 2009). The presence of high kerbs went against the requirements of Universal Design which advocates for provision of designs which are useful to people with diverse abilities (Centre for Excellence in UD, 1997). Experiencing access contributes to giving individuals a social basis for self-respect as equal citizens (Lid, 2013). The presence of hampered access due to inability to surmount kerbs provides a basis for loss of self-respect on the part of the person who is locked out spatially. Within the study area, LwPD pointed out that during some instances, they would have to request for help from other commutes to navigate between drop offs and pavements.

To ensure that all members can enjoy a respectable transition from vehicle drop offs to pavements, kerb cuts/ramps should be provided at all points of level change in the path of travel.

These kerb ramps should have flared non-slip sides having a maximum rise of 10 mm in addition to having a minimum width of 1500 mm (Rebus *et al* 2000). They should also have a rough texture or ground pattern in order to make them detectable and slip-resistant (Accessibility design guidelines 2004).

A study by Ochieng, Onyango and Oracha (2010) in the Central Business District of Kisumu city established that sidewalk kerbs are a common and difficult barrier for pedestrians. The presence of high kerbs in the study area presented a barrier since lack of kerb cuts prevented smooth connectivity between drop offs and pavements. In essence, the presence of barriers between drop offs and pavements passed out non-verbal cues that persons who could not get to pavements independently from drop offs were not welcome, thereby enhancing spatial exclusion.

Provision of dropped kerbs in the study area will embody the spirit of Universal Design which advocates for making the weakest person in the society strong through design. Dropped kerbs will benefit the ambulant, ambulant disabled and wheel chair users. The ambulant category includes learners with mild neurological disorders, travellers who have luggage which is pulled along on castors, parents with prams and expectant mothers. The ambulant disabled category includes special boot users, crutch users, people using walkers and those using walking sticks. The presence of raised kerbs and missing slabs in the study area in essence presented a barrier not only LwPD, but also to travellers who had wheeled luggage, children and parents with prams. To mitigate this problem, there is need therefore for provision of dropped kerbs around crossing points.

4.3.3 Drainage Design

Once the condition of pavements in the study area was evaluated, respondents in the study area were further required to document if there were instances when mobility was hampered due to

the presence of drainages in the circulation path. The presence of drainages along the path of circulation would impact mobility negatively since the open drains would lock out LwPD, while the presence of wide gratings over drainage would present mobility barriers. More specifically, there was a possibility of a trip hazard occurring when crutches or walking sticks got caught in the gratings, or if wheel chair castors fell through the gratings. Table 4.5 presents findings on whether drainages were present along the path of circulation.

Table 4.5: Pedestrian Route crosses over drainages

	Terminus				**Total**
	Bungoma	Kisumu	Kendu Bay	Kakamega	
No	33.8%	.0%	26.5%	13.6%	**73.8%**
Yes	.0%	26.2%	.0%	.0%	**26.2%**
Total	**33.8%**	**26.2%**	**26.5%**	**13.6%**	**100%**

Source: Field Data, 2015

Across the study area, respondents making use of the major bus termini in Bungoma, Kakamega and Kendu Bay noted that the pedestrian path did not cross over drainages. This scenario was however reported in Kisumu terminus where the path of circulation crossed over some areas demarcated for storm water drainage (26.2%). All the respondents making use of Kisumu terminus highlighted this barrier. Plate 4.4 presents a pictorial representation of a drainage section in Kisumu terminus.

Plate 4.4: Open Drain Along Pedestrian Pathway- Kisumu Terminus

Source: Field Data, 2015

Plate 4.4 shows that some sections between drop offs and pavements had open drains. Open drains posed a barrier to all the respondents regardless of assistive device used. Respondents pointed out that whenever they came across such sections, they would have to walk along the entire length of the open drain until they got to a place where the pedestrian path did not cross over open drainages. Respondents pointed out further that some drainages in the path of circulation were covered by wide drainage gratings as is presented in Plate 4.5.

Plate.4.5: Wide Drainage Gratings Present a Mobility Barrier.to Special Boot User

Source: Field Data, 2015

Illustrated in Plate 4.5 is a special boot user who had to walk along the length of the area covered by drainage gratings. The special boot user in Plate 4.5 indicated that the wide drainage gratings posed a trip hazard since the gratings were wider than the base of his special boot. Wheel chair users also noted that whenever they crossed over such sections, they would have to ensure that they wheeled their devices in a direction perpendicular to the direction the gratings faced. Wheeling their devices at a perpendicular angle helped them ensure that the wheels of their devices did not fall through the gratings. Crutch and walking stick users indicated that they tended to avoid areas having drainage gratings as much as possible. On one hand, it was commendable that some drainages within Kisumu terminus had been covered by a grating. On the other hand, the wide spaces between the gratings presented a trip hazard to the respondents.

The researcher noted that within the terminus, drainage covers were either concrete covers or metallic gratings. Figure 4.2 presents a scenario of the interaction between a wheel chair user approaching a section covered by a metallic drainage grating (Figure 4.3)

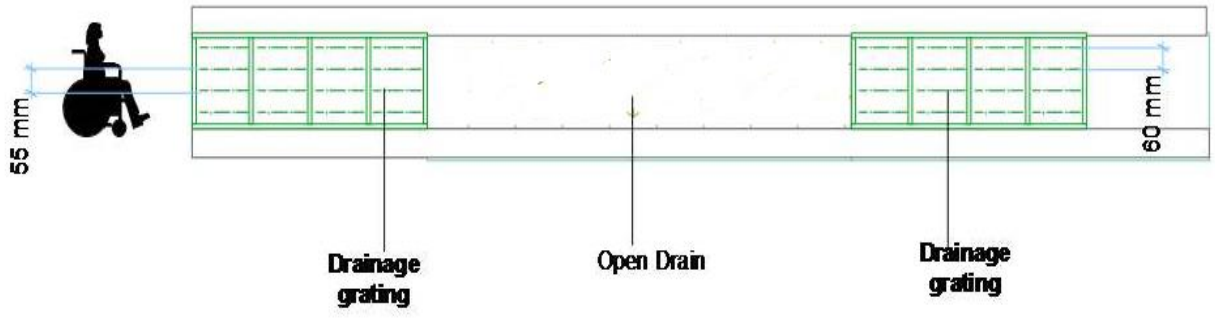


Figure 4.3: Plan View of a wheel chair users approaching an area having drainage gratings and and open drain.Source: Field Data, 2015

Illustrated in Figure 4.3 is a plan view of a wheel chair user approaching a section having a metallic drainage grating. Within the study area, wheel chair users indicated that wide spaces between metallic gratings presented a mobility barrier since the spaces between the gratings were wider than the wheels of their devices. They pointed out further that they preferred to wheel their devices at a perpendicular angle in relation to the gratings. The researcher noted that metallic drainages had spaces between their gratings which ranged between 55 mm to 60 mm.

During instances when it was not possible to wheel their devices at a perpendicular angle to the gratings, the respondents pointed out that that they would have to traverse the entire length of the drop off which was adjacent to the grating (Figure 4.4).

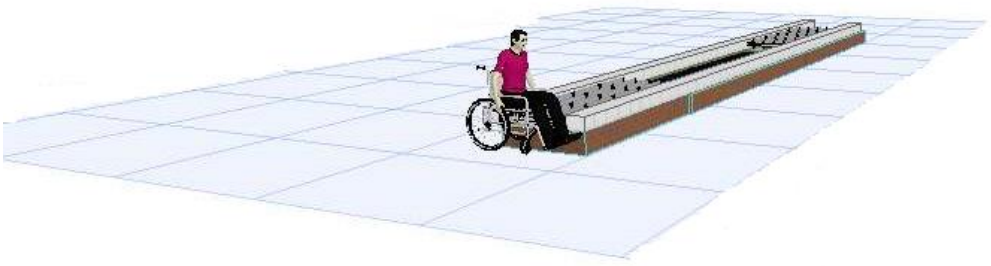


Figure 4.4: Avoidance of Drainage Section by Wheel chair User

Source: Field Data, 2015

Illustrated in Figure 4.4 is a wheel chair user avoiding the drainage section. Wide spaces between drainage gratings presented a trip hazard. Within the study area, crutch users, walking stick users and special boot users also indicated that they would have to traverse the entire length of drainage gratings in order to avoid a trip hazard. The spaces between the gratings were wider than their assistive devices.

The findings of this research are in line with a study conducted in Liberia by Solidere (2004). The study in Liberia established that gratings were hazardous to wheelchair users, cane and crutch users, parents with prams and women with high heels. During instances however when the gratings are in the pedestrian route, they should be flush with the pathway surface and should have narrow patterns of not more than 13 mm (Solidere, 2004). Concrete drainage covers had spaces of 80 mm, while metallic gratings had spaces ranging between 55 mm to 60 mm. This clearly violated the proposal put forth that spaces on the grating should not be more than 13mm. During instances when drainage channels crossed over the path of circulation, the mobility of LwPD was hampered.

Other than the categories highlighted in the study conducted in Liberia, findings from the respondents based in Kisumu terminus revealed that people having neurological disorders also

experienced hampered mobility due to inappropriate drainage designs. Poor design of drainages and drainage gratings in the study area violated the third principle of Universal Design. The Center for Universal Design (2008) explains that the third principle requires designs to be simple and easy to use regardless of the user's experience, knowledge or current concentration level.

4.3.4 Pavement Layout

Within the study area, respondents noted that there were obstacles in the circulation paths which led to constricted circulation paths. Table 4.6 presents a breakdown of the results.

Table 4.6: Obstacles in Circulation Paths

	Terminus				**Total**
	Bungoma	Kisumu	Kendu Bay	Kakamega	
No	14.8%	18%	18.9%	13.2%	**65%**
Yes	18.9%	8.2%	7.6%	0.3%	**35%**
Total	**33.8%**	**26.2%**	**26.5%**	**13.6%**	**100%**

Source: Field Data, 2015

Across the study area, slightly more than a third of respondents (35%) confirmed that obstacles were present in the circulation path. A breakdown of responses depending on the various bus termini was such that: more than half of respondents making use of Bungoma bus terminus (18.9%) encountered obstacles. Less than a quarter of respondents making use of Kisumu terminus (8.2%) and Kendu Bay terminus (7.6%) noted that they experienced obstacles. In Kendu Bay terminus, street vendors had encroached onto the circulation paths as has been shown in Plate 4.6.

Plate 4.6: Wares of Vendors displayed on Pavement (Kendu Bay terminus)

Source: Field Data, 2015

Vendors in Kendu Bay terminus used the pavements to display their wares (Plate 4.6). As a result the respondents indicated that the pavements were narrower. During instances when space in pavements had been taken up by vendors, the LwPD preferred to make use of the drop offs.

Respondents indicated that using drop offs created conflict between them and vehicular traffic. The state of circulation paths in Kakamega terminus has been presented in Plate 4.7.

Plate 4.7: Constricted Circulation Space Due to Presence of Vendors on Pavement

Source: Field Data, 2015

In Kakamega terminus, hawkers had encroached onto the circulation paths as is illustrated in Plate 4.7. The presence of signposts, stalls and wares in the path of circulation hampered free mobility of respondents whenever they accessed these sections. A similar scenario existed in Bungoma terminus whereby the respondents noted that barriers in the pavements were either

luggage or sacks. Some street vendors also used the pavements as their places of operation. As a consequence, a mobility barrier was presented whenever respondents came across such pavement portions. Certain pedestrian pathways in Kisumu terminus were constricted due to the way the parking slots in the termini were designed (Plate 4.8).

Plate 4.8: Narrow Passage (Kisumu Terminus)

Source: Field Data, 2015

Illustrated in Plate 4.8 is a special boot user navigating between parked vehicles in Kisumu bus terminus. Learners who had mild neurological disorders explained that they were able to navigate between parking slots, while wheel chair users explained that they were locked out of such spaces due to the bulky nature of their device. Walking stick users pointed out that they

passed between narrow parking slots with difficulty since the narrow spaces did not accommodate the swing of the walking stick. Figure 4.5 presents a plan view of the state of pavements in the study area.

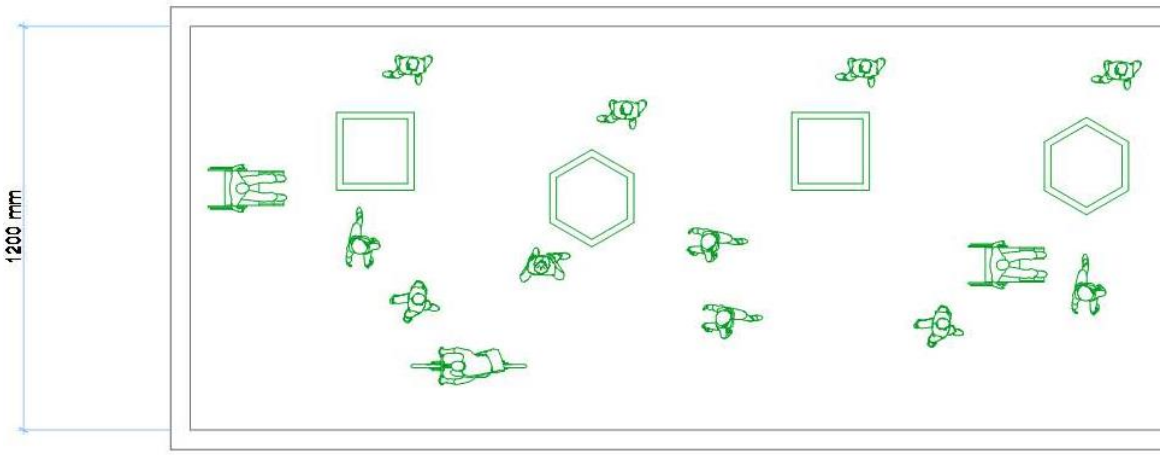


Figure 4.5: Congested Pavements

Source: Field Data, 2015

Illustrated in Figure 4.3 is a representation of how congestion gave rise to constricted circulation spaces. Within the study area, pavement widths ranged between 850 mm to 1200 mm. Despite the presence of wide pavements, the LwPD explained that they experienced difficulty navigating over the pavements since the volume of travellers making use of the bus termini was huge. The respondents explained that they needed extra space to manoeuvre since their appliances were bulky. Whenever they used bus termini, they would request people to give way so that they could pass. Other than the huge volume of people making use of the bus termini, the respondents highlighted other barriers which have been represented in Figure 4.6.

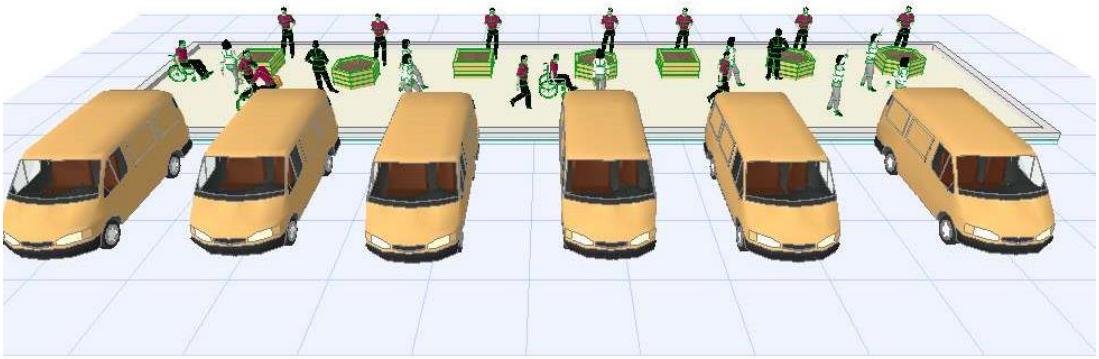


Figure 4.6: Barriers in Pavements

Figure 4.6 presents a pictorial representation of the barriers present along circulation paths. Presence of wares belonging to vendors was a common barrier highlighted across the four bus termini. In Kendu Bay terminus, street vendors had displayed their wares on the pavements. This phenomenon was also reported in Kakamega terminus. In Kisumu terminus, some vendors had hung clothes along the path of circulation. Narrow spaces between parked vehicles was also highlighted as a barrier, more so when the respondents wanted to access the pavements from the drop offs.

The presence of obstacles in the pavements went against the seventh principle of Universal Design. The Center for Universal Design (2008) explains that this principle advocates for provision of designs which enhance approach, reach and manipulation of spaces regardless of user's body size, posture, or mobility. To mitigate the problem of constricted circulation paths, freestanding objects should be located to one side of normal pedestrian routes without limiting the width of the normal route or causing a hazard to persons with visual limitations. In the provision of accessible pedestrian areas, walkways and paths should be a minimum of 1100 mm

and widened to 1600 mm to accommodate persons using mobility aids (Accessibility design guidelines, 2004).

4.3.5 Maintenance of Circulation Paths.

4.3.5.1 Drop Offs and Pavements

Respondents were required to evaluate whether drop offs and pavements had level surfaces. Presence of a level pavement would enhance mobility while the presence of an irregular pavement surface would impact negatively on mobility. Outlined in Table 4.7 is a breakdown of responses on the condition of circulation paths in the study area.

Table 4.7: Condition of Circulation Paths

	Drop Off	**Pavement Conditions**	
	Eroded	Eroded	Cracked
Bungoma	21.1%	33.8%	0.0%
Kisumu	14.5%	6.6%	0.0%
K. Bay	25.6%	16.4%	0.0%
Kakamega	13.6%	10.4%	3.2%
Total	74.8%	67.2%	3.2%

Source: Field Data, 2015

The most prevalent barrier highlighted by respondents was the presence of eroded drop offs (74.8%) and eroded pavements (67.2%). The presence of eroded drop offs posed a barrier to almost three quarters of respondents making use of Bungoma terminus, while in Kisumu almost

half of the respondents pointed out that eroded drop offs were common. Eroded drop offs were a barrier to all respondents making use of Kakamega terminus while more than three quarters of respondents in Kendu Bay terminus experienced this barrier.

Presence of eroded drop offs posed a challenge to all respondents making use of both Kakamega and Kendu Bay terminus. Kakamega and Kendu Bay bus termini recorded the highest occurrence on the presence of eroded drop offs. The highest occurrence of eroded pavements was reported in Bungoma terminus (33.8%). Kendu Bay and Kakamega terminus also reported high occurrences of this barrier. Plate 4.9 presents an eroded drop off in Kakamega terminus.

Plate 4.9: Eroded Drop off in Kakamega Terminus

Source: Field Data, 2016

Certain sections of drop offs in Kakamega had been eroded by rain water as is evidenced in Plate 4.9. Eroded drop offs posed a mobility barrier to all the LwPD regardless of assistive device used. Crutch users and walking stick users pointed out that an eroded terrain posed a trip hazard. Respondents with mild neurological disorders confirmed that they experienced difficulty navigating over eroded portions. Difficulty arose since they would have to expend a lot of energy while traversing over these portions. Eroded pavements also presented a mobility barrier. Plate 4.10 presents a pictorial representation of an eroded pavement in Kakamega bus terminus.

Plate 4.10: Eroded pavement in Kakamega Terminus

Source: Field Data, 2015

In Kakamega terminus, stones jutting out of murram provided an irregular profile to some pavements (Plate 4.10). Wheel chair users explained that they experienced a bumpy ride while traversing over eroded pavements in Kakamega terminus. These respondents stated that there

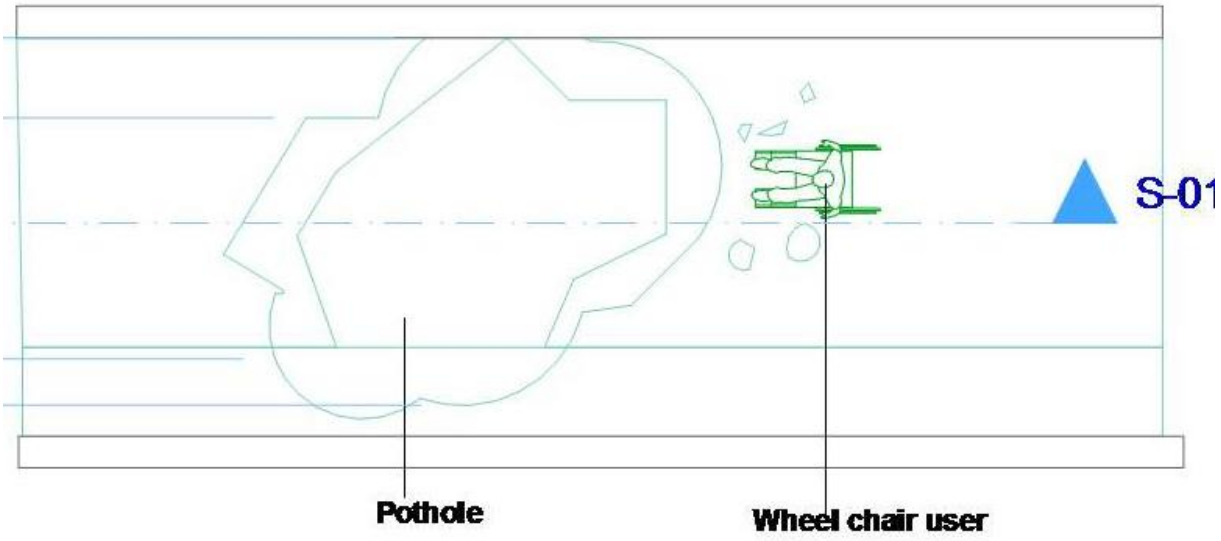
were occasions when their wheel chairs tipped over irregular areas causing them to fall off. These respondents pointed out further that they would try as much as possible to avoid eroded areas as much as possible. Respondents explained that they preferred to use areas demarcated for vehicular traffic, rather than make use of eroded pavements. Eroded pavements were also a common feature in Kisumu terminus as is evidenced in Plate 4.11.

Plate 4.11: Eroded Pavement in Kisumu Bus Terminus

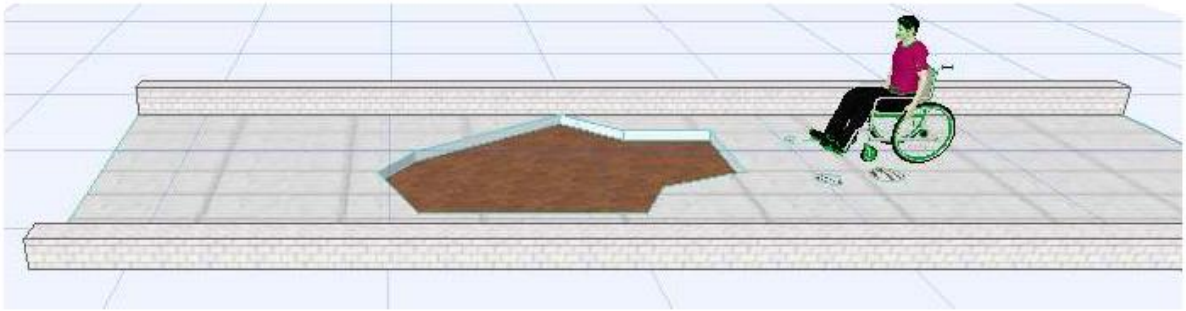
Source: Field Data, 2015

Plate 4.11 illustrates an eroded pavement section in Kisumu terminus. The presence of eroded surfaces presented a barrier to LwPD regardless of assistive device used. Respondents with mild neurological disorders pointed out that during instances when they encountered eroded

pavements and drop offs, they would have to seek for help from other users of termini. The learners explained that they would usually expend a lot of energy when traversing these sections. Figure 4.7 presents a representation of an eroded pavement section.



Plan View



Pictorial representation

Figure 4.7: Wheel Chair user approaching an eroded section

Presented in Figure 4.7 is a pictorial representation of a wheel chair user approaching an eroded pavement section. The irregular terrain presented a trip hazard. Within the study area,

respondents who did not use any assistive device explained that whenever they navigated over areas having eroded pavements, they were disadvantaged since they had neurological disorders which greatly interfered with their stamina. Wheel chair users on the other hand explained that they experienced difficulty since the wheels of the wheel chair would tip occasionally over the irregular surface. Crutch users and walking stick users noted that a trip hazard was posed by the eroded surfaces. Respondents explained that they would have to rely on others to help them navigate over the eroded portions.

The findings of this study are in line with a research done by Rebus et al (2000) who established that uneven surfaces and joints makes pavements to have an irregular terrain. Such a terrain presents a barrier to mobility of people and could contribute to the occurrence of trip hazards or persons falling from their wheelchairs. Unpaved pavements, poorly maintained sidewalks and the presence of geographical features such as sandy pavements present a hindrance to mobility (Savill et al 2003). In addition to this, the presence of eroded terrains limits the mobility of people and places specific demands on the design and maintenance of wheelchairs (Venter et al, 2000). This study established further that inaccessible pavements and drop offs affected the mobility of a wide range of PwD and not just wheel chair users. Irregular pavement and drop offs also negatively affected crutch users, walking stick users, special boot users and LwPD with neurological disorders.

Irregular terrains are difficult to traverse due to the presence of uneven surfaces and joints. Such a terrain gives wheelchair users a rough ride and could contribute to persons falling from their wheelchairs (Rebus et al, 2000). Uneven terrains are hazardous and strenuous for people with walking difficulties (Grace, 1995). Since the overall design of the pedestrian environment had a bearing on the ease with which LwPD navigated over circulation path, the presence of barriers

hindered mobility of LwPD in the study area. Within the study area therefore the pavement surfaces should be constructed such that a surface made of concrete is provided for travel. To ensure a firm foothold upon the pavements, the surface should be of a ground pattern. Alternatively, rubber tiles can be installed along the path of travel.

4.3.5.2 Drainage

Within Kisumu terminus, some sections of the pedestrian pathway had missing slabs over areas where the pedestrian path crossed over drainage gratings. This scenario arose due to wear and tear. The presence of gaping holes in the circulation path presented unsafe conditions as is evidenced in Plate 4.11.

Plate 4.12: Special Boot User Walking Along Area Having Missing Slabs

Source: Field Data, 2015

Plate 4.12 shows that some sections of the circulation paths had missing slabs. Respondents confirmed that whenever they came across areas having missing drainage gratings or slabs, they would have to walk along the length of such areas so as to avoid falling into the exposed drainage sections. As a result, they would have to take a longer route around areas having missing slabs. The respondents explained that the gaping holes in the pedestrian path presented unsafe conditions.

4.3.6 Emerging Issues

The first objective of the study sought to determine the influence of circulation path design on mobility of learners with physical disability in bus termini located in the western part of Kenya. This study established that drop offs and pavements in the study area hindered mobility due to the presence of barriers which arose either due to inappropriate designs or poor maintenance practices (Table 4.8).

Table 4.8: Barriers in Circulation Paths

	Drop Off Surface Design	Transition (Drop Off to Pavement)	Drainage Design	Pavement Layout	Maintenance		
Device	Slippery drop off	High kerbs	Crosses Pedestrian Path of travel	Obstacles in circulation path	Drop Off	Pavement	
					Eroded	Eroded	Cracked
None	16.7%	37.9%	15.5%	9.5%	31.5%	20.8%	2.2%
Wheel Chair	14.5%	28.1%	4.7%	16.4%	20.2%	29.7%	0.0%
Crutch	0.9%	1.6%	0.6%	0.3%	1.9%	11.1%	0.6%
Special Boots	7.9%	16.7%	5.4%	7.3%	15.5%	4.7%	0.3%
Walking Stick	4.1%	5.7%	0.0%	1.6%	5.7%	0.9%	0.0%
Total	44.2%	89.9%	26.2%	35%	74.8%	67.2%	3.2%

Source: Field Data, 2015

The barrier highlighted by almost all of the respondents was the presence of high kerbs (89.9%). Within the study area, designated crossing points were lacking. The respondents explained that they encountered high kerbs whenever they crossed from drop offs to pavements. As a result, the built up environment was hostile to the LwPD. Absence of designated crossing areas negatively

impacted on the mobility of the LwPD since the high kerbs presented a trip hazard. When the prevailing situation was viewed through a Universal Design lens, the pedestrian environment around kerbs was distorted since a large percentage of the respondents experienced mobility barriers.

Lack of proper maintenance of drop offs and pavements also reported high percentages. More than three quarters of the respondents indicated that eroded drop offs hindered their mobility (74.8%) while slightly more than half indicated that eroded pavements were a barrier (67.2%). Within the study area, respondents who did not use any assistive device, wheel chair users, crutch users and walking stick users all pointed out that they experienced hampered mobility due to the presence of uneven surfaces in the study area. The presence of eroded drop offs and pavements violated the sixth Universal Design principle which proposes that built environments should be designed so that they can be used comfortably and with minimum fatigue.

The presence of slippery drop offs posed a barrier to slightly less than half of the respondents (44.2%). Within the study area, both wheel chair users and ambulant disabled highlighted the fact that slippery drop off surfaces presented a mobility barrier. Drop offs in the study area consisted of concrete bricks, murram or tarmac. Tarmac and murram presented slippery surfaces especially when wet. The presence of materials which had a property of being slippery when wet violated the Universal Design principles which advocated for tolerance of error and low physical effort. A possible point of intervention would entail the redesign of the top surface of drop offs and pavements to be of concrete bricks rather than of tarmac or murram. Concrete bricks ensure a firm foothold regardless of whether they are wet or dry.

Slightly more than a third of the respondents indicated that they experienced barriers in the path of travel. Universal Design principles require routes to be free of protruding obstacles,

overhanging signs or branches in the walking area. The existing state of pathways in the study area contravened these suggestions due to the abundance of obstacles. Based on the barriers highlighted, it can be deduced therefore that the mobility of LwPD was affected negatively whenever they made use of circulation paths in the study area.

4.4 Influence of Layout of Amenities on Independence of Learners with Physical Disability.

Other than the design of circulation paths in the study area, an investigation on the effect of design of amenities in bus termini on independence of LwPD was carried out. Amenities evaluated by the respondents included seats, signage and washrooms. In addition to this, the key informant interviews were conducted to establish the specific point at which Universal Design features should be incorporated into the design of washrooms and seats.

4.4.1 Usability of Seats

Respondents were required to evaluate the design of seats and its adherence to Universal Design standards. Variables under study included seat height, seat depth and backrest height. Table 4.9 presents results on the usability of seats in the study area.

Table 4.9: Usability of Seats

	Terminus				Total
	Bungoma	Kisumu	Kendu Bay	Kakamega	
No	32.5%	13.2%	22.4%	10.1%	78.2%
Yes	1.3%	12.9%	4.1%	3.5%	21.8%
Total	33.8%	26.2%	26.5%	13.6%	100%

Source: Field Data, 2015

Across the study area, more than three quarters of the respondents noted that seats were not useable (78.2%). This barrier was common across the study area. Bungoma terminus reported the highest occurrence of this barrier (32.5%) since almost all the respondents highlighted this fact. Kendu Bay terminus also reported high occurrence (22.4%). In Kisumu, half of the respondents confirmed that seats were useable (17.4%) when compared to the percentage which indicated that the heights were not accessible (8.8%). Barriers highlighted by respondents included the presence of makeshift structures, obstacles around seats and the presence of high kerbs around seats. Plate 4.12 presents a pictorial representation of seats in Kendu bay terminus.

Plate 4.13: Seating Facilities in Kendu Bay Terminus.

Source: Field Data, 2015

Seats in Kendu Bay were of makeshift structures as is presented in Plate 4.13. The seat heights ranged between 600mm to 650 mm. All the respondents in the study area pointed out that they avoided using these seats since they were not stable. The respondents pointed out that they preferred to rest on their suitcases, rather than make use of the seating facilities provided in this terminus. Another barrier highlighted by respondents was the presence of obstacles around seating areas. Some obstacles had also been placed on the seats (Plate 4.13).

Plate 4.14: Presence of Obstacles (Kisumu terminus)

Source: Field Data, 2015

The seat in Plate 4.14 had a stepped base. Wheel chair users explained that they were locked out of these sections since they were unable to wheel their wheel chairs over the kerb and the base of the seating area which had a step. Crutch users and special boot users however explained that they were able to make use of such seating facilities, despite the presence of the stepped base. Other than the stepped base, the seating area in the plate had a sack of charcoal and a can of trash. Respondents explained that they tended to avoid areas having obstacles. Some respondents explained that they experienced barriers due to the way seats were designed. A typical seat consists of the backrest, height and depth.

In order to verify the component which presented disabling conditions to the respondents, the researcher measured fixed seats provided in the termini. These dimensions were then compared to Universal Design standards on seat height, seat depth and backrest height. The dimensions have been presented in Table 4.10.

Table 4.10: Seat Dimensions

Terminus	Seat Depth in mm			Mean Depth	Backrest Height			Mean Backrest Height	Seat Height			Mean Seat Height
Kisumu	420	310	390	373.3	400	410	430	413.3	480	550	550	526.7
Kakamega	470	450	470	463.3	420	420	422	420.7	540	580	540	553.3
Kendu Bay	190	150	192	177.3	480	540	460	493.3	660	540	620	606.7
Bungoma	420	400	390	403.3	420	420	420	420	550	550	520	540

Source: Field Data, 2015

Mean depths of seats ranged between 177.3 mm to 463.3 mm. Mean backrest heights ranged between 413.3 mm to 493.3 mm. Mean seat heights ranged between 526.7 mm to 606.7 mm. A comparison of seats across the four termini reveals that seats in Kendu Bay terminus reported the lowest depths (177.3 mm), the highest backrest height (493.3 mm) and the highest seat heights (606.7 mm). Seats in Kendu Bay were makeshift structures made of timber. Seats in Kisumu, Bungoma and Kakamega were however made of concrete. In order to establish the exact component of the seat presenting disabling conditions, the seat dimensions in were compared to the recommended Universal Design standards (Table 4.11).

Table 4.11: Comparison of Seat Dimensions to Universal Design Standards

Terminus	Seat Depth in mm			Backrest Height			Seat Height		
Kisumu	420	310	390	400	410	430	480	550	550
Kakamega	470	450	470	420	420	422	540	580	540
Kendu Bay	190	150	192	480	540	460	660	540	620
Bungoma	420	400	390	420	420	420	550	550	520

Source: Field Data, 2015

A comparison of the seat depths in the study area against the recommended depth (400 mm) reveals that only one seat in Bungoma terminus had the recommended depth. None of the seats had the recommended backrest height of 450 mm. Instead, almost all the backrests fell below the recommended height. None of the seats had the recommended seat height (460 mm). All the seat heights were higher than recommended. In the study area therefore, the seating surface, the backrest heights and the seat depth presented disabling conditions.

Provision of seats in areas where waiting is likely is good design practice since level rest areas with seats are helpful for all pedestrians, especially for those with mobility problems (Lacey, 2004). On one hand, although seats had been provided in the study area the condition of the seats in terms of the seat height, seat depth and backrest height did not encourage use by the LwPD. In addition to this, the presence of barriers around the seats made them inaccessible.

In the study area therefore, there is need to eliminate obstacles around seats. In addition to this, seats provided should meet the required spatio technical standards which enhance usability.

Within the built up environment, designs should encompass social-technical standards to support every potential user (Duarte and Cohen, 2007). The findings of this study reveal that lack of adherence to technical standards led to spatial exclusion of LwPD from the seating area. In the context of the study area, inappropriate seat heights enhanced spatial exclusion of people who cannot "fit" in the seats provided in the termini. Provision of seats which have acceptable dimensions based on Universal Design standards will ensure that seats in the study area are accessible to a wide range of the populace regardless of physical ability. Spatio technical standards also encompass the free space required around seats to make them usable, in addition to correct seat dimensions. Once seats are accessible to the weakest segment of society, then by extension the seats will be accessible to all. Universal Design therefore becomes a platform for celebrating human diversity since its goal is to make the weakest person on society strong through design.

Joines (2009) confirms that low seats make rising difficult for individuals with decreased lower extremity strength or joint problems. The seating surface of accessible seats should therefore be approximately 450 mm above floor level, with backrests at approximately 700 mm above floor level. Within the study area, seats which had been provided were higher than the recommended

height. Disabling conditions were also presented by high backrest heights and seat depths which were fell below the recommended.

To ensure that at least one wheelchair user is able to use areas demarcated for seating, it is advisable to provide space having a minimum clearance area of 1015 mm by 1220 mm beside benches or seats (Accessibility design guidelines, 2004). To reserve this space wheelchair placards should be put in these spaces so that luggage of non-disabled travellers is not put in these spaces. Within the study area, these features were lacking and as a consequence a significant portion of users of the termini were locked out of the seating spaces.

Haugeto (2013) notes that the experience and competence of all users, especially people with disabilities is vital to the accomplishment of true Universal Design which supports equity and equality. It is about independent living since more people will be able to reduce their need for help, assistance and care. Based on this observation, once PwDs can be able to access seating areas of termini independently, other members of the society will be able to use the same seats.

4.4.2 Signage

Across the study area, respondents noted that signage which was in the termini were those passing information on the location of “Mpesa” agents, location of places to board vehicles and the location of public washrooms. Direction signs were however conspicuously absent in the study area. This is a glaring anomaly which had a negative effect on way finding abilities of potential users of bus termini in the study area. Solidere (2004) suggests that signage should consist of information, direction signs and map or information panels.

Inadequate signage in the study area also went against the requirements of Universal Design which advocate for perceptible information. In the provision of this information, it is recommended to use different modes (pictorial, verbal, tactile) for redundant presentation of

essential information. In addition to this, “legibility” of essential information should be maximized (Centre for Excellence in Universal Design, 1997). To improve way finding in the study area, direction signs and information panels should be incorporated in the layout of the termini.

In the design of signs, Solidere (2004) notes further that orientation difficulties usually result from illegible directional signs, street names and numbering and/or the lack of them. Facilities designed with a logical layout can directly assist in way finding. As a result, signs and their location should be part of the process of planning a building or a facility. Signs should be short, consistent, easily understood and obviously identifiable (Lacey, 2004).

Provision of signs adheres to the spirit of Universal Design, more so the principle which advocates for perceptible information. The goal of this principle is such that legibility of essential information should be maximized. In addition to this, adequate signage enables communication of necessary information to the user, regardless of ambient conditions or the user’s sensory abilities (Centre for Universal Design, 1997). Provision of adequate signage therefore ensures that required information is legible enough to those who require certain information. In areas that are likely to be crowded, Lacey (2004) confirms that these signs should be positioned at high levels.

4.4.3 Washroom Design

4.4.3.1 Entrance Design

Respondents in the study area were required to evaluate the entrances of washrooms using the following parameters: thresh holds design, presence of stairs and presence of ramps. Equitable access at washroom entrances would be guaranteed when thresh holds were no higher than 13 mm and when stairs and ramps were provided next to entrances so as to ensure that no segment

of the populace is locked out. A breakdown on the occurrences of barriers has been presented in Table 4.12.

Table 4.12: Barriers Present at Washroom Entrance

Terminus	Barrier at Washroom door			Total
	No Barrier	High Thresh hold	Ramped - no stairs	
Bungoma	2.2%	31.5%	0.0%	33.8%
Kisumu	5.7%	20.5%	0.0%	26.2%
Kendu Bay	25.6%	0.0%	0.0%	25.6%
Kakamega	1.6%	0.0%	12.9%	14.5%
Total	35.0%	52.1%	12.9%	100.0%

Source: Field Data, 2015

Across the study area, the barriers respondents came across were either high thresh holds or ramped access with no stairs. More than half of the respondents indicated that high thresh holds presented a barrier (52.1%). Respondents who indicated that they did not experience any barrier at the wash room entrances (35%) were those who did not use any assistive device. These respondents also had mild neurological disorders. This category of respondents explained further that whenever they encountered high thresh holds, they would lean on the wash room walls or door frame to get extra support. Wheel chair users, crutch users and special boot users however pointed out that the presence of high thresh holds locked them out of doorways. A comparison between the thresh hold heights and the recommended height has been presented in Table 4.13.

Table 4.13: Thresh Hold Heights at Washroom Entrances

Bus Terminus	Thresh Hold (mm)	Recommended Maximum Threshold Height (mm)
Bungoma	160	13
Kisumu	150	13
Kendu Bay	155	13
Kakamega	0	13

Source: Field Data, 2015

Thresh hold heights varied between 150 mm and 160 mm as has been illustrated in Table 4.13. In Bungoma terminus, respondents making use of washrooms encountered thresholds of 160 mm, in Kisumu the thresholds were 150 mm, in Kendu Bay the thresholds were 155 mm, while in Kakamega terminus there were no thresholds since a ramped surface had been provided as the main path of entry. With the exception of Kakamega terminus, thresh holds were more than ten times their recommended height. Thresh hold heights in the study area were much higher than the recommended height, given that in the study area the height of thresh holds was between 150 mm-160 mm, while the recommended height according to the Centre of Universal Design (2008) is 13 mm. The presence of thresholds higher than 13mm in the study area therefore negatively impacted on the independence of LwPD whenever they used doorways of washrooms in the study area.

Slightly more than a tenth of the respondents pointed out that one barrier arose due to provision of ramps at washroom entrances, while an entrance having steps was lacking. This phenomenon was present in Kakamega terminus as is evidenced in Plate 4.14.

Plate 4.15: Ramped Walkway at Washroom Entrance (Kakamega Terminus)
Source: Field Data, 2015

Plate 4.15 presents a pictorial representation of a ramped washroom entrance in Kakamega terminus. Wheel chair users outlined that they did not experience disabling conditions while entering washrooms since a ramp had been provided. Special boot users, walking stick users and crutch users however reported that they experienced difficulty using the ramp.

To cater for people who have non-ambulatory disabilities, Solidere (2004) proposes that ramps should be provided alongside any flight of steps. The design of these ramps should incorporate handrails having a smooth continuous surface from the top to bottom of the ramp, without breaking the handhold. These handrails should extend a minimum distance of 300 mm beyond the top and bottom of the ramp and should be mounted between 865 mm and 965 mm (Accessibility design guidelines, 2004). Within the study area, it is commendable that a ramp had been provided at the entrance of washrooms in Kakamega terminus. The only point of departure is that there were no stairs next to the ramp. Such a scenario locked out the ambulant disabled. This category included those using special boots, crutches, walking sticks or those having neurological disorders.

On the presence of thresh holds, Solidere (2004) confirms that high thresholds present a barrier to potential users. In the study area therefore, the presence of thresh holds having a mean height of 121 mm presented a barrier to all the respondents regardless of physical ability. Joines (2009) explains further that most environments are designed for the average individual, a myth which only exists in anthropometric tables and ergonomics classrooms. Within the study area, the assumption put forth by Joines (2009) was confirmed since the assumption of the designers was that all members of all members of society should be able to use thresholds which in most cases ranged in heights of between 150 mm to 160 mm.

To ensure equitable access over thresholds, Accessibility design guidelines (2004) confirm that thresholds should not exceed 13 mm in height. Solidere (2004) clarifies further that thresholds higher than 6 mm should be bevelled or have sloped edges to facilitate the passage of a wheelchair. In order to ensure safe access over thresholds in the study area, there is need for provision of bevelled thresholds no higher than 13 mm in the study area.

Lid (2013) explains further that Universal Design is not planning and designing for disabled people but acknowledging diversity in abilities among citizens. Universal Design involves values, knowledge and practice. The values are dignity, equality and equal possibilities. Due to the condition of plurality, designers should plan for diversity physically, socially and spatially. Design of public places and institutions can be a manifest expression of respect for all individuals as equal citizens. Within the study area, provision of thresholds adhering to Universal Design standards will help ensure that doorways are accessible to all regardless of physical stature.

4.4.3.2 Doorway Size

Another barrier highlighted by respondents was the presence of narrow washroom doors which impeded access. The researcher verified the washroom door sizes in the study area and compared the widths against the recommended door sizes (Table 4.14).

Table 4.14: Washroom door widths

Terminus	Door Size in mm	Recommended Doorway Size
Bungoma	790	900
Kisumu	790	900
Kendu Bay	700	900
Kakamega	670	900

Source: Field Data, 2015

Door widths ranged between 670 mm, 700 mm and 790 mm. All the doorway sizes however fell below the recommended width of 900 mm. Wheel chair users explained that they were locked

out due to the presence of narrow doors. As a result, they avoided making use of the washrooms since they were not able to wheel their devices into the spaces. In the provision of accessible doorways, Douglas (2002) notes that a clear minimum width of 900 mm should be provided so that potential users can manoeuvre within the doorway without any difficulty. Presence of narrow doorways in essence locks out potential users of washrooms who use assistive devices which require additional space.

Since the normate template keeps a walking and fleshy body at the center of thinking about design, buildings often fail to consider space requirements for bodies that use technologies to navigate space. In order to sustain itself, the normate template relies upon the impression that normates are normal, average, and majority bodies (Hamraie, 2013). Within the study area, both wheel chair users and ambulant disabled experienced difficulty manoeuvring through narrow doorways. A universally designed space can reduce dependence, ease burdens on strained relationships and empower multiple members of the social sphere. Individuals need not struggle to enter through entrances (Joines, 2009).

4.4.3.3 Washroom Layout

Respondents were required to establish whether the layout of washrooms enhanced their independence. Table 4.15 presents the responses.

Table 4.15: Barriers Arising from Washroom Layout

Terminus	Missing Grab Bars	Door opens into washroom stall	High sinks	Narrow Washroom Stall	Slippery Floor
Bungoma	33.8%	33.8%	33.8%	26.8%	28.1%
Kisumu	26.2%	26.2%	17%	12.9%	15.8%
Kendu Bay	26.5%	26.5%	26.5%	19.6%	24.9%
Kakamega	13.6%	13.6%	13.6%	6.3%	13.6%
Total	100%	100%	90.9	65.9%	82.6%

Source: Field Data, 2015

Washrooms were primarily inaccessible since all the respondents noted that grab bars were missing (100%). The respondents explained that they avoided using washrooms since absence of grab bars meant that they could not maintain stability while using the washroom accessories. In addition to this, all doors opened into the washroom stall. Respondents explained that this impacted negatively on their privacy. Slippery floors presented a barrier to more than three quarters of the respondents.

Floors in Bungoma and Kakamega were of ceramic tiles, while floors in Kisumu were of terrazzo. Another barrier highlighted by almost all the respondents was that sinks were too high. Respondents explained that the toilets were narrow. In addition to the narrow stalls, respondents confirmed that the space in the toilets was compromised further since all the doors opened into the toilet stalls. This feature was pointed out by more than half of the respondents. In order to

ascertain the feature leading to narrow stalls, a comparison was done between the recommended washroom dimensions and what existed in the study area (Table 4.16).

Table 4.16: Washroom Sizes

Terminus	Washroom Width in mm	Recommended Width in mm	Washroom Length in mm	Recommended Length in mm
Bungoma	830	1675	1580	1500
Kisumu	850	1675	1600	1500
Kendu Bay	820	1675	1480	1500
Kakamega	820	1675	1590	1500

Source: Field Data, 2015

Washroom widths in the study area varied between 820 to 850 mm. These widths were significantly narrower than the recommended width, given that across the study area, washrooms were half the recommended washroom width. Washroom lengths varied between 1480 mm and 1560 mm. Lengths fell within the recommended dimensions except for washrooms in Kendu Bay terminus which fell short by 20 mm.

A comparison between a Universally Designed washroom and the ones existing in the study area has been presented in Figure 4.8.

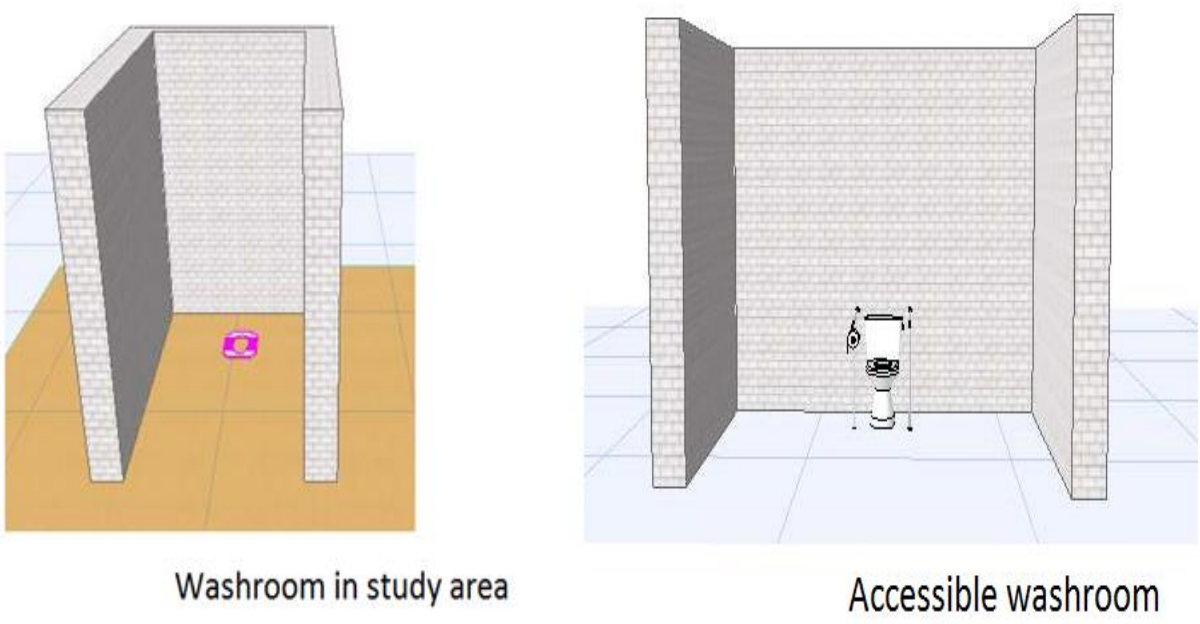


Figure 4.8: Comparison between a washroom in the study area and an accessible one
Source: Field Data, 2015

Figure 4.8 shows that washrooms in the study area were of the squatting type. Respondents in the study area explained that they were unable to use these washrooms. Features which enhance independence in washrooms which were conspicuously absent in the study area included a floor mounted toilet and grab bars which would enhance stability of would be users. Figure 4.9 presents an illustration outlining the dimensions for grab bars and a floor mounted toilet.

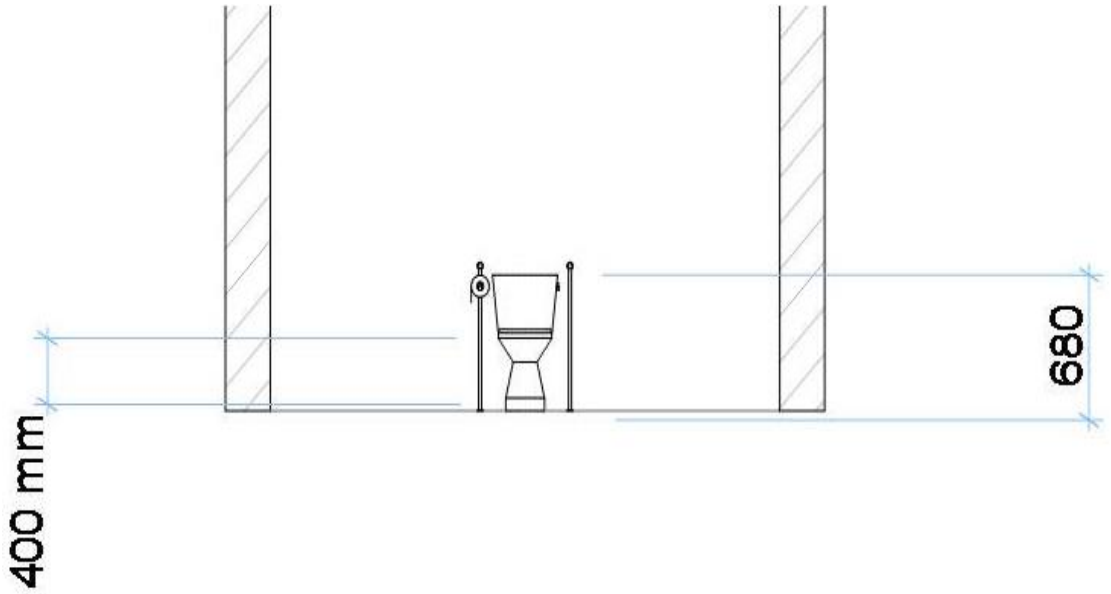


Figure 4.9: Dimensions for floor mounted toilet and grab bars

Presented in Figure 4.9 is a cross sectional drawing detailing the dimensions of an accessible washroom. A floor mounted toilet at a height of 400 mm enhances access, while provision of grab bars at a height of 600 mm would help PwD maintain stability while using the washrooms.

Across the study area, more than three quarters of the respondents in the study area experienced spatial exclusion due to poor layout of washroom stalls. A study conducted in Ontario established that accessible stalls should have dimensions of 1500 mm minimum by a recommended width of 1675 mm. These dimensions enhance independence of PwD during instances they use washrooms (Accessibility design guidelines, 2004).

The presence of narrow washroom stalls in the study area presented a barrier to LwPD, especially the ones who used assistive devices. McLaren, Philpott and Hlophe (1996) note that assistive devices enable disabled people to be independent so that they can function as active members of society While these devices do not cure or eliminate challenges, they take advantage of the strengths of the disabled person; and then circumvent areas of difficulty (Mcguire,

2011). Once this compensation has been done then disabled persons are able to achieve their individual lifestyle goals and ambitions (McLaren, Philpott and Hlophe, 1996).

The presence of washroom widths which are significantly narrower than the recommended in essence enhanced spatial exclusion of individuals who could not operate within the widths set forth. It is important to note that these devices take up additional space and the presence of narrow wash rooms in the study area therefore completely locked LwPD out of wash rooms.

In the design of floors, Lacey (2004) states that floor surfaces should be slip resistant so as not to be a barrier to people who use walking aids such as sticks or crutches. Within the study area, the researcher noted that slippery floors arose due to the presence of a smooth concrete finish or ceramic tiles. Smooth concrete finishes and ceramic tiles have a property of being slippery especially when wet. In order to ensure that washrooms in the study area are accessible to all, washroom floors can be of rubber tiles since they have good grip even when they are wet. Presence of a good grip will also help ensure safety of users during instances they make use of washrooms. There is need therefore to incorporate rubber tile finishes to washroom floors in the study area so as to ensure that floors are slip resistant whether wet or dry.

This study established that all the washrooms did not have grab bars. Absence of grab bars was a glaring anomaly. Grab bars are an important component of washrooms which help PwDs maintain balance as they use washroom facilities. Yuen (2004) puts across the argument that architects and designers often neglect the needs of PwDs due to the impression that most people fit in a particular standard. Absence of grab bars in the study area further confirmed the presence of this notion since such washrooms were not user friendly to PwDs.

The absence of grab bars in washrooms is a glaring anomaly which needs to be corrected since the absence of grab bars in essence locks out disabled persons from using washroom facilities.

To ensure the usability of the toilets, grab bars should be provided to both sides of the cubicle (Pile, 1988). Solidere (2004) concurs with this proposition by stating that grab bars should be installed in water-closets to assist disabled persons to use the facilities safely and easily. In the study area therefore, grab bars should be installed so as to make the washroom facilities accessible.

One of the most important tasks in today's society is to create and build habitable worlds for all people and build habitable worlds for all people throughout their life span. This implies that the starting point should not be a fiction of a normal, average person, but diverse in all aspects. In a population, people will always be of various ages and have different abilities. The design of washrooms should also acknowledge the presence of diversity among potential users (Lid, 2013). Installation of grab bars in washrooms would uphold this proposition since PwD will be able to use sanitary facilities in a dignified way.

Another barrier which was highlighted by respondents was that washroom doors opened into the toilet cubicles. Solidere (2004) identifies insufficient space in wash rooms as a barrier to access. Lacey (2004) suggests that suitable and easily identifiable sanitary accommodation should be provided for all building users. This will involve combinations of general provision of accommodation for ambulant disabled people, those who need more space and wheelchair users. In this way, sanitary facilities will be able to meet the needs of all building users regardless of age, size, ability or disability.

Lacey (2004) suggests further that doors to WC cubicles and wheelchair-accessible unisex compartments should open outwards. It is important however to ensure that the WC door does not open onto a circulation path to ensure privacy of users (Pagel and Harris, 2002). During instances when they open into the cubicle, they should not encroach unduly on usable space.

Where doors swing outward, an additional pull handle should be mounted horizontally close to the hinge side of the door (Accessibility design guidelines, 2004).

4.4.4 Emerging Issues

The second objective of the study sought to establish the influence of layout of amenities in bus termini located in the western part of Kenya on independence of learners with physical disability. The study established that barriers in amenities were as a result of inappropriate washroom layout, absence of adequate signage and the presence of seating facilities which were inaccessible to the LwPD (Table 4.17).

Table 4.17: Barriers in Amenities

	Washroom Entrance Design		Doorway Size	Washroom Layout			Seat Design	Signage
Device	Ramped Access with no stairs	High Thresh Holds	Narrow Doors	Missing Grab Bars	Narrow Stall	Slippery Floor	Usability of Seats	Absence of Signage
None	7.6%	9.8%	41.3%	41.3%	22.4%	8.5%	27.1%	41.3%
Wheel Chair	0.3%	31.2%	33.4%	33.4%	31.5%	6.9%	32.2%	33.4%
Walking Stick	0.3%	0.9%	2.2%	2.2%	1.9%	0.3%	1.6%	2.2%
Crutches	2.8%	8.8%	17.4%	17.4%	7.3%	1.9%	12.3%	17.4%
Special Boots	1.9%	1.3%	5.7%	5.7%	2.5%	0.0%	5.0%	5.7%
Total	12.9%	52.1%	100%	100%	65.9%	82.6%	78.2%	100%

Source: Field Data, 2015

Across the study area, the design of amenities hampered the independence of the LwPD. The barriers highlighted by all the respondents included narrow doors in washrooms, missing grab rails and absence of signage. More than three quarters of the respondents experienced barriers arising from slippery floors and barriers in and around seating areas. Slightly more than half of the respondents experienced disabling conditions arising from high thresh holds.

Within the study area, barriers around seats and the presence of inaccessible seats violated the first and third principle of Universal Design. The first principle requires designs to be useful to

people with diverse abilities, while the second principle requires designs to accommodate a wide range of individual preferences and abilities. Inaccessible seats locked out all the respondents regardless of assistive device. LwPD pointed out that they preferred to sit on their luggage rather than use seats in the bus termini.

Absence of direction signs violated the Universal Design principle which requires the provision of perceptible information to users of a facility. Existence of narrow doorways in the study area violated the Universal Design standard which advocated for provision of appropriate space which enhance approach, reach, manipulation, and use regardless of user's body size, posture, or mobility. The presence of narrow doorways locked out LwPD thereby enhancing spatial exclusion. It can be concluded therefore that the design of amenities in the study area hampered the independence of the LwPD.

4.4.5 Incorporation of Universal Design Features into Amenities

Key informant interviews were conducted so as to establish whether Universal Design parameters had been considered during the erection of bus termini in the study area. The variables under consideration were universal design awareness, current state of bus termini in the study area and the way forward in ensuring design of accessible environments. The target for these interviews included one Director of the National Land Commission, four Planners, four Architects, four people involved in management of bus termini and four Engineers.

4.4.5.1 Evaluation of design of bus termini in study area

Planners, Architects and Engineers were required to evaluate the bus termini in the study area. Outlined herein is a presentation of responses.

> "In a typical set up, the design of major bus termini is a mandate falling under the Engineering department" (Engineer, Kisumu).

"Engineers design pavements and drop offs."(Engineer, Kakamega).

"Architects come on board if buildings are part of the end product".

(Engineer, Bungoma).

Engineers were only concerned with the structural performance of drop offs and pavements while Architects were responsible for buildings within the terminus. Engineers therefore played a role in all the bus termini in the study area, while Architects were actively involved in Kisumu, Kakamega and Bungoma main bus termini.

When asked to comment on the layout of circulation paths and layout of buildings in the study area, the following responses were given:

"At the time of the design and construction of buildings in Kisumu bus terminus, disability mainstreaming was not given emphasis". (Architect, Kisumu)

"Kendu bus terminus was put up when Katito Homabay road was under construction. The concern at the time of its construction was on the structural performance of the pavements and drop offs." (Engineer, Homa Bay)

" Before Kakamega bus terminus was erected, structural drawings for drop offs and pavements were done in relation to loads expected to be exerted by pedestrians and vehicular traffic. As a result, approval of designs of drop offs and pavements were subjected to engineering aspects only."(Engineer, Kakamega)

"Designers have a checklist on what to incorporate" (Engineer, Bungoma).

When the bus termini in the study area were under construction, the focus of the Engineers and architects seems to have been on structural performance of drop offs, pavements and building facilities housed in the bus termini. There seems to be a bias towards the normate template since once the structural stability of drop-offs, pavements and buildings have been ascertained, then the assumption held is that users of the bus terminus facilities should be able to operate in te spaces provided.

When commenting on the building By Law, an informant highlighted the following:

"The building code has a bias to space provision within a housing unit and not a public space" (Architect, Kakamega).

The building By Law which is in use is only concerned with issues on materials used for construction and fire safety of potential users of a space. This By Law does not take into consideration issues of equitable access as has been spelt out in Universal Design requirements.

When asked to comment on the current state of bus termini in relation to its accessibility to people with disability, informants highlighted the following

"Most barriers in Kakamega terminus arise due to the fact that the terminus has lived out its design life. As a result, you will find out that barriers in circulation paths arise due to eroded drop offs and pavements" (Manager, Kakamega Bus Terminus).

> “Currently, the Bungoma terminus has very many barriers since it has outlived its design life. The County Government of Bungoma is preparing to redevelop the terminus” (Manager, Bungoma Bus Terminus).

Within the study area, bus termini had numerous barriers arising from wear and tear. A possible point of intervention is for a thorough audit to be carried out in built environments so that the design barriers can be eliminated.

4.4.5.2 Way Forward on Universal Design in Bus Termini

When commenting on the process of designing a bus terminus in Kenya, a Planner indicated:

> “In an ideal situation, once a bus terminus has been drawn, the proposed designs should be shared with the public through bill boards and notice boards so as to deal with discrepancies. Input from various user groups can also be brought on board at this stage” (Planner, Kisumu)

The informant drawn from the National Land Commission had this to say:

> “The National Land commission provides an oversight role to see if the minimum standards are met. The County Governments execute development control while also setting minimum standards. The Commission provides guidelines on the development of bus terminus facilities as spelt out in the Urban Areas and Cities Act” (National Land Commission)

Bus termini in the study area were however put up before the conditions outlined by the Planning office and the National Land Commission came into force.

Upon inquiry whether those involved in the design of bus termini were knowledgeable on Universal Design issues, the following was established

> "Personnel involved in the design of bus termini are aware of Universal Design requirements since they usually go for periodic trainings organized by the Architectural Association of Kenya" (Architect, Kakamega)

> "Currently, accessibility features such as curb cuts, ramps, grate design and location, and grade elevations are required to be implemented in new constructions" (Architect, Bungoma).

The focus of Universal Design requirements in the study area seems to be on new constructions and not on renovations of existing structures. This may be one reason why the bus termini in the study area are have design barriers.

> "A Reviewed Building Code which clearly articulates UD issues exists. This Code has however not been adopted for use" (Architect, Kisumu).

The current Building Code in use is quiet on Universal Design issues. One other point to note is that dimensions used herein are in feet, while most Universal Design handbooks use metric measurements. Conversion from feet to mm may also lead to loss in some dimensions. There is need therefore for the Government of Kenya to adopt and use the revised Building code so as to ensure that issues of Universal Design trickles down to bus termini and other building facilities open to the public.

> "Since the current building code is still in use, Universal Design requirements should be included in the circulars and physical development plans so that equitable access by potential users is incorporated into project plans before project inception, while the terms of reference are being drawn out. Decision makers in a project have a key role to play as far as implementation of Universal is concerned, they should be made aware of spatio-technical standards which enhance access for all" (Architect, Bungoma).

This observation highlights a pertinent Universal Design issue which is the level of awareness among project developers. In the case of the bus termini, awareness of the Ministers at the County level in charge of termini translates to accessible termini. Other actors involved in project execution include the Members of County Assemblies who would be instrumental in passing the necessary legislation for renovation of termini. In this way, public spaces will not be agents of spatial exclusion since equitable access will be ensured right from the time the terms of reference for projects are being drawn out.

One informant noted the following:

> "There is need for harmonization between legislations governing the design of the built up environment and those advocating for equitable access. Such an exercise will ensure that clauses encompassing equitable access which have been spelt out in the legislations can be implemented while projects are still at the conceptualization stage" (Planner, Homabay).

The researcher queried whether there were provisions for use of International and Universal symbols. One informant had the following to say:

> "The issue on the use of international and universal symbols and tactile signage in termini is still in progress" (Architect, Bungoma).

The researcher noted that none of the bus termini in the study area had incorporated international and universal symbols in the termini. A possible reason could be that the accessible spaces in the termini were lacking in the first place. As a result, it would be improper to post signage demarcating an area as accessible, while the area were full of barriers. A possible point of intervention would be the removal of highlighted barriers, upon which appropriate signage can be posted in the termini.

When asked to clarify the presence of indicator systems on the accessibility of public transport systems, the following comment was made:

> "No indicator system has been developed to measure developments in the accessibility of public transport systems, either for specific parts of the travel chain or for the whole travel chain" (Architect, Kakamega).

Absence of such an indicator system means barriers arising due to wear and tear have not been dealt with. Further, on-going barrier removal is currently not viewed as an obligation by the County Governments. Based on the comments presented in the sections above, it becomes clear

that as much as the County governments have stated that they are committed to UD in bus termini, the facts on the ground dispute this claim.

> "User groups have had a low impact factor although experts have had a moderate influence. Development in other countries has also had a low impact on the execution of projects so far" (Planner, Bungoma).

A further analysis of these comments reveals that since user groups have had a low impact factor in articulating issues which affect the legislations governing development control have not factored the spatial needs of those who use assistive devices. Another point highlighted by these comments is that since development in other countries have had a low impact on legislations used locally, the Counties in which the study fell have not engaged in a benchmarking exercise in the past five years. As a consequence, personnel in the planning office have not evaluated Best Practice in other countries which have succeeded in implementing Universal Design.

When inquiring on the way forward as far as incorporation of Universal Design specifications in bus termini, was concerned, the following comments were made

> "Standards should be inculcated into the practice and project developers should also be informed of standards which enhance access for all. If a project does not conform to Universal Design standards, then fines should be imposed, in addition to denial of development permission. Elaborate Engineering design manuals and standards should be developed. These standards should be used alongside a Universal Design handbook.
>
> This handbook should be welded to a regulatory standard. The regulatory standard and handbook should give exact details including dimensions, elevations, sections, materials to be used and clearance spaces". (Engineer, Kisumu)

Petre'n (2014) confirms that the design of built environments can exclude or include depending on the quality of execution and the decisions behind the same. Based on the findings of the study, it becomes clear that a disconnect seems to exist in terms of erection and maintenance of termini and the UD knowledge of personnel of the Planning Office.

The researcher confirmed that Personnel in the Planning Offices across the study area seemed to be very knowledgeable on UD issues. Despite this knowledge, termini in the study area were full of barriers which hampered mobility, safety and independence of LwPD. By extension, a greater percentage of the populace experienced these barriers whenever they made use of termini. This percentage would include travellers having luggage on castors, expectant mothers, obese travellers and others who were disabled permanently or temporarily.

Lewis, McQuade and Thomas (2004) put forth a strong argument that most environments are designed for the average individual. The average individual is a myth which only exists in anthropometric tables and ergonomics classrooms. One of the most important tasks in today's society is to create and build habitable worlds for all people and build habitable worlds for all people throughout their life span (Petre'n, 2014). This implies that the starting point should not be a fiction of a normal, average person, but diverse in all aspects (Lid, 2013).

The presence of design barriers in the study area highlight the fact that termini in the western part of Kenya are designed with the average individual in mind. As a consequence, spaces and facilities in termini fail to meet the requirements of most users. Such a scenario leads to spatial exclusion of individuals who are not "privileged" to fit in spaces presented in termini.

Since the planners and designers are knowledgeable on Universal Design requirements, the most obvious point of intervention is to plan for renovations of termini across the study area. These renovations should be outlined in such a way that designs move away from the fictitious user of

public areas. The renovations will help ensure that termini are accessible to all regardless of physical status. Indeed, flexible spaces will cater for individuals irrespective of their age or physical ability.

Design for all is a general approach to decision making, planning and design which represents a new paradigm moving from the "average person" to human diversity as a starting point for decision making and design process. This philosophy is a design response to major societal challenges, one of the biggest being enabling the largest possible number of people to live independently and take part in everything that constitute the society. The design for all approach and methodology, goes beyond regulations and standards to translate societal challenges into creative opportunities (Petre'n, 2014).

In this way, the onus of all-inclusiveness becomes a prerogative for both planners and designers. Planners would put in place the required legal framework while designers would incorporate strategies which make the weakest person in society strong through design. On the maintenance of termini, informants confirmed that indicator systems to measure developments in the accessibility of public transport systems have not been developed. As a result, barriers resulting from wear and tear take a long time to be addressed. Jonsson (2014) notes that design can be regarded as a finite process ending up in an infrastructure or a product, or it can be regarded as an infinite process that includes actions and using in the very moment.

In the context of the study area, there is need for recognition of the fact that although the termini have been put up, designers should not assume that there task is done. Instead, periodical evaluations of the components of the terminus should be done in light of UD requirements. Once this is done, barriers arising from wear and tear can be eliminated.

Jonsson (2014) notes further that design is never neutral, it has effects on human existence and behaviour. The existing challenge in the study area therefore is for planners and designers to acknowledge that designs have an effect on users of a public space, long after a project has been completed and commissioned. Within the study area, the presence of barriers affects accessibility negatively. The presence of barriers hampers the independence, mobility and spatial inclusion of some segments of society. The goal therefore is to ensure that designs implemented in public spaces like termini enhance inclusion of all potential users- regardless of their physical stature.

Enabling environments are the ones that encourage the participation and inclusion of individuals with disabilities in social life. Such environments require accessibility to be ingrained in the building industry, and that accessibility standards and Universal Design are the main tool for creating enabling environments (Issa Abdou, 2014). Planners and designers should therefore strive to ensure that bus terminus designs uphold the minimum requirements for equitable access as far as Universal Design is concerned. Planners and designers therefore have an obligation to ensure that enabling environments are put up. Retrofitting termini can also be pursued as an avenue to ensure access for all. Incorporation of these parameters in bus terminus designs will help eliminate disabling barriers which have a negative effect people's ability to navigate through spaces independently and safely.

In the recent past, there has been an emergence of a universal philosophy for environmental and product comfort. Safety and usability has been embraced worldwide as the ultimate design agenda. Universality has become the standard by which design excellence is measured and recognized. By examining successful approaches and interventions, practitioners are presented with a blue print and guidelines for future accomplishments and a world of equity by design (Moore, 2014). The onus is hereby placed on Planners and designers in the study area to examine

examples of “Best Practice” and establish areas where they can learn from success stories of other countries. Such a step may be the basis for provision of accessible termini adhering to UD standards.

Kar and Mullick (2014) propose that interdisciplinary planning, follow up, implementation and assessment of a given design is important. Important aspects of a UD process include: holistic and interdisciplinary, based on user centered design, adoption and application of accessibility guidelines and standards, iterative development, focus on users with diverse accessibility needs and their usage contexts early and throughout the development process, empirical evaluations and focus on whole user experience. The design of public spaces usually pass out non-verbal cues to the populace. On one hand, people who cannot fit into a given space receive non-verbal cues which affirm the fact that they are not considered as potential users of a given space. Based on this communication, inaccessible termini make the argument that disabled bodies are unworthy of inclusion since LwPD are not considered as potential spatial inhabitants.

Hamraie (2013) explains further that although designers do not create social categories, they play a key role in providing the physical framework in which the socially acceptable is celebrated and the unacceptable is confined and contained. Thus when any group that has been physically segregated or excluded protests its second-class status, its members are in effect challenging how designers practice their profession (Hamraie, 2013). A possible point of intervention within the study area towards ensuring access in the study area would be renovation of the bus termini so that the Planners and Designers can apply the Universal Design knowledge which they have in their custody.

Three intersecting approaches which contribute to the advancement of Universal Design include strengthening regulations in order to increase the acceptable baseline; spreading knowledge

through speaking, teaching and writing; and building support through advocacy and representation (Ruptash, 2013). These three approaches will help embed access for all in the built environment. In this way, designers of public facilities can take into account the full diversity of the potential user population. In addition to this, people who are usually considered as having a disability are only a small part of the population of people with reduced functionality. The vast majority of people have some functionality that is significantly less than the norm, and most people go through phases in which they are temporarily disabled by accident, alcohol, drugs, stress or even fatigue (Newell and Gregor, 2002).

Despite the advancement of minimum standards for enhancing access for all, it is important to remember that at the basis of this paradigm, Universal Design should be interpreted as respect for human dignity. If separated from the human condition, there is a risk that it may be reduced to a minimum standard and thus fail to develop its full democratic potential (Lid, 2013). In conclusion, the social model of disability puts forth a strong argument that discrimination against persons with disability can stop only when barriers put in place by society are torn down (Paar and Butler, 1999). Designers and planners of termini therefore have a key role to play in making this observation a reality. The design of the termini should not therefore encourage barrier formation which privileges certain people while excluding others.

4.5 Impact of Attitudes of Other Users of Bus Termini on Spatial Inclusion of Learners with Physical Disability.

The third objective examined the impact of attitudes of non-disabled users of termini on spatial inclusion of learners with physical disability. Outlined in this section is a presentation based on the distribution of attitudinal barriers in termini, sources of attitudinal barriers and the coping strategy of respondents.

4.5.1 Distribution of Attitudinal Barriers

The barriers highlighted by the respondents included inferiority, pity, stereotypes, backlash and ignorance (Table 4.18).

Table 4.18: Sources of Attitudinal Barriers

Bus Terminus	Source of Barrier	Attitudinal Barriers Experienced				
		Inferiority	**Pity**	**Hero Worship**	**Spread Effect**	**Backlash**
Bungoma	Conductor	18.3%	21.5%	22.1%	11.4%	14.2%
	Hawkers	2.8%	1.6%	1.6%	0.3%	1.6%
	Driver	4.1%	4.1%	5.4%	12%	3.2%
	Travellers	18.9%	18.9%	22.7%	3.5%	14.2%
Total		**44.1%**	**46.1%**	**51.8%**	**27.2%**	**33.2%**
Kisumu	Conductor	14.5%	17%	18%	8.5%	12%
	Hawkers	2.8%	1.6%	1.9%	0.3%	1.6%
	Driver	3.8%	3.8%	5.4%	9.1%	2.8%
	Travellers	15.1%	15.1%	18%	3.2%	12.3%
Total		**36.2%**	**37.5%**	**43.3%**	**21.1%**	**28.7%**
K/ Bay	Conductor	15.1%	17.7%	13.9%	16.1%	13.6%
	Hawkers	0%	0.9%	0%	0.3%	0%
	Driver	14.8%	14.8%	14.8%	23%	15.8%
	Travellers	19.2%	19.2%	21.1%	15.8%	20.8%
Total		**49.1%**	**52.6%**	**49.8%**	**55.2%**	**50.2%**
Kakamega	Conductor	0%	8.5%	5.7%	8.5%	5.7%
	Hawkers	0%	0.3%	0%	0.3%	0%
	Driver	7.3%	7.3%	7.9%	12.3%	8.5%
	Travellers	9.1%	1.8%	0.9%%	10.7%	9.8%
Total		**16.4%**	**17.9%**	**14.5%**	**31.8%**	**24%**

Source: Field Data, 2015

More than a third of respondents making use of Bungoma terminus experienced inferiority (44.1%) and pity (46.1%), while more than half were recipients of hero worship (51.8%). In Kisumu terminus, a third of the respondents experienced inferiority (36.2%), pity (37.5%) and hero worship (43.3%). In Kendu Bay, at least half of the respondents experienced the attitudinal barriers. In Kakamega terminus, spread effect was the most common barrier (31.8%). Across the four termini, conductors and travellers were the greatest sources of attitudinal barriers. The most common barrier in Bungoma and Kisumu was spread effect, while in Kendu Bay and Kakamega, pity reported the highest occurrence.

4.5.1.1 Inferiority

One occurrence of inferiority highlighted by one of the respondents occurred when he was alighting from the vehicle. The conductor said

> "You there! Alight quickly for you are wasting my time. You board the vehicle slowly, you also alight slowly. We do not have the whole day to just wait for you."

The respondent explained further that this comment was made in Kendu Bay terminus. This terminus is located along the highway and as a consequence drivers preferred to make a brief stopover. This particular LwPD used a wheel chair and the process of alighting involved the conductor getting the wheel chair from the boot of the vehicle, setting it in place for the learner. Since the driver was in a hurry, the conductor eventually decided to carry the LwPD out of the car and dump him unceremoniously onto his wheel chair, after which the vehicle sped off.

A report by Orissa State Audit (2005) established that inferiority occurs when non-disabled members of the society believe that the presence of impairments renders disabled persons

ineffective. A study by Copestake, Sheikh, Johnston and Bollen (2014) confirmed that people with disability usually experience insensitivity and rudeness from members of the public. This insensitivity included avoidance and rejection by those they came into contact with. Albert and Harrison (2006) point out further that people with disability are not considered to be "real" people at all. A historical perspective of disability reveals that ancient civilizations like Mesopotamia, Egypt, Greece and Rome- understood disability as evidence of the god 's whims or of their active favour or disfavour toward individuals (Johnson, 2011).

4.5.1.2 Pity

Within the study area, pity was either expressed verbally or through looks. During another instance when one walking stick user had to take a long route to avoid going over an open drain, one hawker commented to this learner

> "Oh! Poor, poor child. See how you are having problems navigating through the terminus. I will pray to the gods to have mercy on you. You are having so many problems! See how you cannot cross over this drainage and so you have to go a long, long way. And on top of your problems you have to go to school. I am so sorry".

In this case, the learner had taken a longer route than usual to avoid an open drain. The hawker felt sorry for the learner due to the presence of the mobility barrier and the fact that the learner had an extra "burden" of attending an educational institution. It became clear that avoidance of the open drain became a basis for the expression of pity. In another instance, one passer by offered to assist a crutch user cross over a slippery drop off section onto which food vendors had poured water. The volunteer expressed pity verbally by saying:

> "I am so sorry that you have experienced such a personal tragedy (the disability) at such a young age. I really feel sorry for you that you can not even manage to cross over on your own".

During this instance, the passer by felt pity for the learner since he needed assistance to cross over a slippery drop off. Other than the verbal expressions of pity, respondents noted that there were times when non-disabled users of termini expressed pity in a non-verbal way. This happened during times when people would stare as the LwPD tried to navigate over certain barriers. Examples included when the learners were alighting from vehicles or when they had to go around eroded drop offs and pavements. Upon realizing that they (the learners) were the object of attention, they would turn and look at the people who were following them with their gaze. These people would then pretend to be looking elsewhere.

Pity occurs in instances when non-disabled people tend to feel sorry for persons with a disability (Orissa State Audit, 2005). Many people pity those with disabilities because they believe there is little that can be done to assist people with physical impairments (Yuen, 2004). Pity can be expressed verbally or through looks. Civil inattention usually consists of a glance followed by the immediate removal of visual attention. Consequently, the recipient of the civil inattention often feels in an awkward position. Civil inattention is the foremost disabling process that an individual is likely to confront and it relates to less civil forms of attention such as gazing, staring or unwelcome conversations (Audirac, 2008). This form of pity was very common in the study area and respondents explained that it emanated from hawkers, travellers, drivers of vehicles and conductors.

Another barrier experienced in the study area was hero worship. Results for this barrier have been presented in the sections following.

4.5.1.3 Hero Worship

Within the termini, occurrences of hero worship came from various people. During one occasion, a traveller commented

> "You mean you are able to have a formal education? You must be very brave to pursue this type of education in spite of your disability. Tell me, when the teacher comes into the class, where do you put our crutches? Under your locker, or are they collected at the front of the class? How did you manage to cross from where you alighted to this pavement?"

The traveller felt that the learner was brave since he was able to attend a formal educational institution despite the presence of a disability. In addition to this, the traveller was awed at the fact that the crutch user had been able to get from the drop offs in the terminus and onto the pavements. Another hawker who used a walking stick commented to one LwPD who was also using a walking stick:

> "Did you experience difficulty crossing over those drainage gratings? How did you do it? I tell you, those gratings are my biggest headache in this terminus. I avoid them."

In this case, the hawker was amazed that the learner had managed to cross over a point which was a barrier to the hawker. On one hand, this was a conversation between peers since both were

users of walking sticks and both must have faced the same design barriers present in the terminus.

The Orissa State Audit (2005) clarifies that hero worship occurs when non-disabled members of society consider someone with a disability who lives independently to be brave or "special" for overcoming a disability. Attitudes become a barrier during instances when they block equitable access to goods, services or information of a person or group of people (Reiter and Nelson Bryen, 2010). Thompson, Fisher, Purcal, Deeming and Sawrikar (2014) clarify further that negative attitudes towards people with disability can also reduce people's participation in social and leisure activities, and detract from the fulfilment of their right to social inclusion. Another barrier prevalent in the study area was spread effect. Results for this barrier have been presented in the sections following.

4.5.1.4 Spread Effect

Spread effect as a barrier emanated from conductors, drivers, hawkers and travellers. During one instance, a group of conductors begun talking about one of the respondents right after she had passed by. The train of their conversation ran as follows

Tout 1: Look at this wheel chair user in a uniform.

Tout 3 Look at how she is stranded next to that kerb. Do you think anyone will assist her? Let us wait and see.

Tout 1: Do you see the way she is stranded over there? I bet she is stranded in everything! (More laughter)

Tout 2: Do you think she even understands anything the teacher says?

Tout 1: No I don't think so. I think the disability has also affected her brain.

Tout 3: (Laughing). You know, I think the disability has affected her brain and the brain of the stupid person who sent her to school. Such people should be on the streets begging. Why waste money educating a wheel chair user- and a girl for that matter. (More laughter).[1]

The conductors were of the opinion that the presence of disability in the wheel chair user made the learner unfit to go to school. The learner's inability to navigate over a raised kerb was termed as an occasion showing her failure in everything.

During another instance a crutch user elaborated on a conversation which had taken place between group of street boys.

Street Boy 1: Let's bet. I will give you ten shillings if you can pick a fight with that thing (pointing at the crutch user).

Street Boy 2: No. I do not want your money. He will hit me with that metallic stick he is having.

Street Boy 3: (While addressing Street Boy 2). You are wise my friend for refusing that bet. In addition to him hitting you, you will also give birth to a child who uses metals to walk. Back in the village, my grandmother taught me that if you pick a fight with things like the one which is passing by now (crutch user) you will give birth to a child exactly like him.[2]

Street Boy 2: Why is he avoiding that portion? (Pointing at an eroded pavement)

[1] Conversation between touts in Kendu Bay terminus.
[2] Conversation between street boys in Kisumu terminus. The street boys talked as the crutch users passed near them.

Street Boy 1: Because he is exercising (while laughing)[3]

Street Boy 3: No. I think he just has time to waste.

The cultural beliefs of the street boys was brought into play in this conversation since one of the street boys highlighted what his grandmother had told him. Further, the effort of the crutch user in avoiding a barrier was viewed as a waste of time to them.

Spread effect as an attitudinal barrier occurs during instances when other people assume that an individual's disability negatively affects other senses, abilities or personality traits (Orissa State Audit, 2005). The media usually plays a vital role in reinforcing negative attitudes towards disabled people more so when the media focuses on disabled people as 'benefit scroungers' or as 'psychotic' and 'violent'. (Copestake et al, 2014).

Stereotypes exist due to the negative influence of disability myths (Holmes and Karst, 1990). The conversation of the street boys highlighted above reveals that these boys viewed the crutch user as an object since they consistently referred to him as a "thing". In addition to this, the issue of disability myths showed up, whereby one of the boys believed that fighting with a PwD would make him have disabled babies. Backlash as a barrier also existed in the study area as has been presented in the section following.

4.5.1.5 Backlash

Within the study area, backlash was exhibited by various users of the terminus. During one instance, a conductor commented

"How do you expect me to make any money yet I do not charge you for carrying this chair of yours. It takes up too much space which I would have otherwise placed sacks of

[3] The crutch user was avoiding an eroded pavement portion and as a consequence had to take a longer route

> produce and gotten some good money. You also waste my time since now that you have alighted; you want me to get for you this chair of yours from the boot. For free…….remember you did not pay me to carry it. Now you want me to go get it. Go get it yourself! You disabled people! You just disturb people" [4]

The sentiments of the conductor revealed his anger at not charging the learner any money for transporting the wheel chair. The conductor felt that the effort of putting the wheel chair in the boot at the beginning of the journey and retrieving the same at the end of the journey should have been paid for. Further, he did not consider the wheel chair user as a human being since his parting comment was "You disturb people". The wheel chair user was therefore viewed as a lesser being.

During another instance as a walking stick user was alighting, one commuter commented

> "Be careful with that stick of yours. It might poke me. I wonder why the conductor lets people into the vehicle with sticks"

In this case, the commuters sentiments revealed that he felt that the LwPD should have been compelled to place is walking stick into the boot rather than board the vehicle with it.

Backlash exists when people believe individuals with disabilities are given unfair advantage (Orissa State Audit, 2005). Society is organized to meet the needs of non-disabled persons due to the presence of negative attitudes which hamper the efforts of disabled persons to lead ordinary lives (Najjingo, 2009).

[4] Comment made to a wheel chair user who was alighting at Bungoma terminus. The wheel chair had been put in the boot of the public service vehicle.

4.5.2 Reaction of LwPD to Attitudinal Barriers

In the study area, respondents reacted differently to attitudinal barriers. Some respondents felt ashamed, while others exuded self-esteem in the face of attitudinal barriers. Table 4.19 presents the reaction of respondents to various attitudinal barriers in the study area.

Table 4.19: Reaction of Learners to Attitudinal Barriers Depending on Age and Gender

Reaction to	Age and Gender of Respondents						**Total**
Barrier	Females	Males	Females	Males	Females	Males	
	11-13	11-13	14-16	14-16	17-19	17-19	
Ashamed	2.8%	3.2%	8.5%	7.9%	1.9%	4.1%	**28.4%**
Self Esteem	15.5%	12.9%	20.5%	18.0%	1.6%	3.1%	**71.6%**
Total	**18.3%**	**16.1%**	**29.0%**	**25.9%**	**3.5%**	**7.2%**	**100%**

Source: Field Data, 2015

Within the study area, learners either felt ashamed or exuded self-esteem in the face of attitudinal barriers. Less than a third of the respondents felt ashamed in the face of attitudinal barriers (28.4%), while more than three quarters (71.6%) exuded self esteem.

The variation in the reaction of students to attitudinal barriers can be explained by a report from the Office for Disability Issues (2010) which suggests that those who had acquired an impairment recently tended to feel disempowered and hence that they had less choice and control. Those who had acquired impairment longer ago had longer to adjust to their new situation and sometimes demonstrated greater confidence about how they could exercise choice and control.

Globally, one of the greatest impediments to youth with disabilities is stigma, which leads to social isolation and discrimination. Societal discrimination and negative attitudes arise from

misconceptions, stereotypes and folklore linking disability to punishment for past sins, misfortune or witchcraft. Community members who hold such a view may distance themselves from children and adults with disabilities and limit or prohibit their participation in community life. Understanding and addressing stigma is a critical step to improving the lives of all PwDs (Groce and Kett, 2014).

Despite the existence of legislation advocating for the rights of PwDs, research has established that the real issue behind the presence of design barriers is the disability insensitive attitude of society. Indeed, stringent law can do very little unless there is a change in the mind-set of people and a willingness to accept and respect disabled people (We Care Film Fest, 2010).

4.5.3 Emerging Issues on Attitudinal Barriers

This study established that the following attitudinal barriers existed in the study area: inferiority, pity, hero worship, spread effect and backlash. Non-disabled users of bus termini tended to display these barriers either when they observed the LwPD navigating over barriers or when respondents requested for their help in navigating over the barriers. Despite the presence of the attitudinal barriers, majority of the LwPD were not stigmatized. A third of the respondents however felt stigmatized in the face of attitudinal barriers. The respondents who felt ashamed in the face of attitudinal barriers faced a bigger challenge in terms of lack of accessibility to bus termini when compared to their counterparts who did not feel stigmatized.

The presence of negative attitudes towards LwPD within the study area revealed clearly that non-disabled users view disabled persons as “spatial misfits”. Such a view reinforced the perception that “normal” people should possess a walking, fleshy body. Further, this “normal person” should not experience design barriers. The verbal expressions of users of termini confirmed that

attitudinal barriers were exhibited against the LwPD due to the way they evaded design barriers in the bus termini.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Overview

This section presents the summary, conclusions and recommendations based on the three objectives of the study. The first objective determined influence of design of circulation paths in bus termini located in the western part of Kenya on mobility of learners with physical disability. The second objective established the influence of layout of amenities in bus termini on the independence of learners with physical disability. The third objective examined the impact of attitudes of other users of bus termini on spatial inclusion of learners with physical disability.

5.2 Summary of Findings

i. Barriers in drop offs and pavements arose due to inappropriate maintenance practices and poor design. Mobility of the learners with physical disability was hampered due to the presence of slippery drop offs which consisted of murram or tarmac. Slippery conditions arose when food vendors had poured water onto the drop offs or when there was a downpour. Eroded drop offs, narrow pavement spaces, drainage gratings in the circulation path and the absence of designated crossing points across the four bus termini were also identified as barriers to mobility.

ii. During instances when the learners with physical disability made use of amenities in the study area, they experienced design barriers arising from inappropriate seat design. In addition to this, poor washroom design and layout and absence of way finding and information panels impacted negatively on the independence of the learners. In addition to this, although planners, engineers and designers were aware of Universal Design requirements, the same had not been incorporated into the designs of bus termini in the study area.

iii. Negative attitudes were exhibited by other users of bus termini during instances when the learners had surmounted a perceived design barrier, or when they were locked out of certain spaces due to the presence of a design barrier. The barriers exhibited included pity, hero worship, spread effect, inferiority and backlash.

5.3 Conclusions

Based on the findings of the study, the following conclusions can be made

i. The mobility of learners with physical disability was hampered during instances they made use of drop offs and pavements in the bus termini. Hampered mobility was as a result of inappropriate design construction practices and poor maintenance practices. The existing state of circulation paths did not conform to Universal Design standards which require designs to be useful to people with diverse abilities.

ii. The independence of learners with physical disability was hampered due to absence of way finding and information panels. In addition to this, the learners experienced design barriers arising from inadequate space provision in seating and washroom facilities. Poor spatial layout of washrooms and seating facilities violated the Universal Design principle which advocates for provision of adequate space which enables people to approach and use facilities independently.

iii. Negative attitudes enhanced spatial exclusion of learners with physical disability. These negative attitudes emanated from other users of termini during instances when they observed the way learners with physical disability navigated over design barriers in the bus termini.

5.4 Recommendations

To enhance access of learners with physical disability to bus termini, the following recommendations are made

i. This study established that barriers existed in drop offs and pavements. To respond to these issues, this study recommends that circulation spaces in the bus termini should be redesigned so that barriers arising due to inappropriate construction practices or wear and tear can be eliminated.

ii. This study established that amenities in the bus termini conform to a normate template. There is need for major renovations in bus termini so that the planners and designers can redesign these spaces so that they conform to a Universal Design template.

iii. The Government of Kenya should provide civic education to members of society so as to enable them get rid of their negative view of people with disability.

5.5 Areas for Further Research

Other areas in which research can be carried out are

i. Accessibility of people with physical disability to outdoor eating areas in transportation terminals.

ii. Factors affecting application of universal design principles in execution of building projects.

iii. Accessibility of people with physical disability to public service vehicles.

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APPENDIX I. STUDENT QUESTIONNAIRE

Dear Respondent,

This study intends to establish the design barriers in bus termini which deter safety, independence and free mobility of students with physical disability in the trip to and from school. Please note that participation in responding to questions contained herein is voluntary. The information you provide will be kept confidential within the limits of the law. Your name will not appear in any report or publication of the research. The contents of this questionnaire will be safely stored in a place that is locked and will be destroyed at the end of the study.

Please answer the questions contained herein truthfully.

SECTION ONE: DEMOGRAPHIC QUESTIONS

Given below are questions on your demographic profile. Please answer them truthfully.

1. What is your age? _____
2. What is your sex?
    a. Male
    b. Female
3. Specify the town in which you live. _____
4. Type of assistive device used_____
5. Name of School attended _____
6. Do you travel alone to school _____
7. Are there times you require assistance in using termini? Please explain

8. List the major termini you use in the trip to school

9. Please tick the option which describes your parents:
    a. Married
    b. Divorced
    c. Widowed
    d. Separated
    e. Never been married
10. Tick the statement which best describes the employment status of your father.
    a. Employed for wages
    b. Self-employed
    c. Out of work for more than 1 year
    d. Out of work for less than 1 year
    e. A homemaker
    f. A student

g. Retired
h. Unable to work
i. Not applicable

11. Tick the statement which best describes the employment status of your mother.
    a. Employed for wages
    b. Self-employed
    c. Out of work for more than 1 year
    d. Out of work for less than 1 year
    e. A homemaker
    f. A student
    g. Retired
    h. Unable to work
    i. Not applicable
12. What is the highest level of education completed by your father?
    a. Never attended school
    b. Dropped out before clearing primary school
    c. Cleared primary school
    d. Dropped out before clearing secondary school
    e. Cleared secondary school
    f. Diploma
    g. Degree
    h. Postgraduate
    i. Not Applicable
13. What is the highest level of education completed by your mother?
    a. Never attended school
    b. Dropped out before clearing primary school
    c. Cleared primary school
    d. Dropped out before clearing secondary school
    e. Cleared secondary school
    f. Diploma
    g. Degree
    h. Postgraduate
    i. Not Applicable
14. How many children live in your household who are...
    a. Less than 5 years old?
    b. 5 through 12 years old?
    c. 13 through 17 years old?
    d. Older than 18 years old?
15. Does any of your siblings have a disability
16. If you answered yes to question fifteen above please elaborate more on the issue

SECTION TWO: EFFECT OF CIRCULATION PATH DESIGN ON MOBILITY OF LEARNERS WITH PHYSICAL DISABILITY

A. DROP OFFS

17. Are you able to traverse over the drop offs without difficulty

__Yes __No. Explain your answer

18. Tick the statements which best describes the drop off characteristics

a. __Drop off surface level __Drop off surface not level

b. __Drop off surface firm __Drop off surface not firm

c. __Drop off surface Slip resistant __Drop off surface Slippery

d. __Drainage gratings are located out of the circulation path __Drainage gratings are located In the circulation path

e. __A sloped walkway is provided wherever there is a change in level __A sloped walkway is not wherever there is a change in level

19. Tick the statement which best describes drop offs

The design of drop offs enhances mobility

___Strongly Agree ___ Agree ___Undecided ___Disagree ___Strongly Disagree

20. _____

_____

_____

B. KERBS

21. Are you able to traverse over kerbs without difficulty:

a. Yes_____ No_____

C. PAVEMENTS

22. Are you able to traverse over the pavements without difficulty

__Yes __No. Explain your answer

23. Tick the statements which describe the characteristics of the pavements

a. __Pavement surface level __ Pavement surface not level

b. __ Pavement surface firm __ Pavement surface not firm

c. __ Pavement surface Slip resistant __ Pavement surface Slippery

d. __Accessible route free from protruding objects __Protruding objects present along pavement.

e. __A sloped walkway is provided wherever there is a change in level __A sloped walkway is not wherever there is a change in level

f. __A flight of steps is provided next to ramps __A flight of steps is not provided next to ramps.

g. Tick the statement which best describes pavements

The design of pavements enhances mobility

___Strongly Agree ___ Agree ___Undecided ___Disagree ___Strongly Disagree

24. How do you navigate over barriers in pavements.

_____

_____

_____

SECTION THREE: EFFECT OF LAYOUT OF BUILDINGS IN TERMINI ON INDEPENDENCE OF LWPD.

25. Is your independence in washrooms hampered due to its design while maneuvering through the doorway due to its width?

__Yes __No

26. Tick the statements which describe the characteristics of the washrooms

a. __ Washroom doors are narrow and difficulty is ____ Washroom doors are wide and difficulty experienced going through the doors. is not experienced going through the doors

b. __ The door is light and is easy to push open __ The door is heavy and does not open with a light touch

c. __ The thresh hold is high and difficulty __The thresh hold is low and difficulty is experienced maneuvering over it. is not experienced maneuvering over it.

d. ___The wash room stall is narrow and difficulty is experienced turning inside the washroom. ___The wash room stall is wide and difficulty is not experienced turning inside the washroom.

e. ___ The water closet has a transfer space with with a wide clear on the open side ___ the water closet does not have a transfer space with a wide clear space on the open side space

f. ___Maintaining stability is possible because bars the washroom has at least two grab bars which are slip resistant __The washroom does not have grab

g. ___The urinal is useable because it has a clear space in front of it ___The urinal is not useable because it does not have a clear space in front of it.

h. ___The sink is useable because it has a clear space in front of it ___The sink is not useable because it does not have a clear space in front of it.

i. Tick the statement which best describes washrooms

The design of washrooms enhances my independence when I use the facilities

___Strongly Agree ___ Agree ___Undecided ___Disagree ___Strongly Disagree

j. Explain how you navigate over barriers in washrooms.

SECTION FOUR: EFFECT OF DESIGN OF OUTDOOR AMENITIES ON SPATIAL INCLUSION OF LWPD.

27. Tick the statements which describe the characteristics of the seating area.

a. __The area leading up to the seats is not free of obstacles __The area leading up to the seats is free of obstacles.
b. __The seat height is accessible __The seat height is not accessible
c. __The seats are located on a firm surface __The seats are located on a firm surface
d. __Barrier free walkways lead up to the seating area
e. Explain how you navigate over barriers in seating areas.

f. The signage in the terminus include: (Tick as appropriate)

__Direction signs (Graphic or written directions which indicate clearly the type and location of the available facility)

__Maps and information panels

g. The signs are (Tick as appropriate)

__ visible,___ clear, ____simple,___ easy to read and understand, ___ properly lit at night.

h. Is the signage placed on the pedestrian path of travel ___Yes __No
i. Are accessible spaces and facilities identified by this international symbol of accessibility

___Yes __No

j. Tick the statement which best describes seats

The design of seats enhances spatial inclusion

___Strongly Agree ___ Agree ___Undecided ___Disagree ___Strongly Disagree

SECTION FIVE: ATTITUDINAL BARRIERS IN TERMINI PERPETUATING STIGMA AGAINST LEARNERS WITH PHYSICAL DISABILITY.

k. How often have you been a recipient of Inferiority when navigating over barriers (occurs when non-disabled members of the society believe that the presence of any kinds of impairments render disabled persons ineffective.

__Never __Sometimes __Always. Explain

l. Who were the sources of inferiority
__Conductor __Driver __Fellow commuters
__Hawkers __Street children __Others(specify)_____

m. How often have you been a recipient of Pity when navigating over barriers (occurs in instances when non-disabled people tend to feel sorry for persons with a disability).
__Never __Sometimes __Always. Explain

n. Who were the sources of pity
__Conductor __Driver __Fellow commuters
__Hawkers __Street children __Others(specify)_____

o. How often have you been a recipient of Hero worship when navigating over barriers (occurs when non-disabled members of society consider someone with a disability who lives independently to be brave or "special" for overcoming a disability.)
__Never __Sometimes __Always. Explain

p. Who were the sources of hero worship
__Conductor __Driver __Fellow commuters
__Hawkers __Street children __Others(specify)_____

q. How often have you been a recipient of ignorance when navigating over barriers (occurs when people with disabilities are dismissed as incapable of accomplishing tasks.)
__Never __Sometimes __Always. Explain

r. Who were the sources of ignorance
__Conductor __Driver __Fellow commuters
__Hawkers __Street children __Others(specify)_____

s. How often have you been a recipient of spread effect when navigating over barriers (occurs during instances when other people assume that an individual's disability negatively affects other senses, abilities or personality traits)
__Never __Sometimes __Always. Explain

t. Who were the sources of Spread effect
__Conductor __Driver __Fellow commuters
__Hawkers __Street children __Others(specify)_____

u. How often have you been a recipient of stereotypes when navigating over barriers (exist when non-disabled members of the society form positive or negative generalizations about people with disabilities).
__Never __Sometimes __Always. Explain

v. Who were the sources of Stereotypes
__Conductor __Driver __Fellow commuters

__Hawkers __Street children __Others(specify)_____

w. How often have you been a recipient of backlash when navigating over barriers (exists when people believe individuals with disabilities are given unfair advantage)
__Never __Sometimes __Always. Explain

x. Who were the sources of Backlash __Conductor __Driver __Fellow commuters
__Hawkers __Street children __Others(specify)_____

y. How often have you been a recipient of fear when navigating over barriers (exists when non-disabled people are afraid that they will "do or say the wrong thing" around someone with a disability.)
__Never __Sometimes __Always. Explain

z. Who were the sources of Fear
__Conductor __Driver __Fellow commuters
__Hawkers __Street children __Others(specify)_____

aa. How do you usually react in the face of attitudinal barriers?
a. Feel ashamed. Explain

b. Exude confidence. Explain

Thank you for your participation.

APPENDIX II: OBSERVATION SCHEDULE

Name of Terminus_____
County _____

A. PEDESTRIAN ENVIRONMENT

1. DROP OFF AREAS

a. Has signage been provided to designate the barrier-free spaces as reserved
b. Does the drop off area have the International Symbol of Access?
c. Is it painted in the center of the space
d. Is it in contrasting colour to the pavement

2. FOOTWAYS

a. Is the footway wide enough to allow a wheelchair user and walker to pass one another?
b. Is it having a minimum width of 2000mm?
c. Are the footways clear of overhanging trees and bushes?
d. Are the footways of a level surface to ensure wheelchair users can maneuver easily?
e. Are the joints between paving slabs closed and flush to avoid catching the wheels of a wheelchair.
f. Is the footway of non-slip material?
g. Are gratings and covers non-slip
h. Is the gratings level with the surface.

3. STREET FURNITURE

a. Is the Street furniture (bins, traffic signs and lamp posts) visible
b. Is the Street furniture contrasting with its background
c. Is the Street furniture positioned at the edge of the pavement so they do not create an obstacle or hazard for people with disabilities?

4. SIGNAGE

a. Are maps and information panels mounted at a height between 0.90 m and 1.80 m
b. Are Information signboards rectangular.
c. Are Warning signboards triangular.
d. Does the colour of signs contrast with the surrounding surface so as to be clearly distinguishable.

e. Is the surface glare free
f. Are the letters and signs should raised at least 1 mm from the background.

5. ROAD CROSSINGS

a. Have dropped kerbs been installed at all pedestrian crossing points to enable wheelchair users cross the road and travel on the pavement.
b. Are they positioned to one side of the direct line of the footway along the main road
c. Is the dropped kerb flush with the road
d. Does it have a minimum width of 1200mm?

6. SEATING

a. Are seats provided at regular intervals of between 50 – 100m?

B. BUS STOP DESIGN

1. BOARDING AREA

a. Is the boarding area raised
b. Is there an unobstructed boarding area of 2000mm by 2000mm

2. SHELTERS

a. Have shelters been provided to protect passengers from the elements
b. Have they been located within 2000mm of boarding alighting area
c. Is there a provision of seating in the shelters
d. Is the maximum height of the seats 580mm
e. Is there space for a wheelchair user under shelter
f. Is the shelter transparent and well lit for security
g. Is there enough room to permit pedestrian movement around the shelter

C. PUBLIC REST ROOMS

1. COMPARTMENTS

a. Is at least one compartment for each sex accessible to a physically disabled person?
b. Is the accessible rest rooms marked with the international symbol of accessibility?

2. TOILET DESIGN

a. Is the height of the toilet seat between 450mm and 500mm from the finished floor level?

b. Is the distance between the center line of the toilet seat and the adjacent wall, if provided with a grab bar between 450mm and 500mm
c. Have flushing arrangements and toilet paper dispensers been placed within reach at a height between 500mm and 1200mm.
d. Are Accessible hand-operated flushing controls, located on the open side of the water-closet,
e. Are the water closets Wall-mounted

3. GRAB BARS

a. Have grab bars been mounted on the sidewall closest to the water closet, or mounted on the floor at the edges of the seat.
b. Have grab bars been mounted at a height between 850mm and 950mm from the floor.
c. Do they have a diameter of 30 mm to 40 mm?
d. Do wall-mounted grab bars extend between 35 mm and 45 mm from the wall?
e. Are they firmly fixed with stand loads
f. Do they have non-slip surfaces

4. HAND WASH BASIN

a. Is the height of the washbasin between 800mm and 850mm above the finished floor level?
b. Does the washbasin project forward from the wall a distance between 150mm and 200mm

5. URINAL DESIGN

a. Has at least one accessible urinal been provided in public rest rooms?
b. Does the urinal have a clear space on both sides?

6. REST ROOM DOOR

a. Do the doors open outward unless sufficient space is provided within the toilet stall?
b. Are the doors lockable from the inside and releasable from outside under emergency situations?
c. Has a handle been placed on the door from the inside to facilitate closing?
d. Has another handle been provided on the outside

APPENDIX III: KEY INFORMANT INTERVIEW FOR PERSONNEL IN CHARGE OF MANAGEMENT OF TERMINI

1. Have you developed any kind of indicator systems to measure developments in the accessibility of public transport systems, either for specific parts of the travel chain or for the whole travel chain?

_No _In progress _Yes

2. If yes or in progress,

i. Please give a short description of what is measured responsible authority.

ii. short description of the indicator

3. Please mention some of the most important works and developments regarding policies and legal frameworks for more accessible bus terminals that have ever taken place in your department

4. Please comment if exterior spaces in termini are accessible to all, including disabled persons.

5. Explain if International and universal symbols and tactile signs have been used in termini

6. Does the County organize for sensitivity training for drivers and other transportation staff

APPENDIX IV: KEY INFORMANT INTERVIEW FOR DESIGNERS IN THE COUNTY WORKS OFFICE

Provisions for Accessible Bus Terminals

1. Briefly give a description of the _____ bus terminus.

2. Do you have provisions requiring accessibility of bus terminals for disabled people. Please choose the options that correspond to your situation.

i.	Bus terminal drop offs and	No	In progress	Yes
ii.	Bus terminal wash room facilities	No	In progress	Yes
iii.	Bus terminal pavements	No	In progress	Yes

If you have answered yes or in progress, please explain

3. Does your County ensure barrier-free designs are incorporated into new construction projects and redevelopments in outdoor public spaces?

_No _In progress _Yes

4. Does your County have an internal process for an Accessibility Advisory Committee to review site plans and drawings in a timely manner

_No _In progress _Yes

5. When planning sidewalks and walkways, does your County implement accessibility features such as curb cuts, ramps, grate design and location,
and grade elevations?

_No _In progress _Yes

6. Does your County use international and universal symbols and tactile signage?

_No _In progress _Yes

7. Please comment on the Building Code and how it relates to accessibility of disabled persons

8. Are economic measures and incentives used in order to request or encourage operators or authorities to improve accessibility to public transport systems_No _In progress _Yes

9. If yes or in progress,

i. Please state the name and date of the documents

ii. A brief description of the contents of the document

iii. Please specify the administrative level responsible

iv. If no, please give a short comment.

Training

10. Are there any requirements, programmes, plans or other initiatives (delivered either by Government or by other bodies) aimed at training various groups in order to improve accessibility of public transport for all/for disabled people?

Requirements, programmes, plans or other initiatives aimed at...

i. training transport designers how to plan the built environment in order to improve accessibility to public transport systems?

_No _In progress _Yes

ii. training/supporting people with disabilities to use public bus terminals?

_No _In progress _Yes

iii. training others

_No _In progress _Yes

iv. If yes or in progress, please give a short description, including who is responsible for the initiatives

v. v. If no, please give a short comment

APPENDIX V: KEY INFORMANT INTEVIEW FOR THE DIRECTOR NATIONAL LAND COMMISSION

1. Who has the mandate of designing bus termini?
2. What role does the commission play in ensuring the spaces in bus termini are accessible to people with disability?
3. At what point can interventions be done to ensure that bus termini are accessible to people with disability?
4. Is there any connection between the activities of the commission and the designers of bus termini?