Walkability and Accessibility Audit: Case study of Mukuru Kwa Njenga

Sustainable Transport Equity Partnerships (STEPs)

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1 INTRODUCTION AND BACKGROUND

1.1 Overview

Globally, through the Sustainable Development Goals (SDGs), the world is committed to ensuring sustainable transport, although experiences vary across regions, countries and cities. Walkability in slums and informal settlements, which is the key focus of this scoping study, is a key element of urban transportation. It is the oldest form of human transportation, most affordable, accessible, and the most important target sector for creating sustainable and livable urban settlements. Although walking is clean, easy, and healthy for city residents and integral to community livability, many slums and informal settlement dwellers face challenges due to limitation of infrastructure and services for walking.

1.2 1.2 Access and Mobility in Slums and Informal Settlements

Slums and Informal settlements have been a global concern since the UN-Habitat 1 1986 Conference in Vancouver, and still remain a concern. This on-going concern is due to the limited basic services in such areas. It is in acknowledgement of this challenge that the SDG 11 target 11.1 seeks to ensure access for all to adequate, safe, affordable housing and basic services and to upgrade slums by 2030. It is acknowledged in literature that most services in these areas are wanting, especially in the rapidly growing cities in the developing countries. However, least attention has been given to issues of access and mobility, in particular walking which is the main mode of transport for majority of the urban poor. It was not until the era of the SDGs and the call for inclusion that, the issue of access and mobility especially, among poor urban communities started being visible in development literature and practice

The UN-Habitat 2016 World Cities report notes that `African cities are among the poorest in the World, and their growth rate signal a major challenge to their resource base to build and to sustain adequate infrastructure and public services for the growing population' (UN-Habitat, 2016a: 7). The report dedicates a chapter to the widening urban divide noting that the pattern of urbanization needs to change in order to better respond to the challenges including issues of inequality and informality. The UN-Habitat New Urban Agenda build on the World Cities Report and the SDGs focusing on promoting universal access to basic services, safe, inclusive, accessible green and quality public spaces, including streets, side-walks, and cycling lanes (UN-Habitat, 2016b).

In Kenya, which is the focus of this scoping study, it is estimated that over 60 per cent of people in urban areas live in informal settlements. The informal dwellers are part of the vulnerable groups in society, which include women, children and People Living with Disabilities (PWDs). In 1993 Matrix Development

Consultants, commissioned by the USAID did a study which revealed that most of the informal settlement dwellers had been pushed to the cities peripheries occupying only 5 per cent of the City County of Nairobi's land area (Matrix Dev. Consul. 1993). This situation largely remains the same besides policies, regulations and programmes that have been formulated and designed to address the problem.

The urban poor who largely live in slums and informal settlements have been noted to face a challenge of transport which limits their travel. Most of them do not have travel choices, and they walk because they cannot afford motorized transport (Salon & Gulyani, 2010). Mitullah et al (2018) notes that, the informal dwellers who are most vulnerable cope by limiting their travel outside their settlements. In cases where they travel, it is mainly by walking with the burden of reduced mobility borne disproportionately by women and children. A UN-Habitat (2013) publication finds problem with building or expanding transport infrastructure over increasingly long distances, rather than ensuring people greater access to destinations and facilities that satisfy their needs. The publication calls for urban planners and policy makers to embrace a human rights perspective and ensure equitable access in their efforts to improve urban mobility. A similar call was made by Khayesi et al (2010) who called for inclusive transport planning for multiple street activities by implementing `streets for all policy'.

1.3 1.3 Kenya Policies, Regulations and Programmes

Kenya has made many interventions aimed at addressing the poor situation in slums and informal settlements. A turning point for interventions occurred in 2004 when Kenya developed a National Housing Policy to replace the retrogressive 1st Kenya Policy – Sessional Paper No 5 of 1966/67 (Republic of Kenya 1966) which did not recognize slums and informal settlements. The 2004 policy aims at enabling the poor to access housing and basic services and infrastructure necessary for a healthy living environment especially in urban area. This commitment resulted in the development of a National Policy on Slum Upgrading and Prevention in 2016 (ROK, 2016). The policy has provisions for access and mobility including, safety and security, infrastructure and services including a provision for promotion of Non-Motorized Transport (NMT). However, the policy is still to be operationalized through an Act of Parliament, although some aspects relating to NMT are being implemented, especially in new infrastructure developments.

Kenya continues albeit with mixed results to support slums and informal settlements in line with the United Nations commitments of improving livelihoods of those living in slums and informal settlements. This commitment has seen a number of special programmes implemented with the support of development partners dating back to 1970s. Such programmes included the World Bank and USAID

funded sites and services and upgrading schemes which were for the urban poor but ended up being captured by market forces.

In recent years, programmes such as the UN-Habitat supported Kenya Slum Upgrading Programme (KENSUP) and the multi-agency Kenya Informal Settlements Improvement Project (KISIP) have been implemented. Both programmes aim at improving livelihoods of those living in slums and informal settlements by securing tenure and investing in physical and social infrastructure as well as providing opportunities for housing improvement and income generation. The two programmes were implemented without a policy framework which undermined their potential for replication and scaling beyond the specified projects.

In Nairobi, access and mobility has been a serious challenge to low income urban dwellers and other urban areas in Kenya, where walking to various destinations of activity is the norm. Khayesi et al (2010) highlights the neglect of pedestrians, cyclists and street vendors in transport policy and practice in Nairobi. He observes that transport planning has not adequately taken care of the informal economy and NMT such as walking and cycling. This has resulted in competing use of pavements and roads exposing pedestrians and cyclists and street traders to insecurity and harassment.

It is in response to the challenge of access and mobility that the Kenya Government developed a National Integrated Transport (NMT) Policy (ROK 2012). The policy provides for Non-Motorised and Intermediate Means of Transport (NMIMT) with a goal of promoting provision of appropriate basic road infrastructure, furniture and other amenities including pedestrian crossing, walkways, footbridges and other facilities for NMIMT. The City County of Nairobi Government (CCNG) has also developed a Non-Motorised Transport (NMT) policy with a slogan, `towards NMT as the mode of choice'. The policy acknowledges NMT as an `effective form of mobility for short trips and for last mile connectivity to other modes … as well as an efficient mobility mode with substantially low investment. Furthermore, the mode improves access, creates livelihoods and is a low carbon emitter' (CCNG, 2015: 2).

The development of the Kenya NMIMT policy and the CCNG NMT policy provides a good framework for promoting NMT including walking in Kenyan cities and hence the importance of undertaking a scoping study of walking audit in a low income area such as Mukuru Kwa Njenga.

1.4 Background to the study

This scoping study was undertaken to explore the existing walking patterns in Kenyan Slum Communities; using Mukuru informal settlement as a case study. The study assessed the route choices of the residents

in the community composed of 6 segments and 27 clusters (Slum Dwellers International- SDI K, 2016). This neighbourhood provided a great opportunity to analyze the walking behaviors and patterns of the urban poor communities given the proximity of the settlement to the industrial area which is a major population catchment area. Furthermore, the settlement has been declared by the County Government of Nairobi as a Special Planning Area (SPA). This provides an opportunity for preparation of an Integrated Strategic Urban Development Plan for Mukuru Informal Settlement aimed at improving the existing living conditions.

In order to gain a detailed understanding on the plight of walkability (access and mobility) in the selected settlement, a walking and accessibility audit of the slum community was undertaken guided by the following four objectives:

i. Observe and understand the general pedestrian mobility patterns in the settlement
ii. Explore residents attitude and perception towards the walking environment
iii. Determine the link between activity spaces and walkability
iv. Understand and benchmark the mobility needs of residents in informal settlements

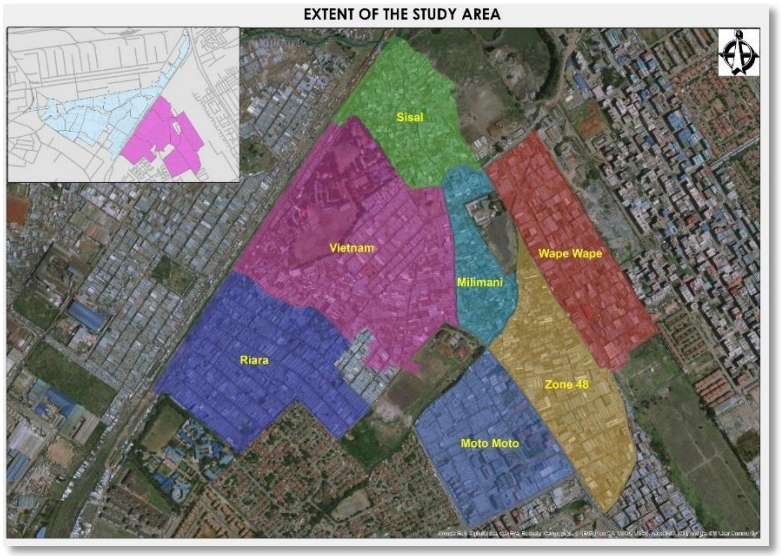
2 STUDY AREA BACKGROUND

2.1 Scope of the study

Mukuru Kwa Njenga which is the neighbourhood selected for scoping is part of the larger settlement of Mukuru; one of the largest informal settlements in Nairobi hosting approximately 301,683 residents on an extensive area of 689.72 Acres - 279.12 Hectares (Slum Dwellers International- SDI K, 2016). Poor service provision in this settlement which is comprised of three wards (Viwandani, Mukuru Kwa Reuben and Mukuru Kwa Njenga) resulted to it being declared a Special Planning Area (SPA) by the County Government of Nairobi in August 2017 under gazette notice 6754. The declaration provided a 2 year time frame within which an Integrated Plan for the Settlement would be prepared. The Plan through comprehensive consultations with the Mukuru communities and other stakeholders will address the community challenges which include but not limited to poor accessibility, poor sanitation, poor drainage, poor quality services and insecurity.

Mukuru Kwa Njenga ward within Embakasi South Constituency and located 5 km to the south of Nairobi is within the city's industrial belt. The settlement covers an extensive area of 1.1082km2 (110.82 Ha) which is equivalent to 39.7% of the total SPA. Mukuru Kwa Njenga is separated from the rest of the SPA by a railway line that passes on the settlements periphery. The settlement is comprised of 7 villages (Riara, Vietnam, Milimani, Sisal, Motomoto, Zone 48, and Wapewape) which host 44,344 low income households in total (133,032 residents). Map 1 below indicates the distribution of the 7 villages in the Settlement:

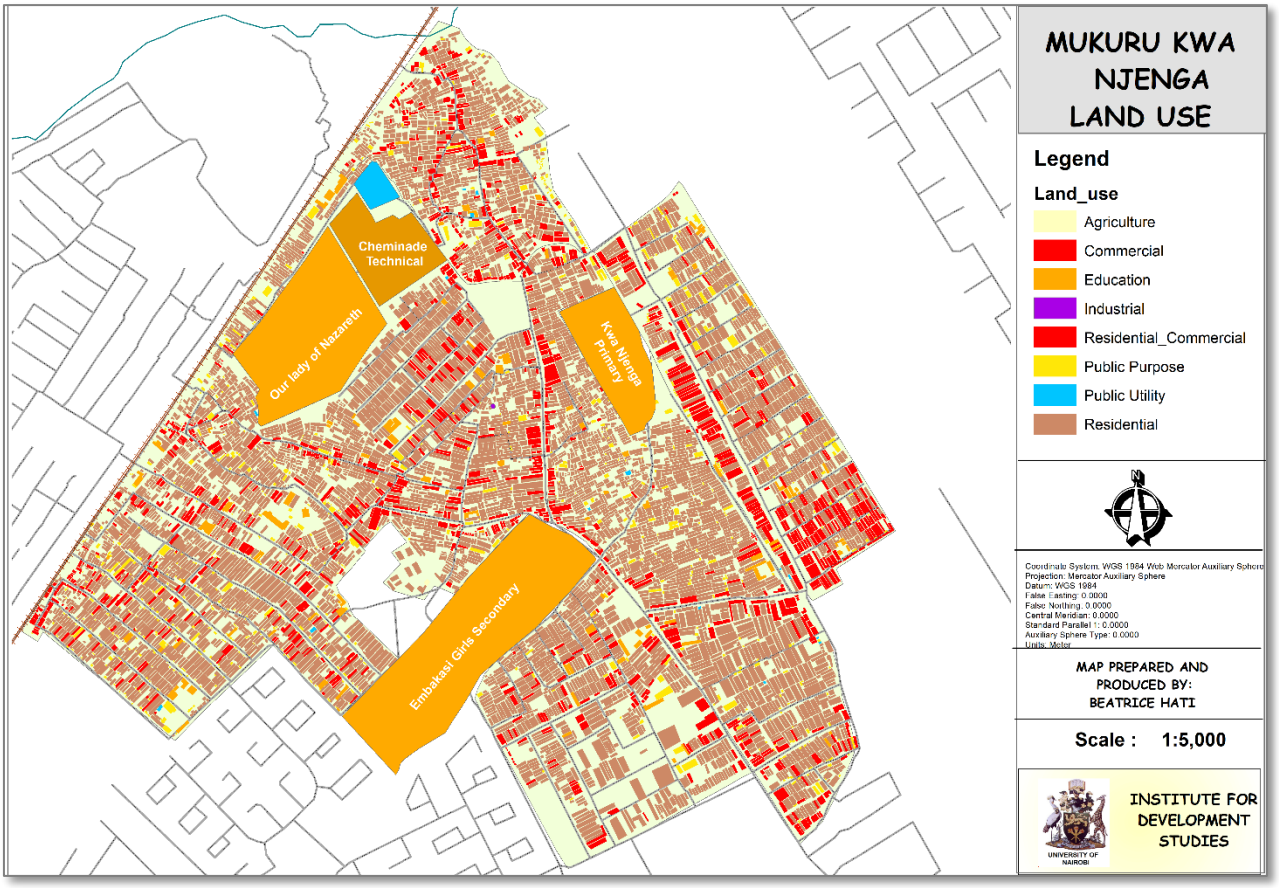
Map 1- Location context of the study area



Source: Field Survey, 2019

As can be observed on the map above, the settlement morphology varies from one village to another. The area exhibits a grain spectrum that has evolved over time; older areas (Sisal village) tend to have a rougher grain that is highly organic compared to the relatively new areas with fine grain (Riara). The highly organic villages are characterized by poor accessibility while the inorganic villages have clearly demarcated although narrow access routes. The land area in these villages is distributed among different uses such as residential, commercial, transportation, public purpose, education, public utilities among others as shown on map 2.

Map 2- Existing land sue in Mukuru Kwa Njenga



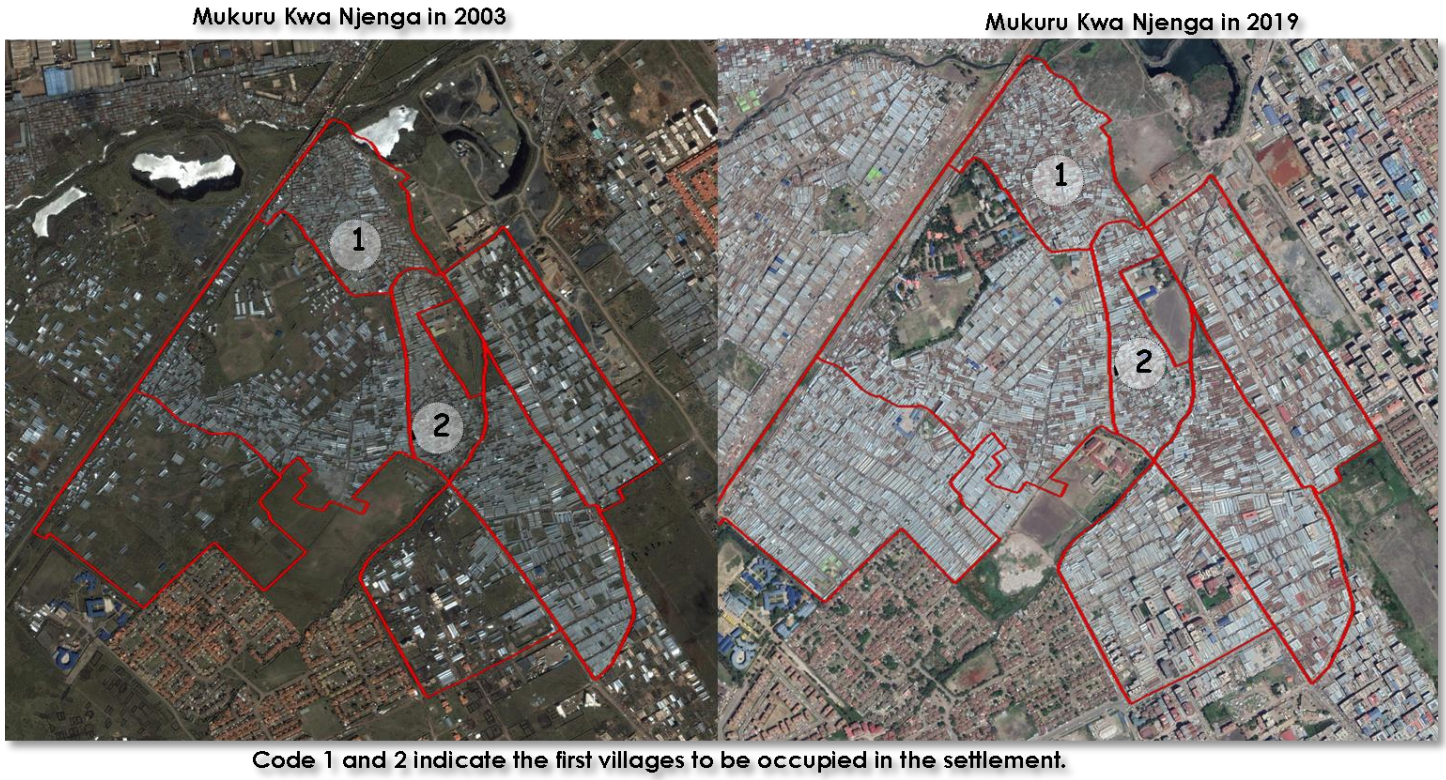
Source: Field Survey, 2019

The major public activity spaces are public education areas- primary and secondary schools which are also used for recreation purposes by the youths in the community. Milimani Villages hosts two of the main education facilities in Mukuru Kwa Njenga (Our Lady of Nazareth School and Cheminade Vocational training center).

2.2 Historical development of the study area

Mukuru Kwa Njenga was named after its founder popularly known as 'Mzee Njenga'. He settled in Sisal and Milimani villages where he was carrying out informal businesses. The land (map 3) occupied by the initial settlers had been issued out by the government to private developers on a 99 years lease period. The condition however was to develop Light industries within a period of 2 years. Some developers did not develop the land and therefore the residents started settling in the seemingly open-available land. The residents put up temporary structures which over time have been upgraded to semi-permanent structures. The settlement has thus undergone through a series of development changes which has over time had a great impact on the transport infrastructure and mobility in general. Some of these changes are visible spatially as indicated on map 3 below:

Map 3- Historical Development of the study area

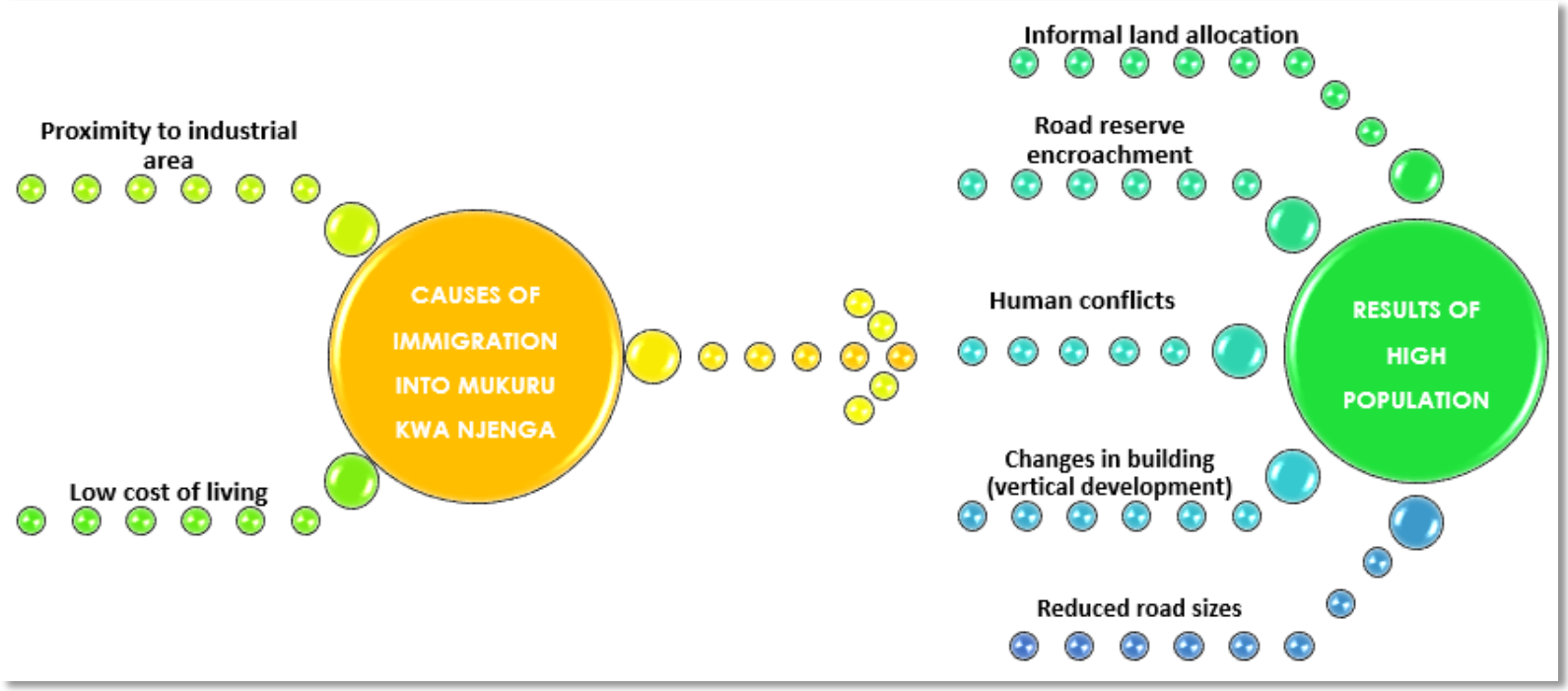


Source: Field survey, 2019

The historical track above indicates the tremendous changes that have taken place in Mukuru Kwa Njenga over a timeframe of 15 years. As people were settling in initially, sufficient space for roads was left between the structures. However with time, migration into Mukuru Kwa Njenga became very high due to the job opportunities created by the industries within the vicinity. The immigrants populated the two villages (Sisal and Milimani) and with time as population increased, demand for residential space became

very high and the other 5 villages came up. Over time, the settlement has become very densely populated and with the limited space available, residents have encroached into the road reserves and any undeveloped space. The impacts of the population increase have not been very pleasant as indicated in figure 1.

Figure 1- Effects of population growth in the study area



Source: Field survey, 2019

The rate of immigration into Mukuru Kwa Njenga with time was alarming and there was need to informally plan where each household would settle. The village elders were tasked with this responsibility and started informal subdivision and allocation of space to the residents. Due to the high demand and continual immigration they commercialized the process. Residents would offer some money to the elders for space allocation. This resulted in haphazard development with no consideration for accessibility. Space left for physical infrastructure was encroached and allocated to residents for commercial and residential development. The subsequent implication of this was narrow roads and dead ends within the settlement. The images on picture 1 illustrate the spatial changes that have taken place in a section of Wapewape Village in Mukuru Kwa Njenga between 2003 and 2019.

Picture 1- Spatial changes in Wapewape village

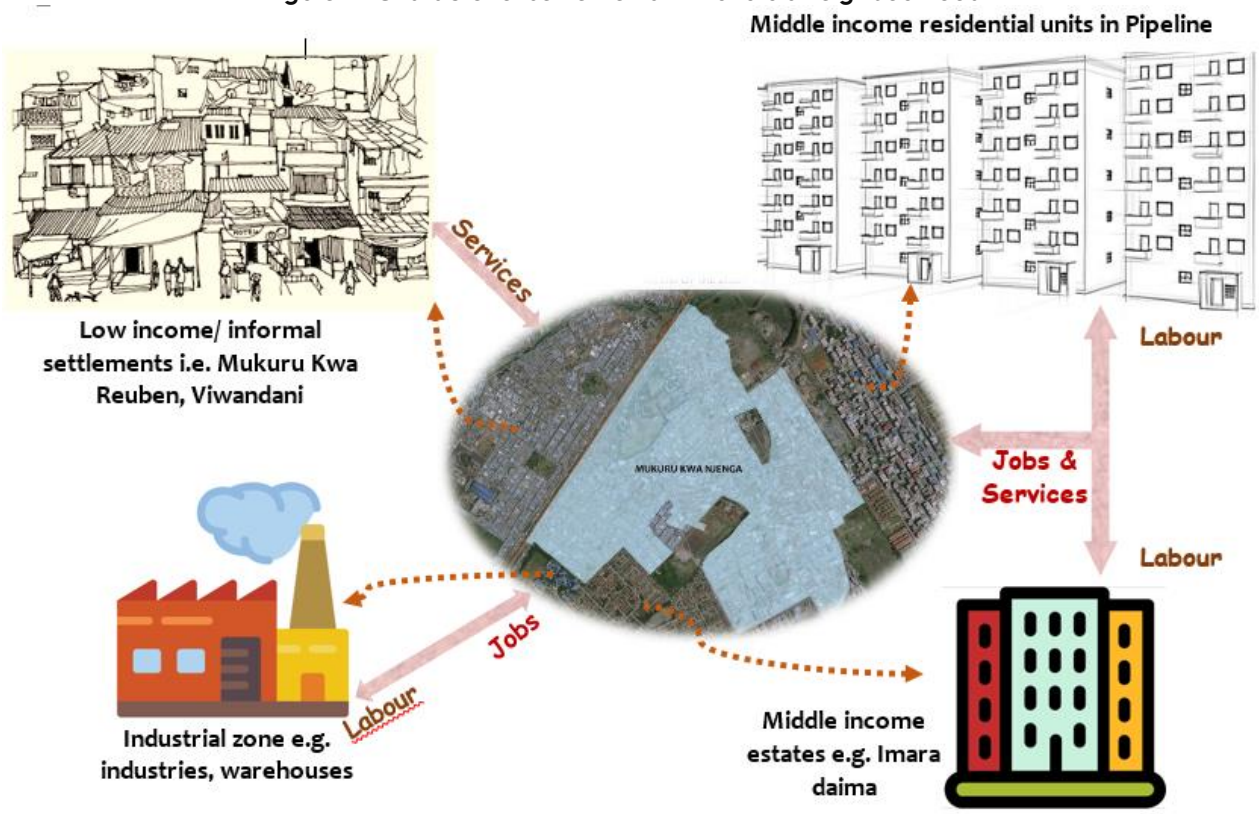
Source: Field survey, 2019

Local access routes were initially well demarcated (5-6m) but due to population pressure and demand for space, people have encroached into the road reserve and only left narrow routes which are barely accessible (1m). These trends have over time limited accessibility and circulation in Mukuru Kwa Njenga.

The neighbouring industrial area has to a great extent contributed to the settlement's overall growth over time. Majority of the residents are both formally and informally employed in industrial area, while others work as domestic and support staff in the neighbouring formal low- and middle-income residential areas.

Walking is the predominant mode of travel in the settlement (Jason Corburn, 2014). Other settlements of diverse character also surround the study area and symbiotic relationships exist between the study area and the neighbouring settlements as represented on figure 2.

Figure 2- Character of settlements in Mukuru's neighbourhood



Source: Author, 2019

3 RESEARCH METHODOLOGY

3.1 Overview

For the scoping concerns to be addressed exhaustively, strategies which combined different approaches and perspectives were employed. The research methodology involved both Primary and secondary data collection, data analysis, interpretation and synthesis and subsequent recommendations to address the identified mobility challenges. A conceptual structure was developed to systematically highlight all the steps that guided the process of collecting, analyzing and interpreting study outcomes.

3.2 Research design

As defined by Selltiz (1962) research design is the conceptual structure in which a research is conducted. It is the arrangement of conditions for the collection and analysis of data in a manner that aims to combine the relevance to the research purpose with the economy of the procedure (Claire Selltiz et.al., 1962). The research design illustrated in Figure 5 describes how the scoping study was planned and conducted from the beginning to the end. The research objectives guided the research design.

The conceptual structure (Figure 3) highlights the steps that guided the process of collecting, analyzing Mobility and accessibility audit parameters the purposes of this scoping study, a number of parameters represented on Figure 4, were considered to measure the mobility and accessibility of routes that exist in the study area.

These parameters included; safety, security, personal preference, availability/lack of infrastructure, convenience, time of travel among others.

Figure 3- Conceptual structure for the scoping study

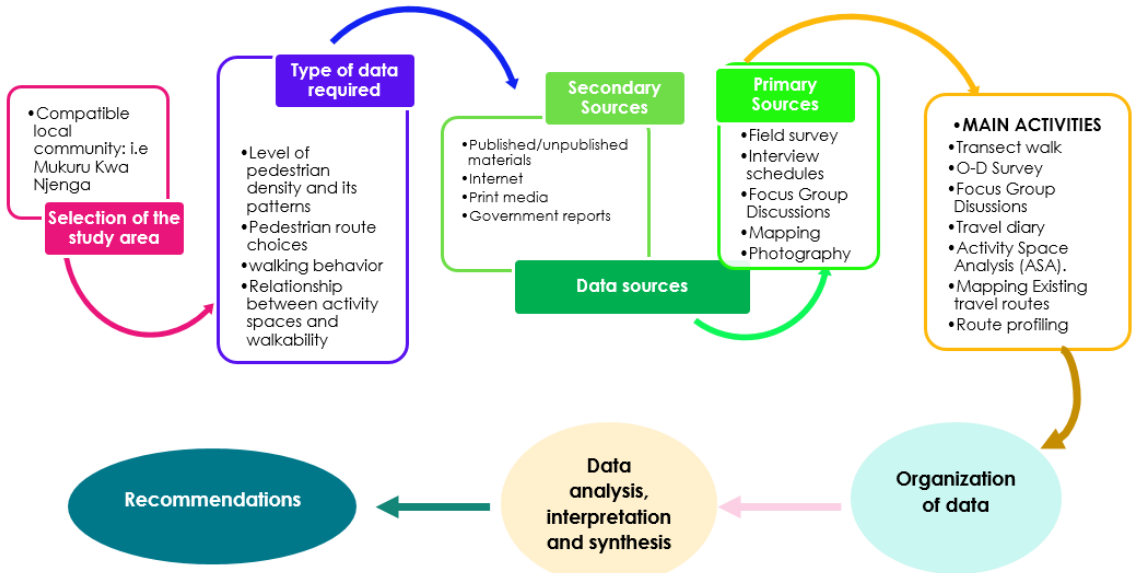


Figure 4- Parameters for the scoping study

Source: Author, 2019

These parameters enabled the researchers understand why pedestrians chose to use or avoid certain routes in the study area. This is based on the assumption that choice of a route is dependent on factors other than the availability of the route.

3.3 Data collection methods

To achieve the purpose of the scoping study, both primary and secondary data were collected through an interactive and evaluative field survey; questionnaires, oral interview schedules, focus group discussion, observation guides, photography, as well as critical and systematic review of literature.

- Primary data

Qualitative and quantitative primary data was collected in the study area under the control and supervision of the researchers. The data gathered included dominant mobility routes in the settlement, factors affecting choice of routes, origin and destination of pedestrians, time taken to walk along the routes, challenges experienced, and coping mechanisms. Majority of the primary data was collected through questionnaires, mapping and observation.

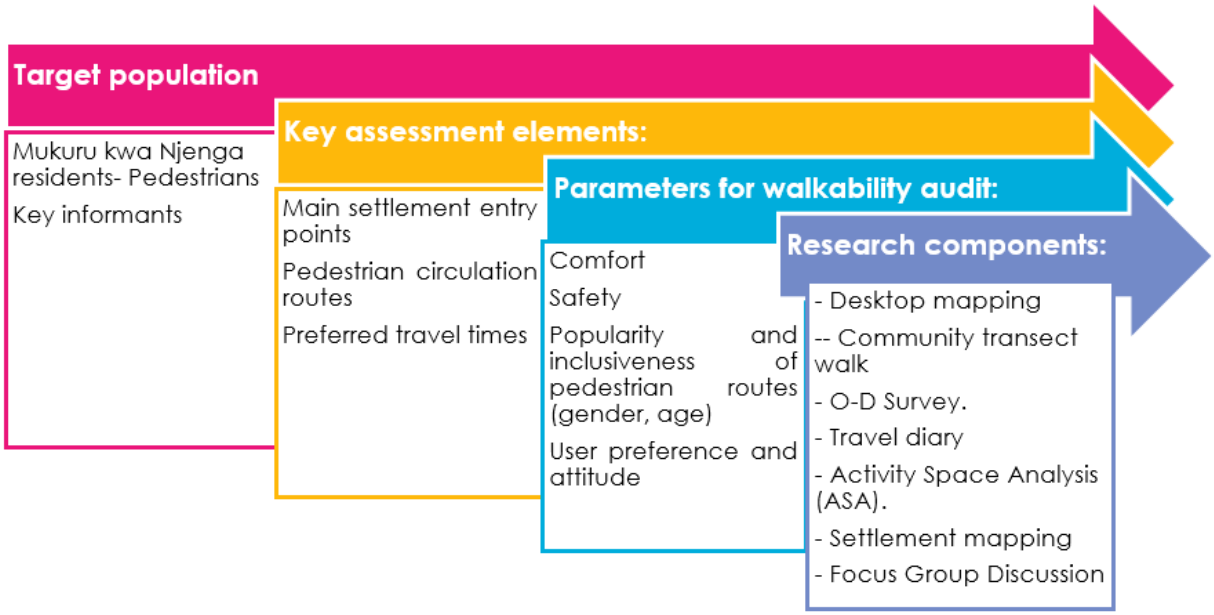
Secondary data

Secondary data comprised of information already collected by other researchers and published in books, articles, magazines, newspapers, government documents, journals among other electronic sources. This data included the historical development of the study area, locational context, population, the policy and regulatory framework for mobility and accessibility of informal settlements, among others.

3.3.1 Primary data collection methods

A number of primary data collection techniques were adopted for this study (figure 7). To ensure that the best outcomes were achieved, the target population, key assessment elements, parameters for walkability and research components were considered as shown in figure 5.

Figure 5- Elements considered for primary data collection



Source: Field survey, 2019

The following techniques were used for gathering primary data:

i. Community transect walk.

This was the entry point for this research in the community. It was a participatory exercise where the researchers accompanied by a community local expert walked through the settlement not only to see the neighborhood's transect but also to observe various elements related to the subject of study. These include; physical infrastructure provided for pedestrians, condition of the infrastructure, connectivity of

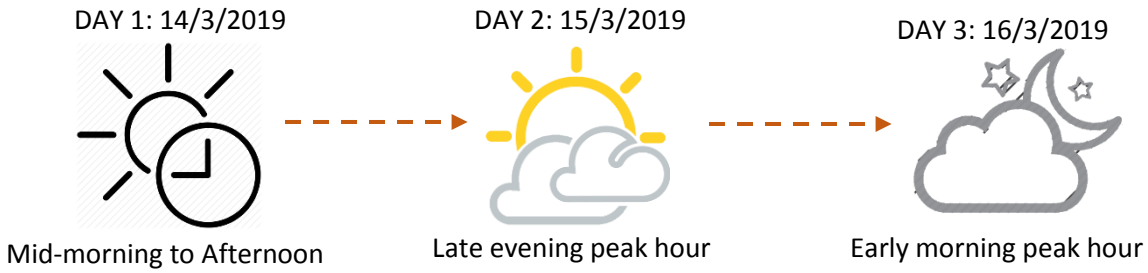
footpaths, interaction between non-motorized transport (pedestrians) and other land use activities among other elements.

ii. Origin Destination survey

After identifying the pedestrian routes within the settlement, the researchers with the help of a community member positioned themselves along the routes to administer questionnaires (appendix 1) to pedestrians aimed at getting details on their trip origin and destination. In order to sufficiently and adequately survey all routes, a total of 20 respondents in each of the six villages were interviewed totaling to 120 respondents. The survey questions included information on origin and destination of trips made by the respondents, time taken for the trip, purpose, frequency of the trip in a day, reasons for the route choice, mobility challenges experienced on pedestrian networks available and alternative pedestrian routes used.

The surveys was carried over a period of three days (14th- 16th March 2019), Thursday 10.00am-2.00pm, Friday 5.00pm-8.00pm and Saturday 6.30am-9.30am as shown in figure 6.

Figure 6- Survey Day and Time



iii. Mapping

The pedestrian circulation networks were mapped and profiled. Start and end points of the routes were clearly marked and the route character documented. With the help of the local community, the researchers also mapped the major activity areas (markets, shopping centers, schools, and administrative areas), conflict areas (Non-motorized-Motorized traffic conflicts, areas that area security/safety hazard) and other elements on a map print out.

After undertaking the 3 activities, first level of data collection was complete and a number of outputs generated as shown in the table 1 below:

Table 1- Data collection outputs

Method	Method description	Output
Community transect walk: ∴ Observation using a checklist ∴ Photography ∴ Community mapping	Examination of pedestrian in natural settings Checklist were used for guidance	Picture Gallery indicating: ○ Pedestrian walking behavior ○ Condition of walking areas
		Travel Diary (Dominant time of travel)
		Comfort/discomfort areas
Pedestrian Origin Destination Survey (O-D Survey)	Surveyed randomly selected pedestrians	Pedestrian Origin destination Inventory indicating: ○ Travel patterns ○ Journey purpose ○ Trip frequency ○ Walking distance
Mapping	Representation of the pedestrian circulation networks graphically.	Pedestrian circulation map
		Major activity sites/spaces

Source: Author, 2019

iv. Focus group Discussion

After the completion of the individual pedestrian's data capture, a group of 13 community members participated in a Focus Group Discussion aimed at corroborating some of the findings from the other methods. This was held at Amusha hall within Mukuru Kwa Njenga on 23rd March 2019; a few days after the field survey was completed. The gender representation during the discussion was 6: 7 males and females respectively. Two of the participants had physical mobility challenges. These ensured that opinions of different pedestrian characters were captured. The researchers guided the focus group participants in the discussions as shown on picture 2 below:

Picture 2- Focus group discussion proceedings

Source: Field Survey, 2019

Information collected earlier by the researchers was presented graphically to the focus group participants to provide an informed basis of discussion.Key elements that were discussed included; Historical development of the settlement, common destinations, existing infrastructure, level of maintenance of the listed infrastructure, pedestrian conflicts , security of the pedestrian paths and general residents' recommendations. the dicussion proceedings were recorded for later transcription.

v. Observing walking behaviors

Observation is a key data collection method that was undertaken throughout the research period. The researcher were keen to observe and record level of pedestrian density, major activity zones, road/path use behaviors, route profiles among other elements. The factors observed contributed towards achievement of a broader purpose; which was understanding and reviewing the mobility elements of Mukuru Kwa Njenga. The factors observed are summarized in table 2 below

Table 2- Factor observed during the survey

OBSERVATION FACTORS	EFFECT ON SETTLEMENT MOBILITY
Street widths and building heights	Indicated **comfort** level of the pedestrians on the footpath/street
Entry and exit points	Indicated the **connectivity** of the streets
Path's visual complexity	Indicated the **vitality** of the street
Lighting	Indicated the **safety** level of the street
Time of day when trips are made	Indicated **time** of travel

Source: Author, 2019

vi. Photography

This involved taking pictures for the sole purpose of documenting the observations made and the tasks undertaken. This was done with great care in order to not offend the pedestrians being observed.

3.4 Data analysis

Data collected during the survey was entered, cleaned and synthesized for meaningful interpretation of mobility and accessibility elements. This enabled qualitative and quantitative data analysis, including the following:

- ☐ Describing and summarizing the pedestrian mobility data.
- ☐ Identifying relationships between walkability and land use/activity spaces.
- ☐ Comparing different survey variables e.g. Trip purpose and trip origin/destination.
- ☐ Identifying the character of different routes mapped
- ☐ Assessing the determinants of route choice
- ☐ Comparing the historical transformation of the settlement, accessibility and mobility

The quantitative data collected was analyzed through SPSS and presented using statistical methods such as charts, frequency distribution, and analytical tables. ArcGIS was used to map and analyze the existing mobility patterns. Scaled maps were produced to present this data.

The analysis of the qualitative data was done using content analysis and presentation of narratives and descriptive notes. Sketches and photographs were equally used for illustration of findings.

4 FINDINGS

4.1 Overview

This chapter presents an analysis of the findings collected from both the secondary and primary data and organized along the study's objectives. The section begins by providing the socio-economic characteristics of the respondents, followed by details of other findings related to mobility and accessibility of the study area. The findings are analyzed to bring out a comprehensive understanding of the study subject. The chapter concludes by presenting the general mobility needs of the residents in Mukuru Kwa Njenga. Charts, pictures, and maps are used to enhance understanding and bring out the characteristics and condition of mobility routes, challenges experienced along these routes and various factors affecting mobility in the study area.

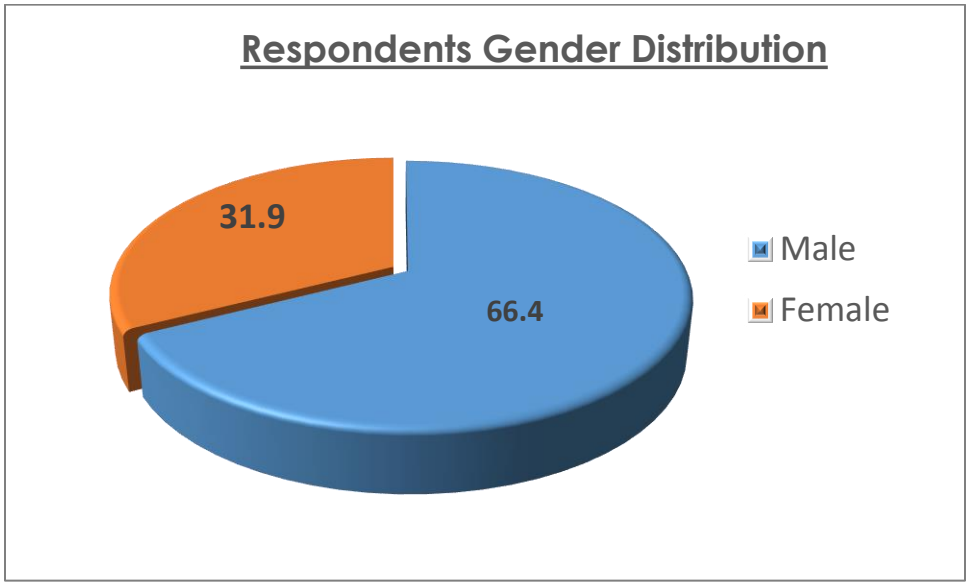
4.2 Socio-economic characteristics

Mukuru Kwa Njenga is generally a low-income neighbourhood. It is home to a large informal economy and labor force contributing to economic activity both within the settlement as well as in the surrounding areas. Residents engage in a number of economic activities to earn a living. The settlement is located within a light industry neighbourhood, with majority of the residents employed as casual labourers in neighboring industries. Other economic activities include small-scale retail businesses, mostly located within the settlements and also along strategic transport corridors leading in and out of the settlement. A resident in Mukuru Kwa Njenga earns approximately 12,000 Ksh on average with a significant difference by gender in earnings across occupations with the women reporting to earn about 25% lower than the male counterparts for a similar occupation (Jason Corburn, 2016).

Majority of the residents were born and live in Mukuru Kwa Njenga. They are mainly tenants who occupy semi-permanent structures which are made of Iron sheets and timber. Security of tenure is a key challenge in Mukuru Kwa Njenga. Residential structures are constructed on land that is under private ownership which has constantly led to conflicts between the land owners and the residents.

Majority of the respondents were male as indicated on chart 1. On the second day of the survey especially where the survey was conducted in the late evening, very few females were spotted walking. The few interviewed stated that females prefer walking during the day as opposed to late evenings and night citing security challenges.

Chart 1- Gender distribution

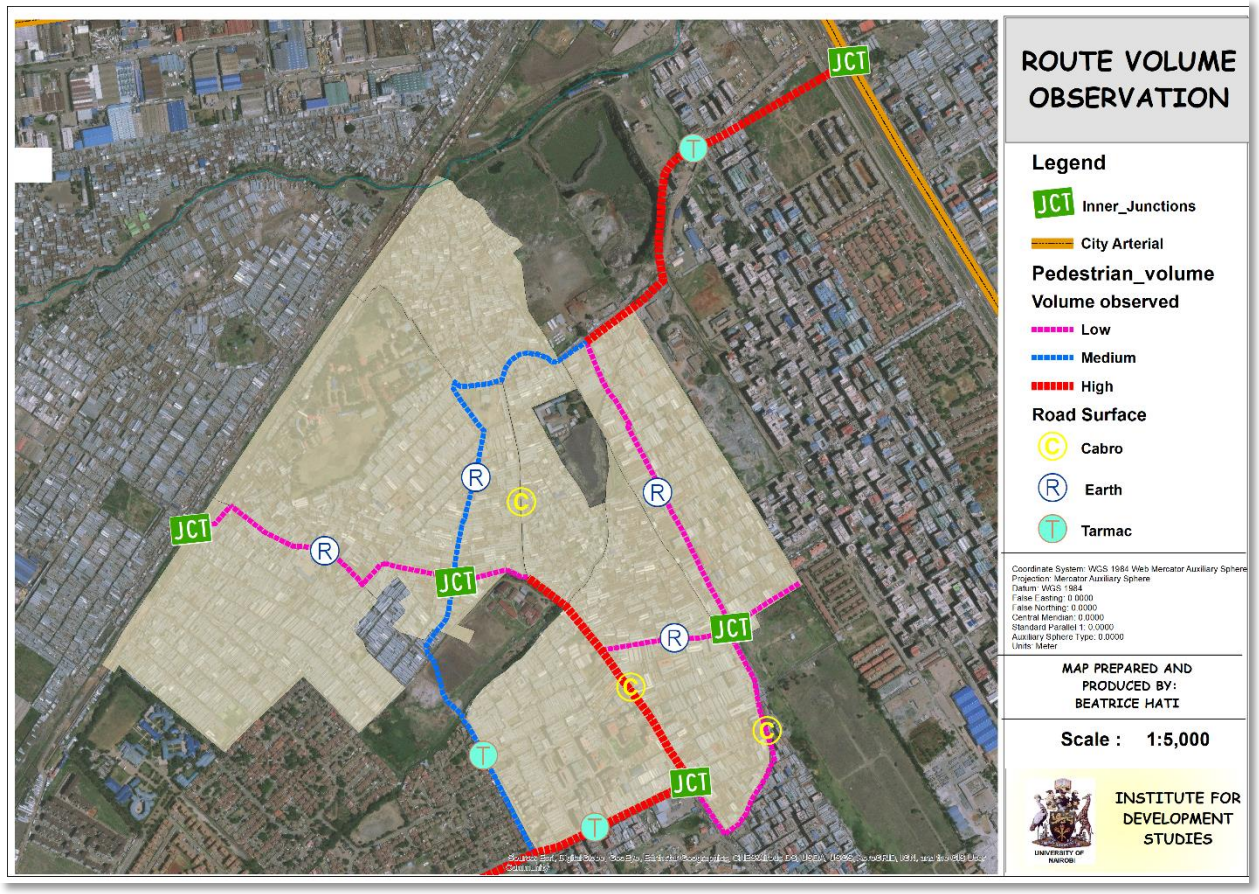


Source: Field survey, 2019

4.3 General pedestrian mobility patterns in the settlement

As confirmed by the area residents, most people work in the industries in the neighbourhood and thus use walking as the dorminant mode of movement to and from work. The roads in Mukuru Kwa Njenga record high pedestrian volumes especially along the main roads and junctions while the local footpaths record lower pedestrian volumes as shown on map 4 below.

Map 4- Pedestrian volume variation along routes



Source: Field survey, 2019

4.3.1 Road user behavior

Roads in the settlement are characterized by diverse forms of traffic. Major roads are comprised of both motorized and non-motorized traffic. The minor roads/local access routes are synonymous to non-motorized transport due to space limitation. Picture 3 below shows the various type of traffic observed on Mukuru roads and the general road use behaviors of the residents.

Picture 3- Pedestrians walking in Mukuru Kwa Njenga

Source: Field survey, 2019

On most roads, pedestrian traffic is not segregated from vehicular traffic. Pedestrians often use the carriage way and have to pave way for vehicles and motorcycles. The interaction between pedestrians and vehicles is fairly safe as opposed to the interaction with motorcycles. Despite the narrow and congested state of the roads, motorcycles are always driven recklessly and at very high speed. The residents interviewed during the survey cited motorcycles as a key threat to mobility on Mukuru roads.

Picture 4- Designated footpath on Catherine Ndereba road

Picture 4 portrays the layout and use of Catherine Ndereba road; recently upgraded by the Nairobi City County Government. Pedestrians along this route stated that over the years they had been used to walking on the carriageway and have not yet adjusted to the planned mobility route.

Some sections of the route are either partially or completely encroached by informal businesses leaving pedestrians no choice but to use the carriageway.

Source: Field survey, 2019

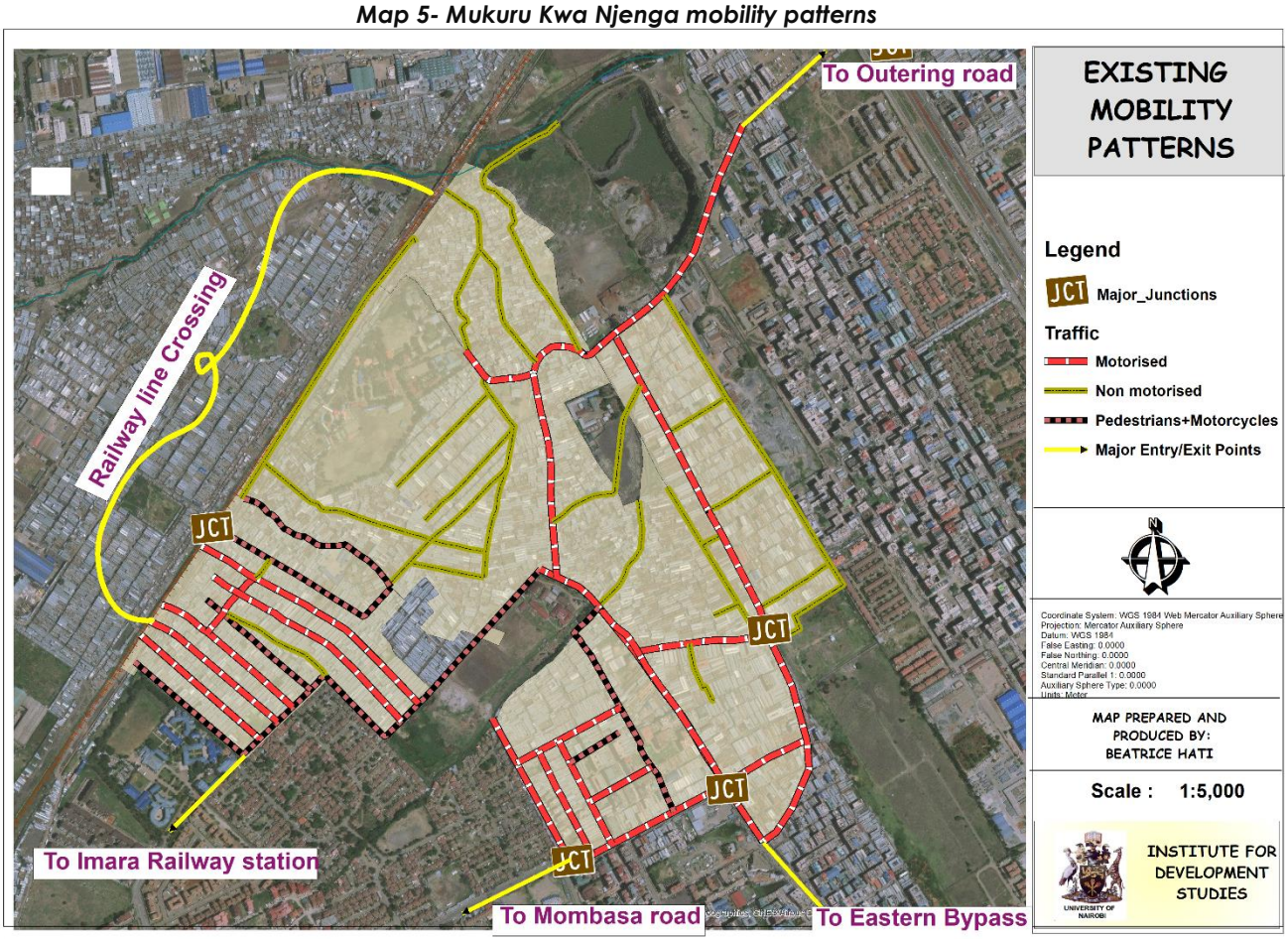
Two main roads in the settlement have provided for segregated footpaths but have been dominated by informal business activities. Pedestrians however enjoy walking along these roads since the businesses on the paths have promoted active street life even at night. Despite the provision of a segregated sidewalk, some pedestrians still opt to walk on the carriage way.

Crossing of roads is a pedestrian road use behavior that was identified as a key potential risk to mobility. Pedestrian crossings are not available on any road in the settlement thus pedestrians cross the roads spontaneously. This poses a threat to them and to other road users. A number of conflicts were stated to occur along the main road (Catherine Ndereba road) since motorized traffic is at relatively high speed yet safe crossing areas are not provided.

4.3.2 Existing mobility patterns

The movement of pedestrians depends on the interactions between people and between people and the environment. The routes used therefore connect to various activity spaces. Routes used by the Mukuru Kwa Njenga residents to circulate within the settlement and out of Mukuru were mapped and profiled with the help of the community members. These are as shown on map 5.

Map 5- Mukuru Kwa Njenga mobility patterns



Source: Field survey, 2019

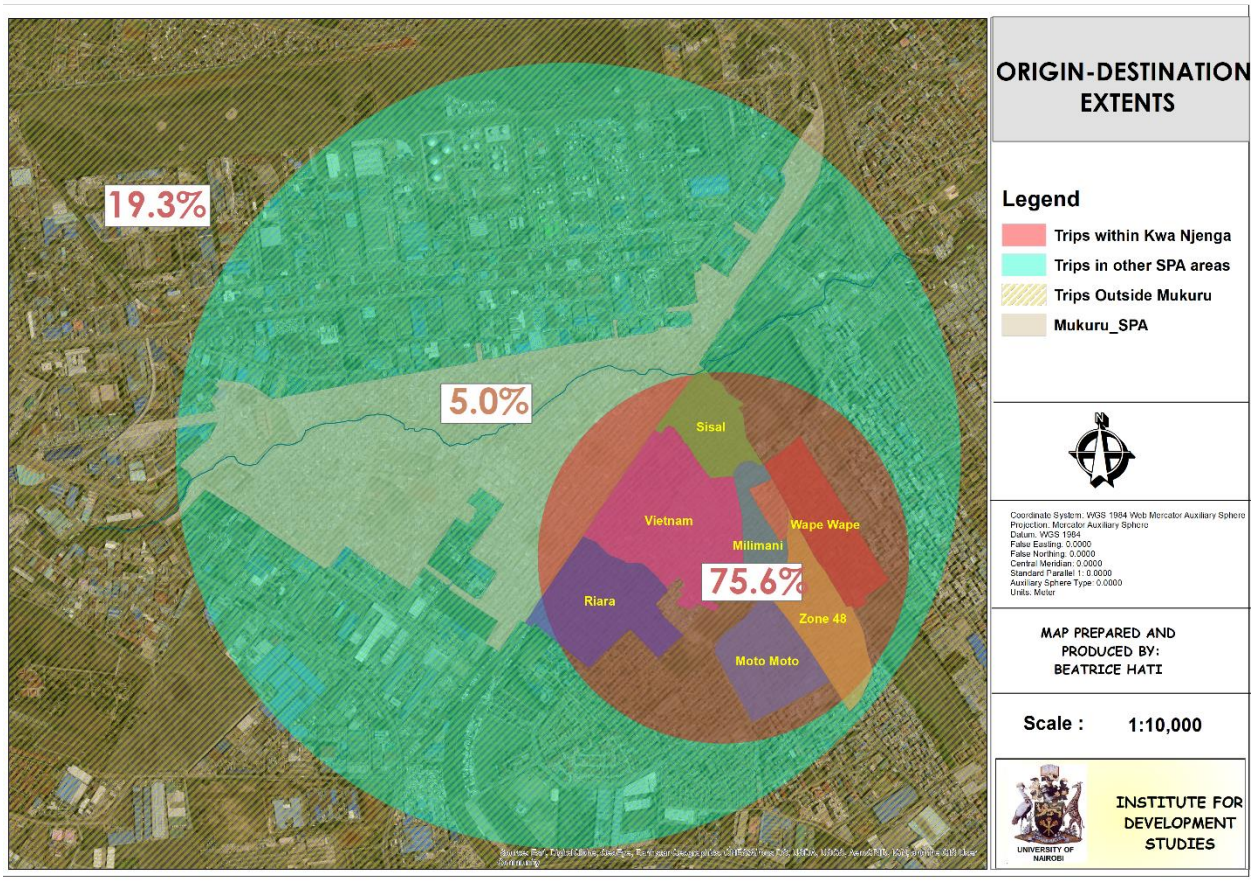
The above routes vary in size and character. Motorized routes record the highest pedestrian volumes in the settlement because they are wide and are connected to the major exit and entry points. These exits points are Imara Daima railway station, Mombasa road, Eastern Bypass, Outering road and the railway station which connect traffic to areas outside the settlement. The routes are also characterized by a series of linear commercial activities such as small-scale retail shops, open air street vending among others. Semi-motorized routes (pedestrians + Motorcycles) also record fairly high pedestrian volumes. The routes however are not wide enough to accommodate vehicles. Street vending is rare on these routes but a few small-scale retail shops are present.

4.3.3 Origin-Destination analysis

Mukuru Kwa Njenga is conveniently located within an industrial neighbourhood. Some of its residents therefore work in the surrounding industries while others have set up informal businesses e.g. Food

vending to serve the industry employees. The survey and group discussions undertaken revealed that there are three major forms of pedestrian movements as shown in map 6.

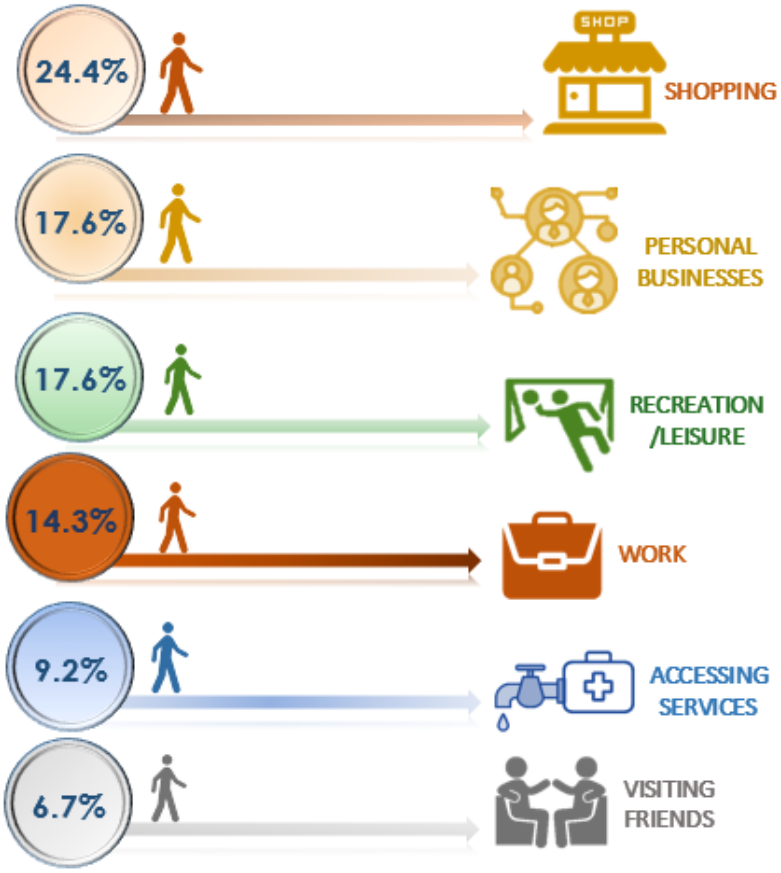
Map 6-Origin Destination of pedestrian trips



Source: Field survey, 2019

Based on the survey, pedestrian movements in Mukuru can broadly be described as intra and inter settlement movements. Intra settlement movements were the majority where movements traced were within the seven villages in the settlement. A number of residents also make trips outside the settlement, either in the other two Mukuru settlements (Mukuru Kwa Reuben and Viwandani) or in Mukuru's abutting settlements. The two types of movements mentioned above are undertaken by pedestrians to fulfill certain needs as summarized on Figure 7 below.

Figure 7- Trip purpose



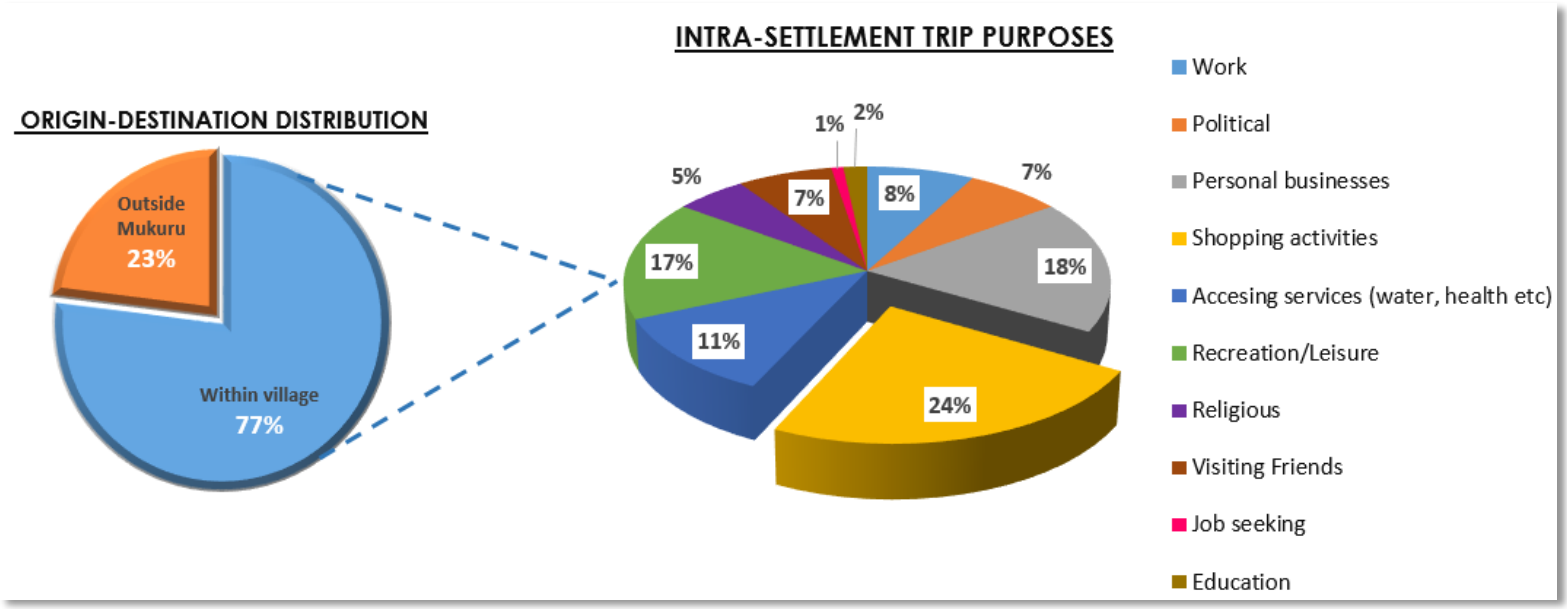
Source: Field survey, 2019

Most youths and residents below 35 years are unemployed and cited personal businesses as a reason for pedestrian movements. As explained by the respondents basically meant that they did not have anything to do and were walking around with the hope of getting some work to earn them money for the day.

4.3.3.1 Intra-settlement movements

Trips within the settlement are made by residents who carry out commercial activities within the settlement while others walk within Mukuru Kwa Njenga for other purposes as illustrated in chart 2 below:

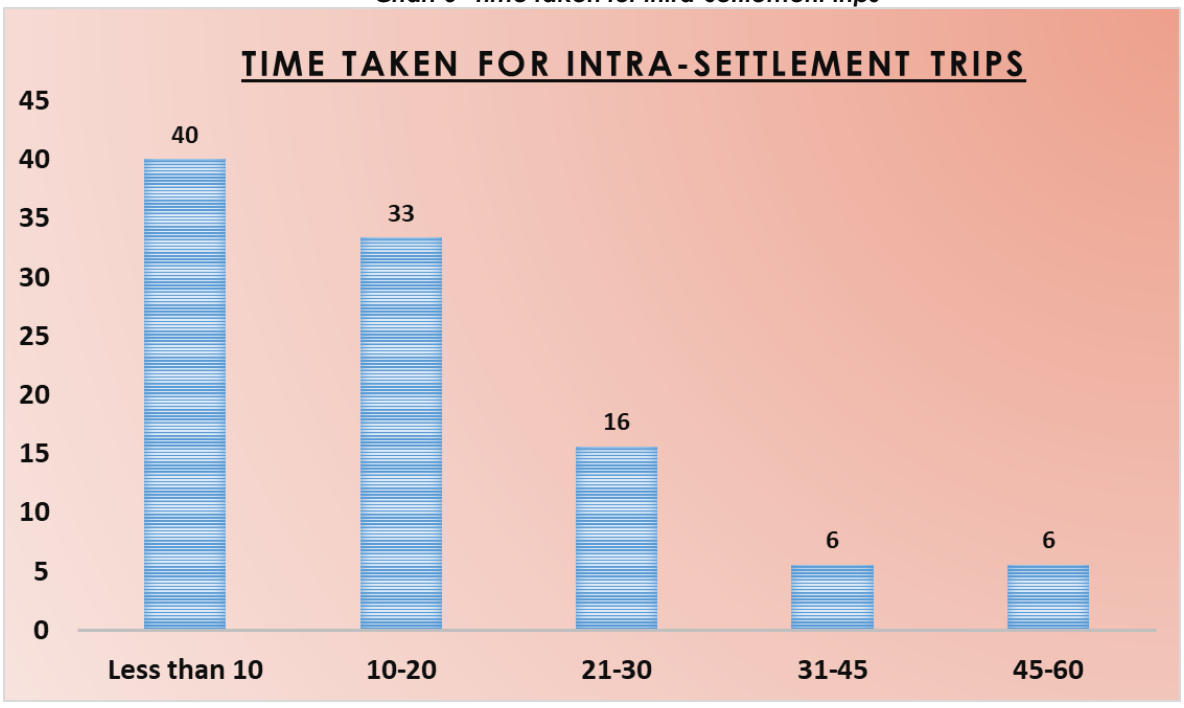
Chart 2- Purpose of intra-settlement trips



Source: Field survey 2019

There are 7 villages within the settlement distributed across a settlement width of 1.6 kilometers. The time taken for the trips within the settlement ranges between 5 and 60 minutes depending on the destination and route used as shown on chart 3.

Chart 3- Time taken for intra-settlement trips



Source: Field survey 2019

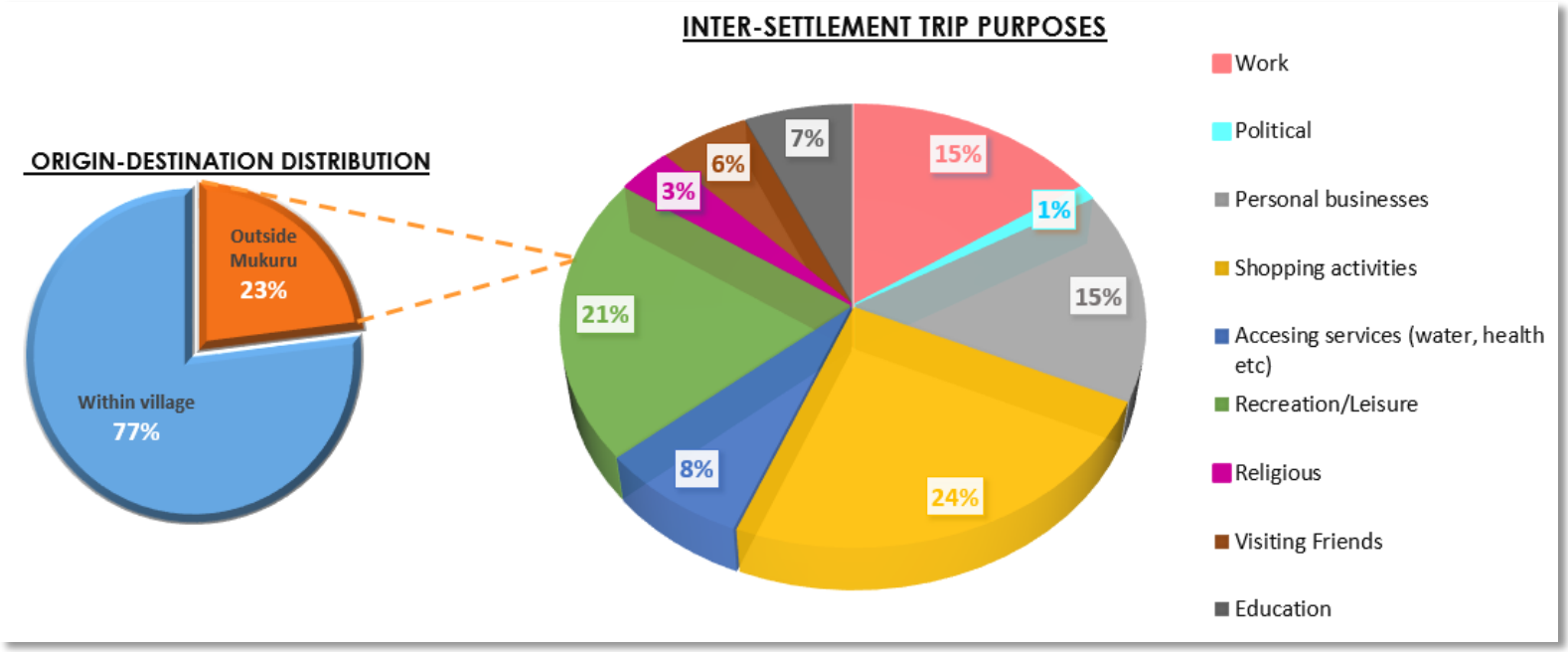
Majority of the pedestrians take 5-20 minutes to access their destinations within the settlement. Pedestrian routes in some villages are characterized by dead ends forcing pedestrians to seek alternative routes taking them longer to walk.

4.3.3.2 Inter-settlement movements

These are movements whose destination or origin is outside the study area. At the inter-settlement level, shopping was still a key purpose for most pedestrian movements as chart 4 indicates. However, at this level, walking was not used continuously to the shopping destinations. Pedestrians mainly walk to public transport points where they connect to public service vehicles and motorcycles to reach their shopping destination.

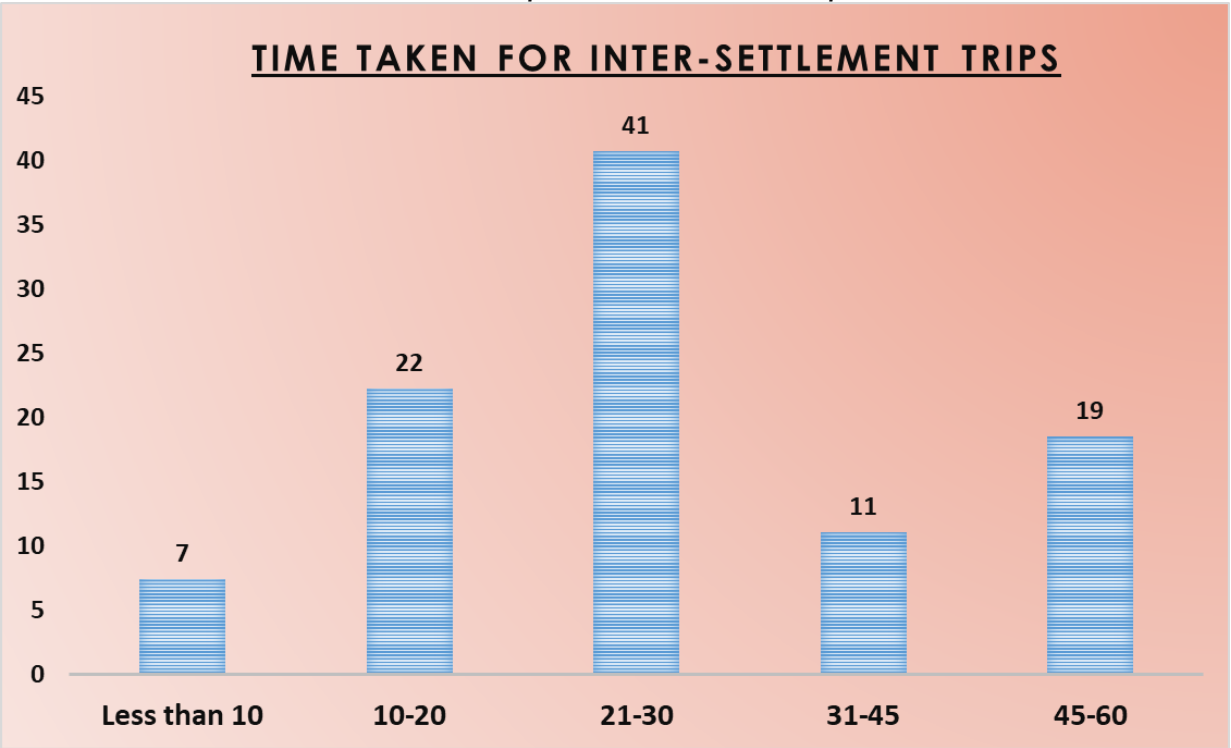
Chart 4- Purpose of inter-settlement trips

Source: Field survey 2019



For other trip purposes, most pedestrians use one mode of transport (walking) to destination. This is mainly because the destinations are located within the settlement's neighborhood. These destinations include but not limited to industrial area, Pipeline, South B and C, Donholm, Mombasa road, Imara Daima and Tassia middle income residential areas. It takes them between 10 – 60 minutes (chart 5) to reach their destinations.

Chart 5- Purpose of inter-settlement trips



Source: Field survey 2019

Majority of these trips take slightly longer than the trips within the settlement. Walking for such long distances is attributed to two main reasons; financial constraints and lack of alternative routes. Money earned from the casual jobs at the industrial area is not sufficient to allow the residents to pay for transport costs. Routes used from the houses in most cases are narrow and barely accessible to public transport, leaving residents no choice but walking.

4.3.4 Profile of the identified routes

All urban sidewalks and paths require a number of basic ingredients for successful movement of different groups of people: adequate width of travel lanes, a buffer from the travel lane, curbing, minimum width, gentle cross-slope (2 percent or less), a buffer to private properties, adequate sight distances around corners and at driveways, adequate distances to walls and other structures, a clear path of travel free of street furniture, continuity, a well-maintained condition, ramps at corners, and flat areas across driveways. Sidewalks also require sufficient storage capacity at corners to allow the predicted volume of pedestrians gain access to and depart from signalized intersections in an orderly and efficient manner. During the study the following basic ingredients were identified for analysis.

i. Road/path Width

In Mukuru Kwa Njenga, sidewalk provision is only on one road running from Kobil to AA where it is on both sides of the road. The width of sidewalk on each side on this road is 1.5m. The remaining roads have no sidewalks hence pedestrians use the main road just like other road users. The width of these roads vary between 4m and 15m. There are, however, numerous smaller footpaths within settlements with an average width of 0.5m to 1.5m. Figure 8 illustrates the layout of these footpaths.

Figure 8: Minimum and maximum road/path width

Fairly wide road without footpaths/sidewalks resulting to conflict between road users

Narrow path in Milimani village being used by pedestrians from different direction

Narrow footpath between two buildings in Sisal with feeble and unstable wooden surface.

Source: Field survey, 2019

Comparing the existing widths of streets and pedestrian walks and paths in Mukuru against the ideal situation, it is evident that there is need for provision of adequate pedestrian widths to enable easy and safer movement of pedestrians. Footpaths and sidewalks should be wide enough to allow two adults to walk comfortably next to each other. The width of a footpath can vary as per the adjacent land use. Footpaths in residential areas require a minimum clear width of 1.8 m, which is enough space for two wheelchairs to pass each other. For commercial areas, the clear width should be at least 2.5 m (Institute for Transportation and Development Policy, 2013).

ii. Surface types

Mukuru Kwa Njenga, like any other informal settlement in Kenya lacks attractive streets with good walking surfaces. From the study, even though surface type is a crucial element of a pedestrian walkway, only 2%

of pedestrians chose routes due to quality walking surface. This is evident of the poor state of the walking surfaces within Mukuru Kwa Njenga.

The pedestrian walkway material should be firm and slip-resistant. Concrete is the preferred walking surface. A different look can be achieved by using stamped concrete or concrete pavers, which are available in a variety of colors and shapes. Good walking surfaces increase safety of pedestrians, improves accessibility of places for pedestrians, help to increase walking as a mode of transport (environmental benefits and reduced traffic congestion). The end result is an improved health and fitness of the walking society.

iii. Traffic

Traffic on roads consists of road users including pedestrians, ridden or herded animals, vehicles, streetcars, buses and other conveyances, either singly or together, while using the public way for purposes of travel.

A number of characteristics relating to the interaction and presence of traffic have been identified in the study including the volume, the speed and the composition of the traffic flow. From observation checklists road users in Mukuru are both motorized and non-motorized. The most common motorized users include vehicles and motorcycles. The vehicles are mainly medium size vehicles supplying and providing goods and services in shops, supermarkets and open air/roadside markets within different villages in Mukuru KWA Njenga settlement. Other vehicles are also serving different households in different ways.

Non-motorized road users in Mukuru are dominantly pedestrians. Others include bicycles, handcarts and animals. In terms of traffic volumes, pedestrian traffic was found to be the highest especially in the early morning, mid-afternoon and late evening. Human traffic speed was observed to be impeded by a number of factors including congestion of the narrow streets by pedestrians during peak hours. Motorized road users such as motorbikes were found to have high traffic speeds that led to accidents including knocking down of pedestrians and hampering walkability.

iv. Existing infrastructure

The pedestrian environment refers to the infrastructure, the geometric layout and the management of the transport system with particular respect to the provision for pedestrians, for example, footpath width or the unevenness of the surface and the crossing facilities. There are many important factors and all of them add to the ability of pedestrians to use the provision. People with Disability (PWDs) Rights groups in

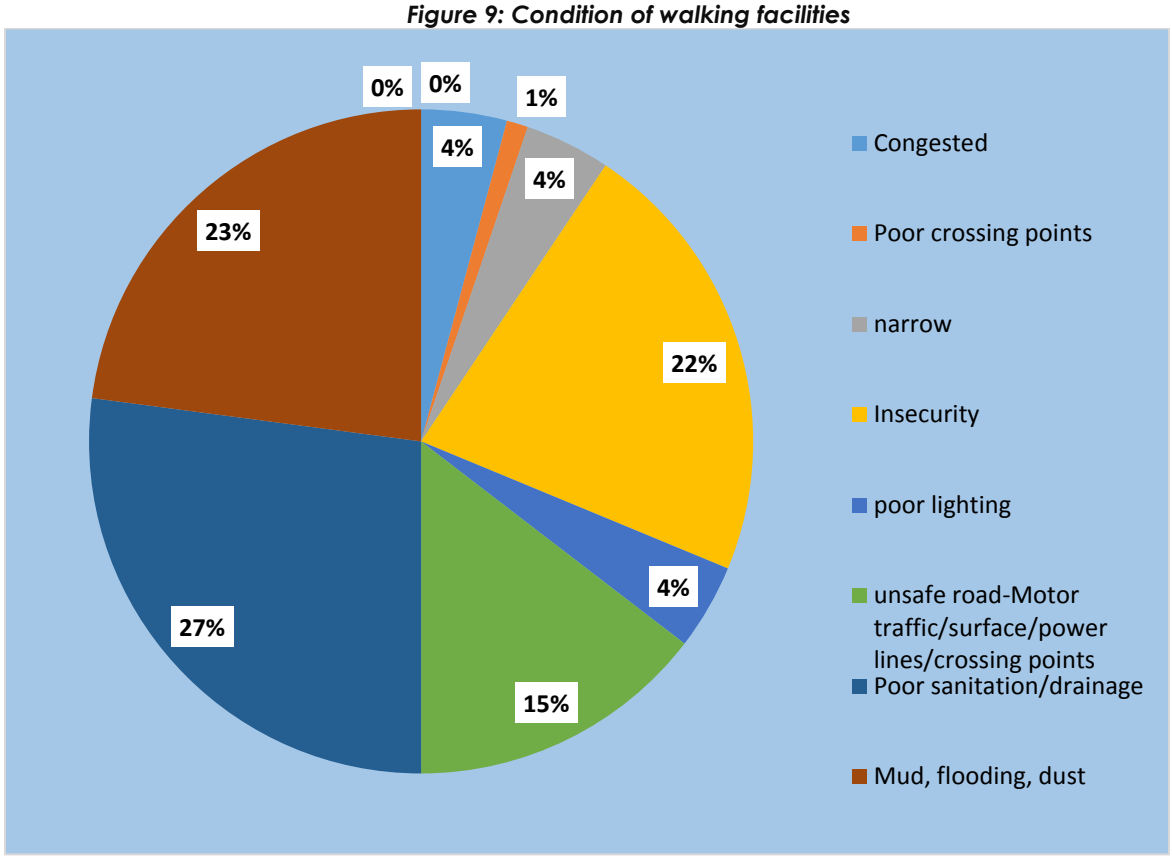
particular have argued that it is important to take the very detailed characteristics of the pedestrian environment seriously in order to understand pedestrian route choices. What can be a relatively minor factor in the pedestrian environment, such as pavement crack can actually cause people with a physical or visual impairment a lot of extra effort and trouble to surmount.

Mukuru Kwa Njenga lacks the basic pedestrian infrastructure. The streets lack sidewalks, proper street lighting, street buffers including landscaping, quality walking surface and proper and safe crossing points. Lack of infrastructure impedes safe and efficient walkability of streets in Mukuru Kwa Njenga.

v. Condition of pedestrian infrastructure

Condition of pedestrian infrastructure plays a critical role in enhancing walkability within streets. The walkability audit conducted in Mukuru Kwa Njenga, found out that the general condition of sidewalks and pedestrian paths is pathetic and unreliable. According to 27% of respondents drainage systems are poor, 23% are affected by adverse weather making them either muddy or flooded during rain and dusty during dry, windy season. As many as 23% of the residents believe that the paths are insecure, 16% consider them unsafe for walking by children, women, the aged and PWDs. The paths according to 4 percent of respondents are congested during peak hours; are too narrow to accommodate two people at ago (4%) and also lacks proper lighting (4%) as shown on figure 9.

Figure 9: Condition of walking facilities



Source: Field survey, 2019

vi. Street Buffer

The limited space in Mukuru Kwa Njenga seems to have contributed to lack of street buffers in the settlement. The zone creates a psychological buffer between motorized vehicles and pedestrians. The zone contains trees, signs, street lights, seats and parking meters, bicycle parking and other street furniture.

vii. Street lighting

For both safety and security reasons, most sidewalks require street lighting. Lighting is needed for both lateral movement of pedestrians and for detection by motorists when the pedestrian crosses the roadway. As a general rule, the normal placement of street luminaries, such as cobra heads, provide sufficient lighting to ensure pedestrian movement. However, in commercial districts, it is often important to improve the level of lighting, especially near ground level. Successful retail centers often use low street lamps in addition to or in lieu of high angle lamps. Some designs permit both the high angle highway lamp and the low angle street lamp on the same pole.

Pedestrians on a pedestrian-oriented street design (shopping district) require three sources of lighting. The first is the overall street lighting, the second is the low placement of lamps (usually tungsten) that reach between and below most trees, and the third is the light emitted from stores that line the street. The omission of any one of these lights can result in an undesirable effect, and can reduce the desire to walk or shop at night.

Lights are needed in all areas where there are crosswalks or raised Channel Islands. Lighting can be either direct or can be placed to create a silhouette effect. Either treatment aids the motorist in detecting the pedestrian.

viii. Landscaping

The streets in Mukuru lack a sense of landscaping considering that they are bare and dry. There is no street with landscaping in the informal settlement making it difficult for pedestrians to walk in the streets in the hot sun during sunny days.

Planting design and plant choices for areas surrounding pedestrian areas play a big role in the overall appearance and environmental impact of the pedestrian area installation or new development.

Furthermore, the provision of pleasant street environments encourages more walking, potentially reducing the number of car trips taken and pollution produced. Trees can provide seasonal shade for pedestrians, cyclists and motorists and reduce the light reflection or glare from buildings and other surfaces. Trees assist in reducing the extreme temperatures by trapping heat in wet seasons and by filtering heat and increasing the humidity during dry seasons. Trees are ideal for reducing wind velocity in streets.

4.3.5 Character of the mobility routes

i. Design of footpaths

Despite the fact that Mukuru Kwa Njenga has a high low-income and a walking population that require footpaths and sidewalks on roads, the pedestrian paths in the informal settlement lacks these basic facility designs. In few cases, like the road between Kobil and AA the sidewalks are not designed based on the level of service. Where the surface is cabro, for example AA to Sisal road, there are no designated footpaths designed as per the existing laws, instead residents walk on the road. Most of the paths, especially at plot level, within the settlement do not meet the required minimum width of 1.8m making

it difficult for more than one person to walk within the paths. This has an impact on mobility as it reduces speed of pedestrians making them waste more time walking.

Street layout design directly impacts the ability to walk to various destinations. Frequently, the layout of subdivision streets makes distances much longer than they need to be. Long neighborhood block lengths and cul-de-sacs contribute to this problem. Neighborhoods that are designed with long blocks and numerous cul-de-sacs are often barriers to walking as they reduce connectivity and increase travel distance between the destinations.

Design of footpaths are based on stipulated standards and requirements including.

- Footpaths are designed for level of service and functionality.
- Footpaths must slope away from the property boundary, and be elevated above the adjacent nature strip.
- Minimum 1.8 m(width) x 2.2 m (height) clear from all obstructions
- Constructed above the carriageway separated by kerbs

ii. Safety

According to residents of Mukuru Kwa Njenga, most roads particularly within the activity zones have recorded several cases of accidents involving pedestrians and other road users particularly motorcycles. Catherine Ndereba road recorded the highest number of accidents according to the residents. These types of accidents are mainly attributed to speeding motorcycles and the poor state of pedestrian paths leading to conflict between pedestrians and motorcycles and other vehicles.

The feeble nature and the poor design of the many footbridges and crossing points within Mukuru also make pedestrian movement unsafe. Other phenomena that are attributed to insecurity of pedestrians include floods that sweep away crossing points and pedestrians particularly children, the aged and the drunkards.

Lack of road signage in Mukuru Kwa Njenga has also contributed immensely to minor accidents involving pedestrians and other road users.

The capacity to respond to pedestrian safety is an important component of efforts to prevent road traffic injuries. Pedestrian collisions, like other road traffic crashes, should not be accepted as inevitable because

they are both predictable and preventable. By law, traffic routes must also keep vehicle routes far enough from doors or gates that pedestrians use, or from pedestrian routes in order not to threaten the safety of pedestrians.

A safe pedestrian route protects pedestrians from road hazards such as moving vehicles and motorcycles. Dangerous conditions can be mitigated by addressing three root causes of pedestrian-vehicle crashes: vehicle and motorcycle speeds, pedestrian-exposure risk, and driver and pedestrian predictability. These mitigation measures heavily rely on the design of the pedestrian paths and roads which is often not taken care of in slums and informal settlements.

iii. Security

Insecurity of streets are mainly brought about by lack of proper lighting. Lighting in subsidiary roads, is intended to target the needs of pedestrians. Several guidelines on pedestrian security at night have considered lighting as a major component and have stated that lighting for subsidiary roads and areas associated with those roads should enable pedestrians and cyclists to orientate themselves and detect vehicular and other hazards, and to discourage crime against people and property. The lighting on such roads can provide some guidance for motorists but is unlikely to be sufficient for revealing objects on the road without the use of headlights".

According to this walkability audit carried out in Mukuru Kwa Njenga, pedestrians are not able to discern obstacles or other hazards in their path and be aware of the movements of other pedestrians, friendly or otherwise, who may be in close proximity. As a result of this, several cases of street mugging and robbery with violence have been reported in the settlement. Cases of motorcycle hit and run at night are also not new to the settlement and are mainly as a result of insecure nature of dark streets.

iv. Connectivity

The connectivity of various bicycle and pedestrian facilities directly impacts the ability to walk or bicycle to activity areas and destinations. Characteristics of a well-connected road or path network include short block lengths, numerous three and four-way intersections and minimal dead-ends (cul-de-sacs). As connectivity increases, travel distance decreases and route options increase. A network of streets, sidewalks, bicycle lanes and paths in which all parts are well-connected to each other reduces the distance

people have to travel to get from home to their destinations, allows for the use of more local streets rather than major roadways and provides a greater choice of routes to travel to and from school.

Increasing connectivity of streets, paths and sidewalks reduces travel distances and makes it easier for pedestrians and bicyclists to access destinations. Mukuru Kwa Njenga has streets that start and end unpredictably. Other pedestrian streets and roads start at a point and trespass major facilities. An example is the two roads trespassing Njenga primary school and Embakasi Girls Secondary school yet linking key activity areas. In an event the two schools are declared out of bound by erection of lockable gates to the already existing perimeter walls, mobility will be greatly affected especially between the interlinked activity areas.

The road from Wapewape road market towards Njenga primary school also has a dead end due to encroachment and solid waste piling. Sisal and Milimani villages are the most affected by dead ends and in connectivity. Most of these paths are too narrow leading to dead ends making them poorly connected.

v. Inclusivity

Inclusivity of streets in terms of design is a critical element to pedestrians and other road users. All the streets in Mukuru have no consideration for PWDs, the aged and children. Most streets are earth surface with an irregular nature making them inaccessible to people with wheelchairs. The footbridges and steps on most streets have no provision for wheelchairs and their feeble condition make them unstable for the aged and children.

Open and overflowing drainages, presence of manholes and electricity poles on roads and muddy nature of roads also make them unfriendly to children, the aged and the PWDs and to some extent women.

vi. Conflicts along the mobility routes

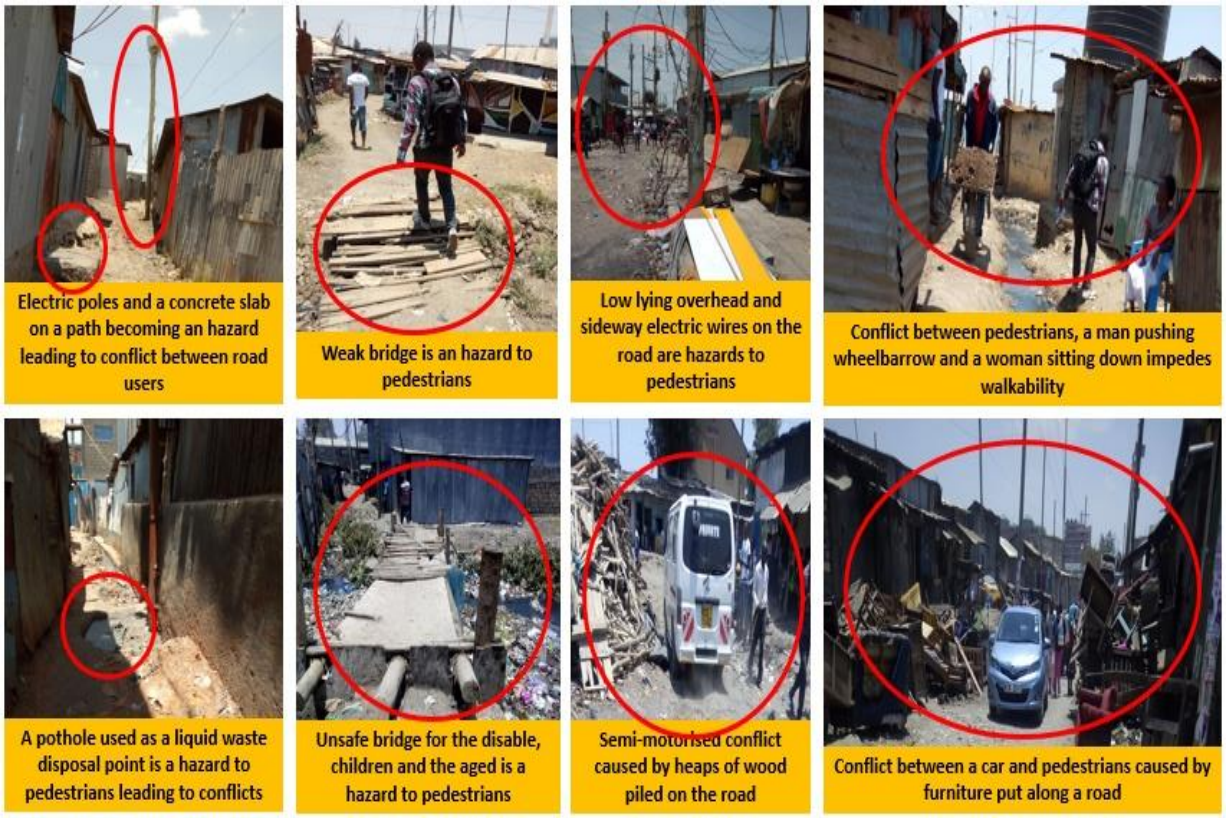
Road conflicts in Mukuru Kwa Njenga can be categorized into three namely non-motorized verse motorized conflict and non-motorized conflicts and motorized against other motorized. The non-motorized verse motorized conflict refer to conflicts between pedestrians, handcarts, bicycles among others and vehicles including motorcycles. Non-motorized conflicts refers to conflicts between pedestrians and other pedestrians, pedestrians and handcarts and pedestrians and bicycles while the motorized against motorized refers to conflicts involving different types of vehicles including motorcycles.

Due to the narrow nature of streets and roads in Mukuru and the high number of pedestrians, conflicts involving pedestrians and other pedestrians are the most common especially in the peak hours of early morning, mid-afternoon and late evening.

The conflicts which ae illustrated on Figure 10 below are mainly caused by the following factors;

- Encroachment of streets by business and other land uses
- Irregular road surface making pedestrians to walk in the middle of the road
- Exposed water pipes on the surface
- Kiosks on the sidewalks
- Pedestrians, vehicles and motorcycles using the same lane
- Vehicles and handcarts parked along the street
- Construction materials put on roads which are obstacle to mobility
- Low hanging live electric wire on the roads
- Lack designated pedestrian walkways hence vehicular human traffic conflict
- Offloading of commercial vehicles on the road

Figure 10: Conflicts and hazards

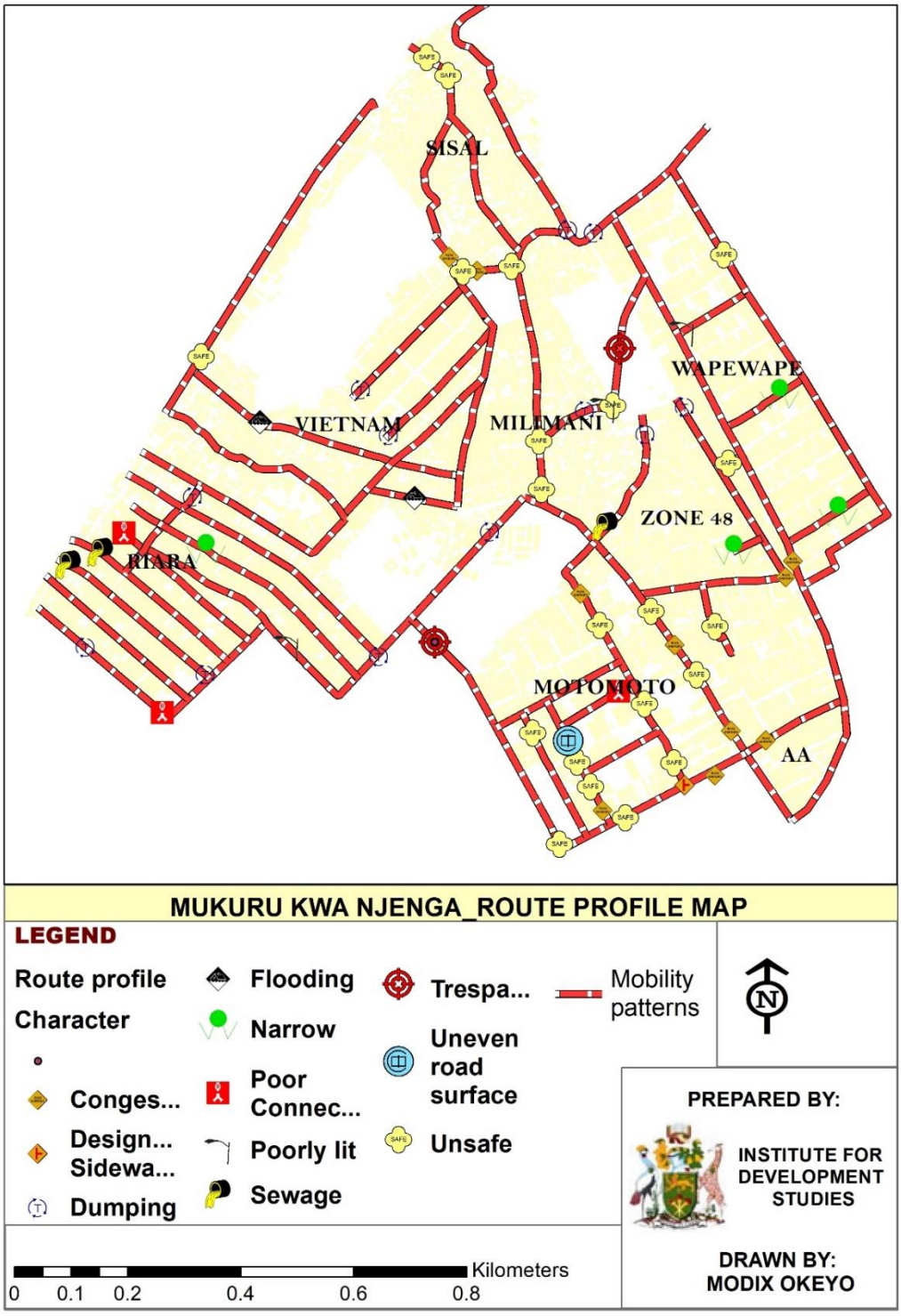


Source: Field survey, 2019

Generally from the characteristics discussed above, it is evident that mobility routes in the study area are diverse in nature and are characterized by a wide range of challenges. The map below highlights the dominant challenges along the different routes mapped in Mukuru Kwa Njenga. Unsafe points are the majority. Safety has been compromised due to the conflicts with motorized traffic causing accidents, poorly installed electric cables, feeble footbridges, open drains among other factors.

Route character varies depending on the type of route. Dumping is dominant on the local access routes while congestion is mainly traced on the main roads which are characterized by a ray of informal business activities along the stretch. Map 7 below shows the character of each route mapped in the settlement.

Map 7- Route Profile Character Map



Source: Field survey, 2019

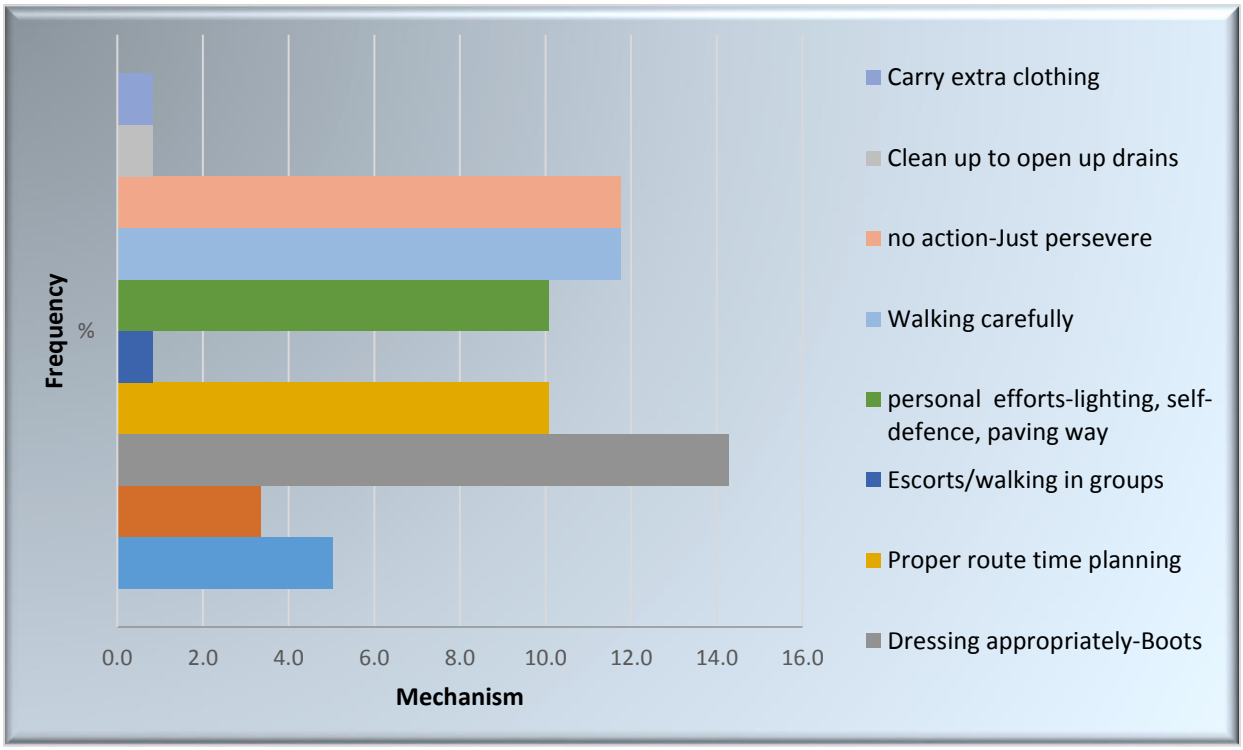
vii. User's coping mechanisms

Pedestrians encounter several challenges on their way to different activity places and destinations. Challenges like piled solid waste on or along roads and paths, open drainage systems crossing or exposed along walkways, insecurity, poor odour, speeding motorcycles and vehicles, lack of signage on roads, improper crossing points and poorly designed footbridges, poor condition of roads making them muddy during rain and dusty during dry and windy seasons among others, make it difficult for pedestrians to conveniently use paths and walkways.

Several options and coping mechanisms have been adopted by pedestrians in Mukuru Kwa Njenga to enable them be able to use such paths and walkways irrespective of the condition as highlighted below and in Chart 6:

- Walking right in the middle of the road
- Constructing wooden pathways over the open sewer drain
- Using corridors as pathways to avoid running sewage on the road
- Using alternative routes
- Pedestrians stop and wait on the side to allow vehicles and *boda bodas* (motor cyclists)to pass
- Vehicles moving on different direction have to stop for other road users to pass
- Trespassing institutions like Embakasi Girls and Njenga primary school
- Jumping over large stones placed where the road is muddy or has liquid/solid waste crossing
- Walking on the side of road where there is no open drain
- Stopping for other pedestrians to pass
- Dressing appropriately for example putting on protective shoes such as gumboots and timberland

Chart 6- Coping Mechanism



Source: Field survey, 2019

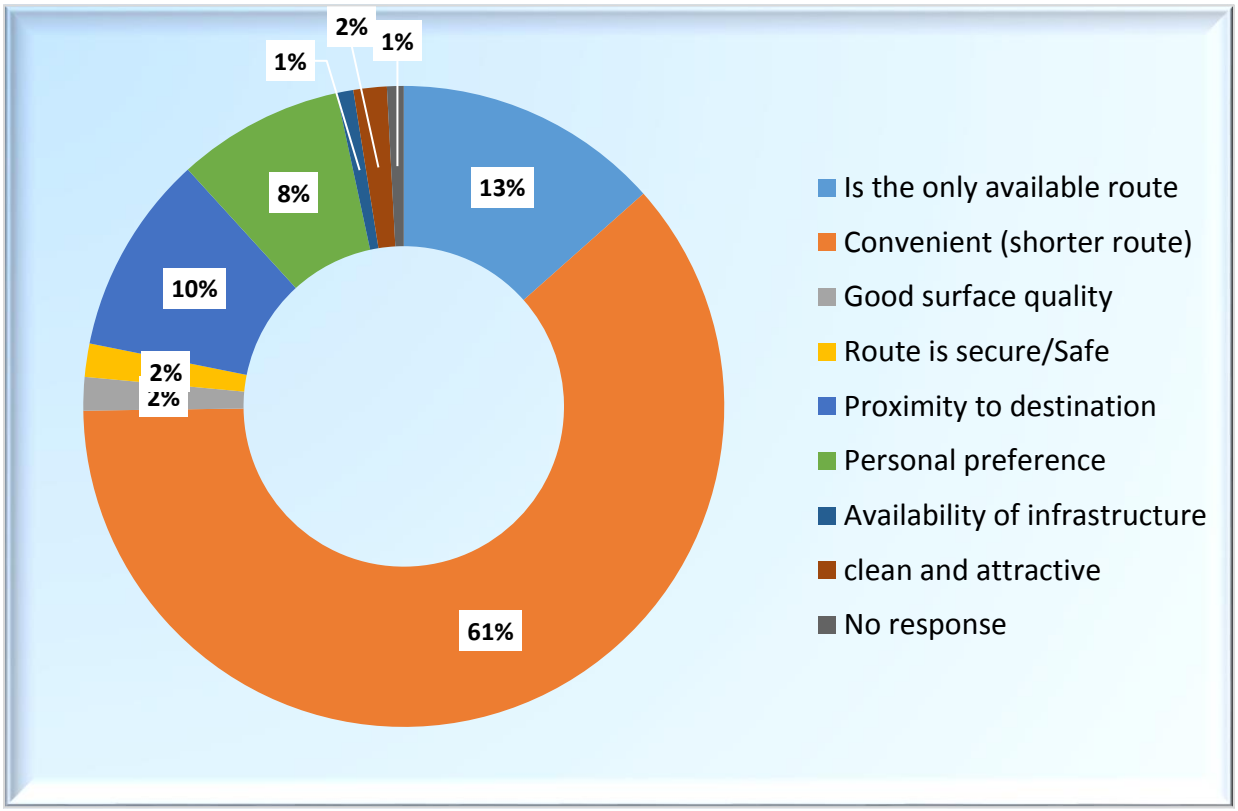
4.4 User's attitude and perception towards the walking environment

4.4.1 Factors that determine route choice

Related literature note that pedestrian route choice is mainly influenced by six factors, namely, (1) distance to the destination; (2) feeling of safety; (3) intelligibility of the route; (4) general aesthetics of the built-up environment; (5) accessibility to locations of interest; and (6) the presence of green areas and the avoidance of air and noise pollution.

This is in agreement with the findings of this study that places convenience of a route at 61% as the main factor determining route choice in Mukuru Kwa Njenga. This is as indicated on Chart 7. Other factors found to affect choice of route are lack of alternative routes (13%), proximity to destinations (10%), personal preference (8%) as well as clean and attractive, quality surface and security of the street at 2% each.

Chart 7- Factors Determining Route Choice



Source: Field survey, 2019

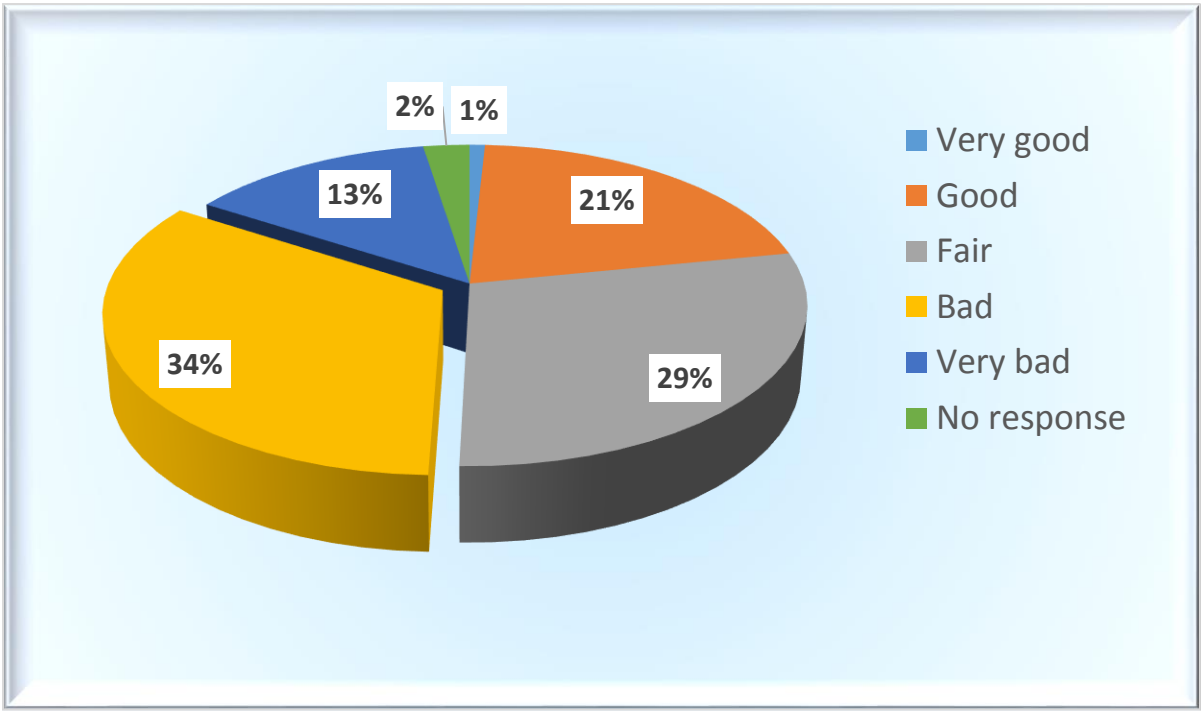
4.4.2 Experiences of route users

Route user experience design is the process of creating pedestrian routes that provide meaningful and relevant experiences to users. A quality and user-friendly pedestrian route enhances and promotes walkability in urban set ups.

In Mukuru Kwa Njenga, several factors including poor drainage system, poor disposal of solid and liquid waste, poor condition of road or walkway surface, insecurity and lack of streetlights, narrow and congested streets, muddy and dusty pedestrian paths (depending on the weather) and speeding motorcycles heavily contribute to the poor experience on the pedestrian routes.

The good experience is majorly contributed by the good infrastructure particularly along the Kobil to AA road and also along the carbro surfaced road between AA and Sisal through Milimani. The pie chart (Chart 8) indicate the route user experience based on the field survey.

Chart 8- Route User Experience



Source: Field survey, 2019

4.5 Link between activity spaces and mobility

4.5.1 Mobility-land use analysis

4.5.1.1 Space activities that have impacts on mobility

Human beings often spend a significant amount of time at specific places such as home and work locations. These key activity locations serve as important anchor points in people's everyday lives. Individual mobility patterns could be largely explained by the travel activities that occur around these locations.

Through observation, this study determined the various centers of activities within Mukuru Kwa Njenga. Markets centers, particularly Wapewape market, were found to be the most active zones of the settlements. Commercial centers starting from zone AA to other areas of commercial activities along roads were characterized by parked vehicles, motorcycles and handcarts that competed with pedestrians for access on the narrow and congested streets. Other areas that attracted people included the illicit brew (Chang'aa) dens in Wapewape and other villages.

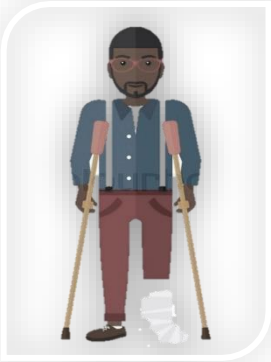
Playgrounds majorly attracted young people and children who actively used them for recreation. One such playground is the playground bordering Kware.

4.6 Mobility needs of residents in informal settlements

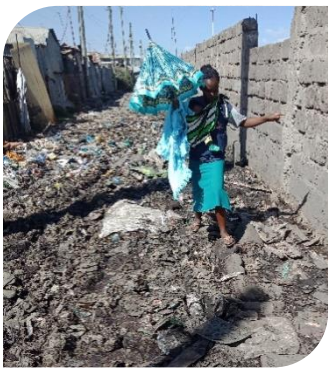
4.6.1 Users' definition of walkable routes

Residents in the study area recognize with great weight the relevance of mobility and accessibility for pedestrians. All residents engaged during the study agreed that the existing routes are not walkable and pose a number of risks to pedestrian safety and security. Different respondents had diverse opinions on what a walkable route is based on their mobility needs. The summary below highlights a few opinions from interactions with pedestrians. To protect respondent identity, names used are character names for the purposes of reporting;

On the third day of the survey we meet 'Mary' who sells second hand clothes in Mukuru. The source of her commodities is Gikomba market. We meet her at 5pm as she is on her way to Gikomba Market. She states that the best commodities at the market can only be bought between 6-7pm. She therefore returns home at 8-9pm. Her experience on the way back home at night is disturbing since the route is not well lit posing a security threat. She also states that she fears harassment from alcoholics in the numerous illicit brew dens along the route. Despite these challenges, she still has to use the route since there are no alternatives. She points out that a walkable route for her needs to have sufficient lighting to enhance security.

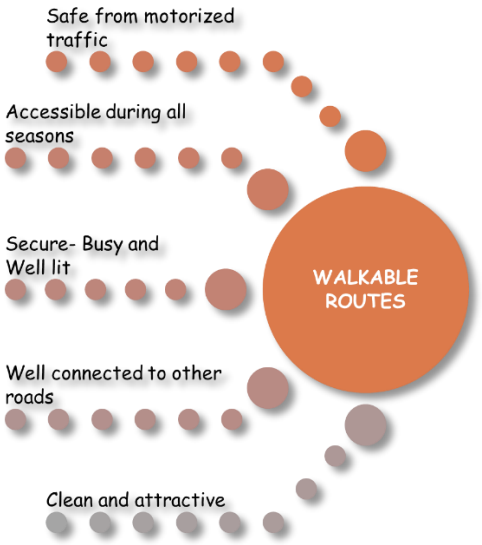


During the Focus Group Discussion we meet 'Peter'. He has a broken leg and thus has trouble walking. His injury is a result of an accident caused by a speeding motorcycle in the settlement. He states that the motorcycle drivers are reckless and a potential threat to all pedestrians. He concludes that the existing routes are not pedestrian friendly, and to promote walkability, pedestrians should be safely segregated from other forms of traffic through **well designed pedestrian footpaths**.



On our second day of the survey we meet 'Nancy'. She has a child on her back and is struggling to pass over solid waste dumped on the footpath. The situation has been worsened by a clogged open sewer. She struggles to step on stones that have been placed to help pedestrians maneuver over the sewer and solid waste. This is very unsafe for her and other pedestrians and she suggests that footpaths cannot be termed as walkable if they do not have efficient drainage and sewer systems. She also states that in order to create proper footpaths, solid waste management should be prioritized.

Putting together the above and other residents opinions, a walkable streets to Mukuru Kwa Njenga residents is;



4.6.2 Resident's proposals

In an effort to attain walkable routes in the settlement, respondents put forward a number of proposals. These include;

- Provision of segregated pedestrian footpaths. This will also help cater for people with special needs
- Strict enforcement on use of pedestrian footpaths. Catherine Ndereba road has clearly demarcated and segregated footpaths but this have been encroached partially and completely on

some sections by informal businesses and parking. Residents thus stated that the County Government should intervene and ensure footpaths serve the intended purpose.

- Ensuring the routes are well lit with street light or flood lights
- Provide employment for the youth since they pose a security threat to pedestrians along the roads
- Proper solid waste management
- Provide safe pedestrian Crossing points
- Provide proper drainage systems
- Road surface improvements to ensure routes are accessible across all seasons
- Control speed of motorized traffic through well placed bumps.
- Active community involvement and engagement in upgrading of settlement roads.

5 References

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6 APPENDICES

Appendix 1:

THE INSTITUTE FOR DEVELOPMENT STUDIES (IDS)

MUKURU KWA NJENGA WALKABILITY AUDIT

INTERVIEW DETAILS

Interviewer	Date	Time	Village

1. Respondent's details:

- Name: .....

- Gender: ☐ Male ☐ Female

- Marital status:
  - ☐ Single ☐ Widowed
  - ☐ Married ☐ Divorced

Age (Years): .....

2. Trip information:

Route name/code	Origin	Destination

3. What is the purpose of this trip?

- ☐ Education/School
- ☐ Shopping
- ☐ Medical
- ☐ Recreation
- ☐ Religious
- ☐ Personal Business
- ☐ Visiting friends/relatives
- ☐ Leisure
- ☐ Others (Specify) .....

4. How frequently do you make such trips?

- ☐ Number of trips in a day .....
- ☐ Number of days in a week .....

5. How long does it take you to walk to the destination? (In minutes)

- ☐ Less than 10
- ☐ 10-20
- ☐ 21-30
- ☐ 31-45
- ☐ 45-60
- ☐ More than 60 (Specify).....

6. Do you have a physical condition that affects your ability to walk?

☐ Yes (specify).....
☐ No

7. What is the main reason why you choose walking on this route?

☐ It is the only available route
☐ It is convenient (shorter route)
☐ It is safe (minimal risk to injury)
☐ Route is secure
☐ Proximity to destination
☐ Personal preference
☐ Availability of infrastructure
☐ It is clean and attractive

☐ Others (Specify).....

8. What is your experience walking on this route?

EXPERIENCE	REASON
☐ Very good	
☐ Good	
☐ Fair	
☐ Bad	
☐ Very bad	

9. Are there any challenges you experience when using this route?

☐ Yes ☐ No

If Yes, which ones?

.....

.....

10. How do you overcome these challenges?

.....

.....

THANK YOU FOR YOUR ASSISTANCE!!

Appendix 2:

THE INSTITUTE FOR DEVELOPMENT STUDIES (IDS)

WALKABILITY CHECKLIST

VILLAGE: ..... **ROUTE CODE** (as indicated on map)**:** .....

1. **Key elements of observation**

a) General impression of the area
- Size of roads and footpaths
- Connectivity of footpaths to activity spaces/areas
- Condition of roads and footpaths; are they maintained?
- Observable risks to pedestrians
- Residents coping mechanisms (Efforts to address mobility challenges)
- Pedestrian walking behavior (across all ages and gender)

b) Interaction with other traffic
- Availability of crossing areas
- Safety of crossing areas
- Speed of vehicles
- Areas of conflict

c) Footpath character (Refer to inventory below)

2. **Walking Route Inventory:**

YES	FOOTPATH/SIDEWALK CHARACTERISTICS	NO
	Safe from other forms of traffic	
	Present on both sides of the street.	

Appendix 3:

THE INSTITUTE FOR DEVELOPMENT STUDIES (*IDS*)

MUKURU KWA NJENGA WALKABILITY AUDIT

Date_____ **Location**_____

FOCUS GROUP DISCUSSION (FGD) GUIDE

1. Historical development of Mukuru Kwa Njenga
    a. When and how was Mukuru kwa Njenga established?
    b. How was the original Mukuru in terms of planning of walking paths and accessibility?
    c. How has accessibility changed over time in Mukuru Kwa Njenga?
2. Common destinations of the settlement dwellers (probe whether within, surrounding or distant)
3. Existing Infrastructure
    a. What infrastructure/facilities exist to promote accessibility and mobility?
    b. What is the nature/condition of the noted facilities?
        - ☐ Path size (useful path width, presence of barriers to passage such as utility poles and signs mounted on the walkway, water pipes crossing and occupying the walkway)
        - ☐ Material/surface type
        - ☐ Pedestrian path buffer (Space separating the path from adjacent roadway and other activities).
        - ☐ Street furniture (lighting, benches, waste receptacles)
        - ☐ Drainage facilities and Solid waste management facilities
4. Design of pedestrian paths in Mukuru Kwa Njenga (Are they accessible to all people, regardless of age, gender, disability or other factors).
5. Level of maintenance of the listed infrastructure/facilities
6. Pedestrian conflicts in Mukuru Kwa Njenga
    a. What type of pedestrian conflicts exist in the settlement?
    b. Where/how do conflicts manifest?
7. Safety of pedestrian walkways in Mukuru (Frequency of accidents involving pedestrians and other road users).
8. Security of the pedestrian paths both during the day and at night
    a. Which are the most insecure paths for pedestrians in Mukuru kwa Njenga?
    b. Which are the most secure paths for pedestrians in Mukuru Kwa Njenga.
9. What do you recommend to be done to improve walkability in Mukuru kwa Njenga?

Thank you!