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An Assessment of Walkability and Pedestrian Perceptions in Jinja City: A Case Study of the Central Business District

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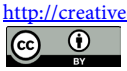


Abstract

There is a close relationship between walkability and liveability in growing cities such as Jinja. As a key mode of transport in towns and cities, walking has economic, social and environmental benefits. This paper assessed walkability conditions and pedestrian perceptions in Jinja Central Business District in view of the region's urbanisation trends and development. The study was evaluative in nature and employed a mixed methods research design. Both qualitative and quantitative approaches to research were also used. A sample of 80 pedestrians on 8 selected roads of Jinja city in the Central Business District was used in undertaking a questionnaire survey. Besides, 10 agency forms that involved rating of the walkability parameters for the 8 selected roads in Jinja city Central Business District based on the Global Walkability Index (GWI) were filled by the city officials. The results showed that the Walkability Index (WI) for Jinja Central Business District considering the busiest 8 selected roads is neutral at 51 on scale of 100. This means that there are some walkable locations in the CBD of Jinja city but most of the daily trips still require a bicycle, car or public transport. The study also identified major obstructions on the roads in Jinja city to include big cars parked on both sides of the roads, cyclists especially numerous bodabodas and vendors who use the sidewalks as parking and waiting areas. Some kiosks have been put along the walkways of some major roads such as Nizam Road and along the market area. This is coupled with poor road surfaces due to eroded tarmac and potholes with poor drainage along these roads. Based on the findings of the study, it is recommended that the city authorities adopt diverse walkable approaches for the city through involving a series of comprehensive urban policies and actions that affect the urban quality and city plans as well as innovative interventions that encourage the development of walkable communities. Pedestrian facilities urgently needed include walkways, security lights, and traffic control signals/lights, curb ramps, sign

posts, zebra crossings, waiting shades and other pedestrian amenities like benches and public toilets.

Keywords

Walkability, Pedestrians, Pedestrian Facilities, Central Business District

1. Introduction

Walking is one of the most sustainable ways of transport and mobility. With the increasing urbanisation, it is critical to encourage people to walk especially in busy towns. Walking makes the urban environment more pleasant, safer and less polluted (Dalton, 2019). Improved walkability in cities can ease traffic congestion and as well improve on the overall public health.

Walking is also essential in supporting urban mobility, improving the overall livability of cities, providing accessibility within built areas, and providing an alternative to private vehicles for short-distance trips (Gota et al., 2009). Walking provides mobility to a large percentage of people in many cities of Uganda especially the urban poor who often do not have other alternatives (Ministry of Works and Transport, 2012). Majority of cities in Uganda have however not prioritised the needs of pedestrians. This is because walking and cycling are attributed to poverty and uncivilization.

The quality of the pedestrian environment is key to encouraging people to choose walking over other means of mobility (Southworth, 2005). To create walkable cities, it's important for city planners and mangers to know and understand what sorts of infrastructure encourage people to walk. This is important in facilitating orderly urban development. From garden city to the concept of the neighbourhood unit and from post-modern experimentation to the era of digitisation, a good design always involved the intention to provide walkable urban forms (Blečić et al., 2020).

City residents in Uganda mainly rely on walking and public transport for daily travel. Ugandan cities also have relatively lower motorization levels. In Kampala for example, it is estimated that up to 70% of the city residents commute by foot, with over 50% coming from a low-income earning bracket (Ministry of Works and Transport, 2012). Non-motorised means of travel are not given deserved attention. This is because walking and cycling are attributed to poverty and low social status. Urban managers and city governments have continued to focus on motorisation with a general false interpretation that car ownership is a sign of progress, wealth and development.

Uganda's Non-Motorised Transport Policy 2012 targets fundamental changes in transport sector. In new secondary and intermediate cities like Jinja, walking and cycling could provide affordable mobility to the residents. Cycling and walking are already common especially among the young adults and women and

therefore having policies and infrastructure to protect pedestrians and cyclists could make it more attractive to commuters.

The population and economic standards of Jinja city are increasing. This is an indicator for a potential growth in private car ownership. Much as the required pedestrian facilities on busy streets in Jinja are unavailable, the existing facilities are also in poor conditions and majority of the residents are not aware of their importance and use. Other transportation challenges include traffic accidents where most affected road user categories are pedestrians and motorcycle riders. According to Jinja Police records, crashes involving non-motorized transport are up to 95% of the total road traffic injuries.

In 2001, Jinja conceived its Non-Motorised Transport Project after the organization of the Pan African Bicycle Conference (PABIC) which was organized by the First African Bicycle Information Organization and Workshop (FABIO), a nongovernmental organization promoting non-motorized mobility. The consolidation of the NMT Master Planning process and conceptualizing the idea among the relevant stakeholders both on national and local level was done.

FABIO established strategic partnerships with Jinja Municipal Council (JMC) and the Ugandan Ministry of Transport. With support from GIZ (Germany), Interface for Cycling Expertise (I-CE, The Netherlands), SUSTRAN (Sustainable Transport Network, Kenya) and ITDP Europe, the workshop clarified the strategy of the NMT and the Pilot Project in a first period of three years (2004-2006). A vision was passed and short-, medium- and long term-targets developed. Jinja Municipal Council was identified as the main implementers of the Pilot Project assisted by representatives on the task committee.

However, the implementation of this demanding project has not been realized. The Uganda Support to Municipal Infrastructure Development (USMID) project has contributed to the road modernization plans in Jinja city through promotion of road safety and walking. Some of the planned interventions under USMID include installing traffic lights on busy road junctions, setting up several zebra crossings and gazetting of pedestrian lanes.

People who live in areas that are more conducive to walking and cycling are more likely to engage in these forms of active transport (Pucher et al., 2010; UN-Habitat, 2018). Central Business Districts are centres of trade in Cities. They attract people to buy and sale goods and services. They are also centres of socialisation and leisure and thus are thought to be drivers of economic growth and prosperity.

Therefore, it is critical to assess walking conditions in Jinja Central Business District and determine the condition of the existing pedestrian facilities. If pedestrian facilities are not well designed in suitable locations, it becomes a discomfort for users and thus their relevance may not be appreciated.

2. Jinja City

In July 2020, Jinja Municipality was declared a city and it was among the first

batch of Local Governments to be elevated to this status in alignment to the idea of decongesting the capital City Kampala.

Jinja is a city in eastern Uganda. It is the second busiest commercial centre in the country, after Kampala, the capital and largest city. Jinja was established in 1907. Jinja lies in southeastern Uganda, approximately 54 miles (87 km), by road, east of Kampala, the capital. The city is located on the shores of Lake Victoria, near to the source of the Nile River. Jinja is the largest metropolitan area in Jinja District, and is considered the capital of the Kingdom of Busoga. Nearby towns and villages include; Njeru, Buwenda, Kimaka, Mpumudde, Masese, Walukuba and Bugungu as shown in Figure 1.

According to the 2014 Census, Jinja has a population of slightly over 71,000. However, the city administration estimates that Jinja's current daytime population swells to 400,000 when other groups of people in the city are counted: unregistered residents, people who reside just outside the official municipal boundary, and those who commute on a daily basis to do business or use city services. In the past, factories chose Jinja as their base because of the nearby electric power station at the Owen Falls Dam.

Since the early 2000s, the economy of Jinja picked up steadily with the main economic activities taking place in the Central Business District.

There is new market for fresh produce that was completed during the fourth quarter of 2014.The facility can accommodate up to 4500 vendors and cost US$ 3.7 million to construct with a loan from the African Development Bank from 2011 until 2014. The biggest local employer is Kakira Sugar Works (KSW), a member of the Madhvani Group of companies. KSW is one of the largest sugar factories in East Africa.

Bidco International Oil Refining Company maintains a palm oil factory in the city. The palm oil fruits come from Bidco's 6500 hectares (16,000 acres) plantation on Bugala Island in the Ssese Islands Archipelago, Kalangala District, in Lake Victoria. The factory in the islands crushes the fruit, and the crude palm oil is transported to Jinja for refining into edible oil and other products.

Kiira Motors Corporation, also known as the Kiira EV Project, a locally based startup car company, expects to set up the first car manufacturing facility in Uganda, based in Jinja. The Kiira EV Project received 40 hectares (100 acres) of land at the Jinja Industrial and Business Park and production started in 2018. The government of Uganda provided funding to the initial production and setting up of a factory for the project Jinja is commonly regarded as "the adventure capital of East Africa" due to the very many activities in town that one could engage in, especially for tourists. Local attractions include white-water rafting, the "Source of the Nile", and bungee jumping.

About 5 miles (8.0 km) north of Jinja is the Bujagali Power Station. The hydroelectric facility is providing 250 megawatts of electric power.

Jinja City Map

As shown in Figure 1, Jinja City has two administrative divisions, that is The Northern and Southern Divisions bordered by Buikwe and Kayunga District.

Figure 1. Map of Jinja City (Source: Jinja City Council, 2022).

3. Specific Study Objectives

a) To generate a walkability index for Jinja Central Business District in accordance to the Global Walkability Index.

b) To investigate public perceptions towards walkability and current condition of pedestrian facilities in Jinja Central Business District.

c) To suggest policy recommendations on fostering non-motorised transport in Jinja city and other newly created cities in Uganda.

4. Scope of the Study

This study was conducted in Jinja Central Business District on the streets of Alidina, Kutch, Nizam, Lubas, Main Street, Gokhale, Clive Road and Rippon Road. These roads were selected because they attract a relatively huge number of pedestrians as compared to other streets in the Central Business District of Jinja.

Location of the Selected Case Study Roads

Figure 2. Location of selected case study Roads (Source: Author, 2023).

As indicated in Figure 2 above, the selected case study roads are within the CBD of the city and are considered the busiest in the city with a majority of the users

being pedestrians. The roads are adjacent to market areas such as the central market, the main market and madhivan market which attract a multitude of travellers either walking, cycling or driving.

5. Literature Review

Walking is one of the oldest and simplest forms of transportation. Walkability encompasses how friendly a city or a neighbourhood is to pedestrian activities. "Walkability" is a term used to describe and measure the connectivity and quality of walkways, footpaths, or sidewalks in cities (Forsyth, 2015). It can be measured through a comprehensive assessment of available infrastructure for pedestrians and studies linking demand and supply (Leather & Gota, 2011).

Walkable cities return urban environments to scale, pattern and mix for sustainability of resources; therefore, walkable cities are safe, connected and lively. A walkable city should offer good experiences to the walkers so that they are often attracted to choose walking especially for shorter distances over other means of travel. Offering easily accessible transit services, complete streets and safe paths for biking or walking attracts more pedestrians (Healthy Spaces and Places, 2009).

An ideal pedestrian path should provide for the comfort and safety of pedestrians of varied ages and physical abilities, continuous without gaps, and should have a relatively smooth surface without pits, bumps, or other irregularities that could make walking and wheelchair access difficult or hazardous (Southworth, 2005).

In order to successfully design pedestrian facilities, it is important to recognize that pedestrian needs are wide-ranging, and the design approach must be flexible to meet the diversity of needs.

Being a tourism city, spaces and activities have to be developed for purposes of conceiving tourist friendly destinations. The cities that accommodate most tourists are large multifunctional entities into which tourists can be effortlessly absorbed and experience largely on foot the spaces within the cities (Gregory & Stephen, 2010). Pedestrian infrastructure means provisions for public foot traffic including sidewalks, walkways, crosswalks and other amenities including shades, lighting, and benches to ensure overall safety and convenience to the people using such facilities.

As stipulated in **Figure 3** below, the possibility to walk in an urban context depends on the interactions between pedestrians, infrastructure and context (Campisi et al., 2020).

Walkability is determined by the availability of enabling infrastructure, the pedestrian behavior and habits and the environment in an area. The provision of good pedestrian infrastructure and linking them to users is likely to encourage people to choose walking as a way of meeting their mobility needs over other alternatives.

Creating cities that embrace mixed use planning principles, bringing residential, commercial, recreational and educational elements in areas of around 400 m^2 of neighbourhood or town centre has increased the rate of pedestrian and cyclists

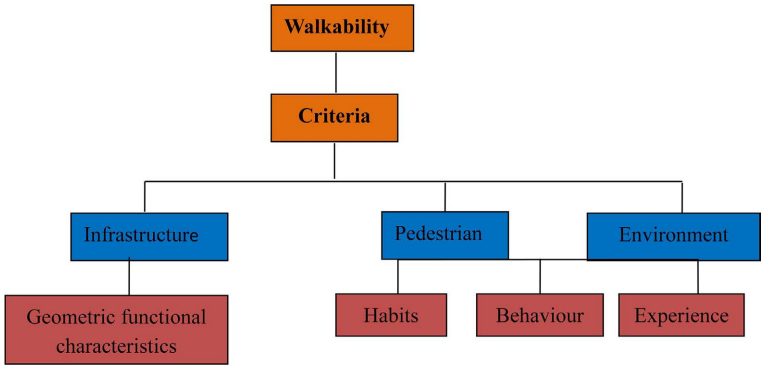


Figure 3. Walkability variables (Source: Campisi et al., 2020).

among residents and visitors (Campisi et al., 2020; Lambert, 2020). It should be noted that different cities embed different cultures, social and built environment and climatic conditions. Therefore, it is essential that the local context and priorities are integrated in the provision of such pedestrian facilities so that the best walking environment for the city and its population is created.

According to the New Zealand Transport Agency (2014), there are four (4) concepts any city could adopt to improve their pedestrian environment:

Living Streets: The idea of 'living streets' perceives that, as a need, lanes ought to be structured with living and network collaboration. While vehicles are not rejected, they are planned so drivers know they are in a region where a person on foot and different clients are imperative. A living road intends to adjust the necessities of occupants, organizations, people on foot and cyclists with vehicles, and accordingly empower a superior personal satisfaction and a more noteworthy scope of network and road movement.

Pedestrian Precincts: Pedestrian precincts are pedestrian-only areas. They are created by limiting traffic access or closing roads to traffic. They are most useful where there are a lot of activities provided for pedestrian, retail or mixed development. It requires continued maintenance. It could be allowed to have delivery vehicles during the early morning or evening, but also could be prohibited completely based on the maintenance system. Furthermore, public transport could be permitted within a narrow corridor. But cyclists are usually welcomed and parking lots are extra needed.

Shared Zones: A shared zone is a street designed to serve pedestrians and residents while minimizing vehicle use. It is a residential or retail street that still allows vehicle service but in a limited way by landscape design elements to slow the vehicles speed.

Sharing the Main Street: Sharing the main street is to adjust it to improve the safety and the quality of the road environment for all kinds of users. Users of the main street have various needs such as crossing safer for pedestrians, the ability to park for visitors, and attracting customers for the business.

Improving non-motorized is often one of the most effective ways of improving motorized transport because Parking lots, transport terminals, airports, and

commercial centers are all pedestrian environments (Litman, 2022).

Though non-motorised transport cannot serve every purpose, it has a potential for saving resources and finances. Non-motorised transport is more affordable and resource efficient as compared to alternative forms of transportation and recreation (Litman, 2022). The high value placed on driving and low value placed on walking in conventional planning reflects how transport is measured (Litman, 2003). This tendency to undervalue non-motorized travel can be particularly harmful because transportation decisions often involve trade-offs between different travel modes (Litman, 2003). Wide roads, high traffic speeds and large parking facilities create barriers to walking, so evaluation practices that undervalue walking tend to create automobile dependent communities.

Pedestrian-friendly commercial districts ("Mainstreets") can be important for urban revitalization (Bohl, 2002; "Downtowns," VTPI, 2008). Research by Hack (2013) indicates that walkable shopping areas are often economically successful, improved walkability tends to increase commercial and residential land values, many want to live within walking distances of commercial services, and that current market trends are likely to increase demand for walkable shopping districts.

Commuting pauses high costs to travellers especially workers and students. Such costs are in terms of hours lost in traffic jam, fuel, accidents and environmental damage due to pollution. Walking remains the cheapest form of transportation according to Walkable Communities Inc. The construction of a walkable community provides the most affordable transportation system any community can plan, design, construct, and maintain (Ryan, 2003).

There is a close relationship between walkability and the liveability in communities. Streets are a major portion of the public realm, that is, places where people interact with their community (Litman, 2004). More attractive safe and walkable streets increase community liveability (Forkenbrock & Weisbrod, 2001). Residents on streets with higher traffic volumes and speeds are less likely to know their neighbours and show less concern for their local environment than residents on streets with less vehicle traffic (Appleyard, 1981).

From the reviewed existing literature, it is clear that walking as a mode of transport should be promoted in large growing cities like Jinja as a sustainable mode of travel. It is also critical that investigations are carried out to assess the walking conditions and establish measures to promote it based on local and international experience.

6. Methodology

6.1. Study Design

The study was evaluative and employed a cross-sectional research design with a range of data diverse triangulation quantitative and qualitative techniques.

6.2. Data Collection Methods

The data collection methods were phased as described below:

Phase I: Inception and Literature Review: This was the first phase of the assignment during which the team reviewed existing literature non motorisation and pedestrianization as reflected in the reference section of the report. In addition, the team held an inception meeting with the Jinja City Technical officials on 15th August 2022 to agree on the scope and mapping of the key stakeholders including field visits to the earmarked roads and pedestrian facilities in the city. The literature review helped in refining the data collection tools and relevant documentation required for the research study as well as gaining in-depth knowledge about the study.

Phase II: Stakeholder Engagement: This phase entailed engagement with 10 key stakeholders both at the national level (in Kampala) and Jinja City business center using a key informant interview guide. Data was collected from the officials of the department of engineering and works (1), physical planning (1), city council representatives (3), environment and natural resources (1). At the national level, data was collected from the National Planning Authority (1), the Ministry of Works and Transport (1), and private sector representatives (1) and local leaders (1). The key informant interviews were used to assess views of stakeholders on quality of pedestrian facilities, capacity of Jinja City council to improve the pedestrian facilities, sustainability as well as an assessment of potential partnerships and policy interventions on non-motorized transport in the cities.

Phase III: Pedestrian Perception Survey

In this phase, field survey was conducted to collect data from a representative sample of 80 pedestrians (men and women) walking on the 8 selected roads (Gokhale, Kutch, Main street, Lubas, Clive, Aldina, Nizam and Rippon roads) in Jinja city using a structured questionnaire to assess their perception levels on walking conditions and pedestrian facilities. The questionnaire was developed, in line with the Global Walkability Index (GWI) survey requirements and parameters. Special attention was given to the sex and age disaggregation to allow for gender analysis.

Phase IV: Agency and Pedestrian Survey to determine the Walkability Index

Based on the Global Walkability Index (GWI) developed by H. Krambeck both the pedestrian survey and the agency survey were conducted. The walkability survey forms/questionnaires were developed for both pedestrians and agency officials using parameters given by the GWI with some modification to suit Jinja City. The methodology was both quantitative and qualitative as it provides insight to the several key parameters which enabled identification of areas of improvement. The agency rating was done by Jinja City Officials while the field rating was done by pedestrians along the selected case study roads/streets. The 80 pedestrians and 10 agency (Jinja City) officials from 4 departments of physical planning, engineering and works, environment and natural resources, and city council) were asked to rate the walkability parameters on a scale of 5 point for each attribute with 1 being the lowest and 5 being the highest on each of the selected streets. The average of each of the parameters were converted into a rating system from 0 (lowest) and 100 (highest). Hence, the summation of these surveys gave the Walkability Index

for Jinja Central Business District.

The walk score was then determined for Jinja Central Business District. The walk score is a number between 00-100 and to evaluate this, (Minhas & Poddar, 2017) highlighted the guidelines in **Table 1** below.

Table 1. The walk score guidelines.

Score (%)	Code	Description	Interpretation for Walking
90 - 100	5	Walkers' paradise: Owning a car isn't necessary and most errands can be done by walking	Very satisfactory for walking
70 - 90	4	Very walkable locations: Some amenities might be at walkable locations; some amenities but everyday errands must require proper transportation facilities	Satisfactory for walking
50 - 70	3	Neutral	Neutral for walking
25 - 50	2	Not walkable; only a few destinations are within easy walking range. For most errands, driving or public transportation is a must.	Unsatisfactory for walking
0 - 25	1	Driving only; virtually no neighbourhood destinations within walking range. You can walk from your house to your car.	Very unsatisfactory for walking

Source: Minhas & Poddar, 2017.

Phase V: Site Inspection and Observation: The research team inspected the pedestrian facilities and walking conditions on the roads in terms of security, safety, access and convenience among others.

Phase VI: Report writing: This fourth stage entailed the compiling the information gathered into a comprehensive research report upon which the policy makers and GGGI will base its investment decisions.

Phase VII: Validation of the study: The study was validated by the research project officials from Makerere University and GGGI through a dissemination meeting.

6.3. Data Analysis and Presentation

Upon completion of the data collection exercise and after cross checking and editing, the questionnaires were sorted and entered into the created SPSS data entry screens by the data entrants under direct supervision. The data was cleaned and analyzed to support the writing of the report.

6.4. Data Quality

The data collectors and entrants were trained by the project team to ensure that they were acquainted with the survey instruments and survey approach. The data

collection instruments were pre tested to check for any inconsistencies as well as provide room for changing some ambiguous questions. Field supervision was carried out by both the supervisors and principal investigator to cross check all the questionnaires for completeness.

6.5. Ethical Considerations

The study got approval from the Makerere University and Town Clerk Jinja City. The study used some secondary data available from Jinja City registries, records and reports. The study data obtained was confidential. All COVID-19 SOPs were followed by the research team in the field.

6.6. Limitations

Some of the respondents were not readily interviewed on the roads due to their busy schedule. This was solved through voluntary interviews from those waiting for a ride and willing to spare some 20 - 30 minutes. The pedestrian interview survey was mostly conducted in the morning and evening hours to capture the peak-hours.

Some of the literature on NMT was not readily available in Jinja City records. It was therefore supplemented with other reference materials from other line Ministries, academic research publications, and internet resources as well as primary data.

6.7. The Study Area and Target Population

The study was conducted in both Northern and Southern Divisions of Jinja City targeting the 8 main roads (Gokhale, Kutch, Main Street, Lubas, Clive, Aldina, Nizam and Rippon roads) in the commercial business district. The total of 80 pedestrians was interviewed in the 2 divisions. As indicated in Table 2 below, 34 respondents were from the Northern Division while 46 respondents were from the Southern Division of the city.

Table 2. Sampling of pedestrians at jinja city business centre.

Division	No of Pedestrians	Percent
Northern	34	41.8
Southern	46	58.2
Total	80	100.0

Source: Primary data (August, 2022).

7. Results and Discussion

7.1. The Socio-Demographic Characteristics of the Pedestrians

7.1.1. Gender Considerations

The results in Figure 4 below show that, males constituted the majority (64.6%) of the respondents in the study. The results depict those men were easily found as

most pedestrians on the roads in Jinja City on daily basis looking for money to support their families compared to females who were mostly confined in the homes doing home chores.

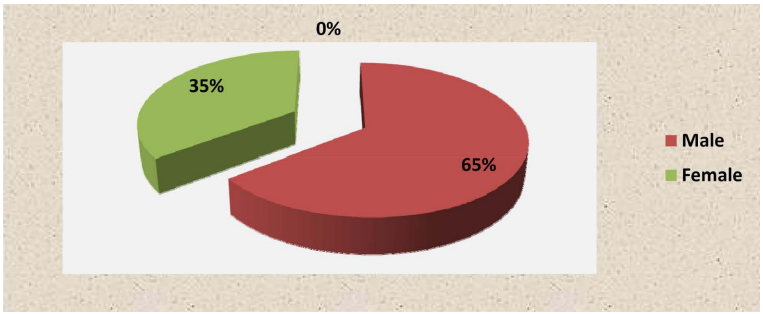


Figure 4. The proportion (%) of pedestrians interviewed by gender. Source: Primary data (August, 2022).

7.1.2. Age Group

As in **Table 3** below, the youthful age group of 20 - 29 years was the common pedestrians interviewed on the roads due to their active walking culture followed by the middle-aged adults of 30 - 39 years. While those pedestrians of 50 and above years of age constituted only 7.6% due to their poor walking culture, another 20.3% were 40 - 49 years of age.

Table 3. The age group of the respondents.

Age group	No of pedestrians	Percent
20 - 29	31	39.2
30 - 39	26	32.9
40 - 49	16	20.3
50 and above	6	7.6
Total	80	100.0

Source: Primary data (August, 2022).

7.1.3. Education Attainment

The study results in **Table 4** below indicate a mix of pedestrians interviewed in that most (44.3%) of them were certificate holders as the highest academic qualification attainment compared to those with diploma (16.4%) and bachelor's degree holders which were 15.2%. The rest of the other pedestrians (26.6%) had informal qualifications and or never went to school a tall. The results therefore, depict that it is more common to find the less educated people with low income in urban areas who would prefer walking along the roads to save for the transport costs.

7.1.4. Occupation of the Pedestrians

The results in **Figure 5** below reveal that, most (40.5%) of the pedestrians interviewed were engaged in private business followed by civil servants (13.9%),

Table 4. Highest level of education of the pedestrians.

Highest Qualification	No of pedestrians	Percent
Certificate	36	44.3
Diploma	15	16.4
Bachelor's Degree	12	15.2
others	21	26.6
Total	80	100.0

Source: Primary data (August, 2022).

employers (10.1%) and farmers (5.1%). The other 30.4% interviewed included students, housewives and or the common unemployed hustlers in urban areas. It is a common scenario in urban areas to find the many unemployed youth walking on the streets in search for jobs.

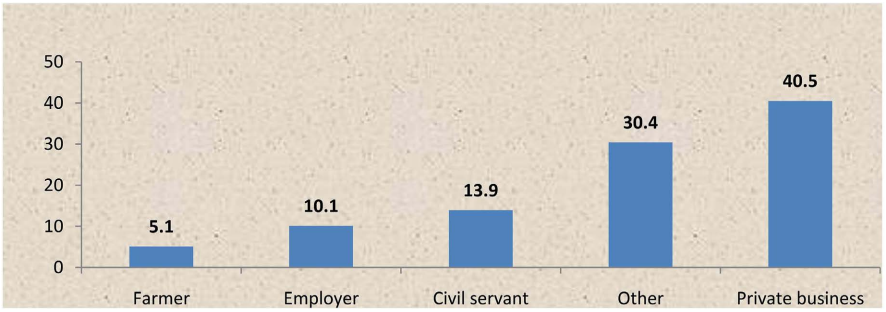


Figure 5. Occupation of the pedestrian (%). Source: Primary data (August, 2022).

7.1.5. The Monthly Earnings of Pedestrians

Table 5 below reveals that, the majority of pedestrians earn less than UGX 100,000 per month followed by 16.5% who are in the income bracket of UGX 100,000 - 200,000. Additionally, while 8.9% earn UGX 200,000 - 300,000, only 1.3% earned above UGX 300,000 per month. There were 12.7% of the unemployed category who did not have any source of income and these include the common youth hustling and walking on the streets looking for jobs.

Table 5. The monthly income in UGX of pedestrians.

Monthly Income level	No of Pedestrians	Percent
0 - 100,000 UGX	49	60.8
110,000 - 200,000	13	16.5
210,000 - 300,000	7	8.9
Above 300,000	1	1.3
None	10	12.7
Total	80	100.0

Source: Primary data (August, 2022).

7.2. Movement and Travel Pattern

7.2.1. Transport Mode Split in the City

When pedestrians were asked what transport means they preferred to use while on the road, the majority (69.7%) preferred walking compared to cycling (24.1%), public means (3.8%), and those using private transport were only 2.5% as shown in Table 6 below.

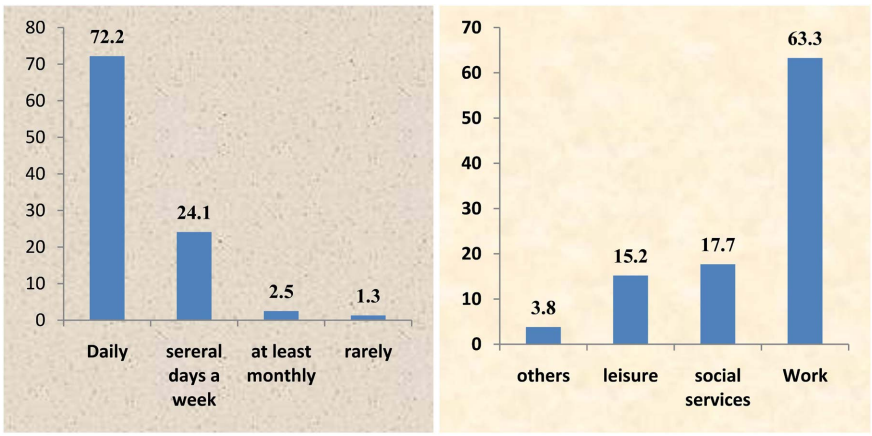
Table 6. Transport mode split of respondents.

Preferred Transport means	No of Pedestrians	Percent
Public	3	3.8
Private	2	2.5
Walking	56	69.7
Cycling	19	24.1
Total	80	100.0

Source: Primary data (August, 2022).

7.2.2. Frequency and Purpose of Walking as a Means of Transport

Study results in Figure 6(a) and Figure 6(b) show how 72.2% of the pedestrians walk daily, 23.1% walk several days a week while 1.3% walking rarely. Additionally, most (63.3%) of respondents walk to work, 17.7% do walk to access the social services such as health, education and other amenities and 15.2% walk for leisure especially during evening hours and weekend days.



(a) (b)

Figure 6. (a) How often (%) Do You Walk on the Road? (b) Purpose (%) of Walking on the Road. Source: Primary data (August, 2022).

7.2.3. Journeys Made While Walking on the City Roads

Table 7(a) and Table 7(b) show that most (30.4%) pedestrians make over 5 trips in a day walking followed by 24.1% who walk 2 trips on daily basis and only 8.9% make 3 trips per day due to various reasons such as work, business, leisure and other errands among others. On the other hand, the average time most passengers

(34.1%) take to walk to city centre from their homes is 16 - 30 minutes. While 30.4% of the passengers take less than 15 minutes to reach city centre, 19% take over 45 minutes on average to reach city centre.

Table 7. (a) The average number of trips made in a day while walking; (b) Average Time taken to walk from your home to reach Jinja City Centre.

(a)		
Average Trips Per Day	**No of Passengers**	**Percent**
Only One	11	13.9
Two	19	24.1
Three	7	8.9
Four	11	13.9
Over 5	24	30.4
Total	80	100.0
(b)		
Time taken	**No of passengers**	**Percent**
0 - 15 Minutes	24	30.4
16 - 30 Minutes	28	34.1
31 - 45 Minutes	13	16.5
Over 45 Minutes	15	19.0
Total	80	100.0

Source: Primary data (August, 2022).

7.2.4. Household Transport Assets

According to result in Figure 7 below, 34.2% (28) of the pedestrians interviewed owned bicycles, 13.9% motorcycles while only 2.5% have cars. The results show that walking is prominent in the area despite some pedestrians having other transportation means in their households such motorcycles, cars and bicycles among others.

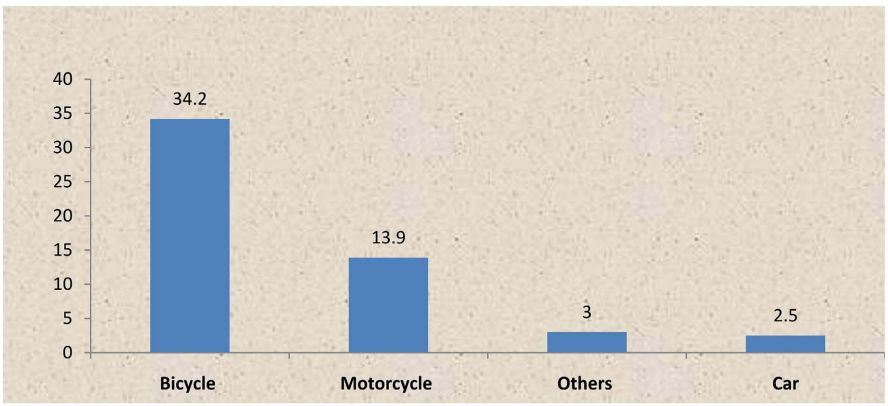


Figure 7. Household transport asset owned by the pedestrian (%). Source: Primary data (August, 2022).

Even where there are options as a means of movement, walking seems to be a way of mobility across all age groups and people at different income levels. It's stipulated that at least all individuals walk in a certain way either directly as a means of travel or walking being their last mile movement.

7.3. Walkability Index for Jinja Central Business District in Accordance to the Global Walkability Index

In this case the pedestrian field survey (FS) was conducted in the 8 roads to rate the walkability of a specific road and what makes a good pedestrian facility including specific improvements needed. The results were compared with those of the agency survey (AS) using 10 officials from Jinja City.

The results in Table 8 show that the average field survey (FS) rating of the 8 selected roads in Jinja Central Business District was 2.6 and the average of public agency survey (AS) result was 2.5.

Therefore, the Walkability Index (WI) = Average of public agency survey (AS) + Average of field Walkability survey (FS) = 5.1. This means that on a 100 point scale it becomes 51. Therefore, 50 - 70 holds neutrality for walking. This means that there are some walkable locations in the 8 roads but most of the daily trips and errands still require a bike, car or public transport. The results of 8 roads studied reveal that only a few destinations are within easy walking range. For most errands, driving or public transportation could give the best option. On the whole, the pedestrians and technical officers in the 4 departments of physical planning, works and engineering, environment and natural resource as well as the city council departments have rated the facilities in central business district of Jinja city as neutral (51 on a scale of 100) as shown in Table 9 below.

The variations in both pedestrian field survey and public agency ratings is due to the changes in the sidewalk widths, parking on sidewalks and degree of funding and resources devoted for pedestrian planning in the 8 roads of Jinja City.

Table 8. Walkability Index of 8 Major Roads of Jinja Central Business District Using Field Survey (FS) and Agency Survey (AS) Summary Data.

Road	Distance in KM	Safety and Security		Convenience and attractiveness		Policy in funding and pedestrian planning		Total Average		Walkability Index (AS + FS)
		AS	FS	AS	FS	AS	FS	AS	FS	
Kutch Road	0.81	2	1.8	2	2	2	2	2	1.9	3.9
Alidina Road	0.35	2	1.5	2	1.5	2	2	2	1.7	3.7
Lubas Road	0.96	3	2.8	2	2.8	2	3	2.3	2.9	5.2
Main street road	1.58	4	3.5	2	4	4	4	3.3	3.8	7.1
Rippon road	0.63	3	2.7	2	2	2	2	2.3	2.3	4.6
Clive road	1.47	3	3	2	3.5	2	2	2.3	2.8	5.1
Gokhale road	1.56	3	2.7	2	2.8	2	2	2.3	2.5	4.8
Nizam Road	0.81	2	2	2	2	2	2	2	2	4.0
Average Rating for all Roads	1.1	2.8	2.5	2	2.6	2.3	2.4	2.5	2.6	5.1

Source: Primary data (August, 2022).

Given the above results, the major areas of concern are lack of provision for traffic mediators, absence of pedestrian friendly crossing facility and ramps connecting to the carriageway and missing continuity of walkways. These need to be given proper consideration by the Jinja City authorities.

The average GWI rating of 51% implies that proper and sustainable steps should be taken by Jinja City Council to improve the design structure hence significantly improving the road-user facilities like walkover bridges, increasing the width of sidewalks (wherever applicable and possible), provide maximum parking spaces and reducing the black spots.

7.4. Condition of Pedestrian Facilities on Selected Main Roads in Jinja Central Business District

Walkability indices computed per road indicate that, the Main Street road with walkability index of 7.1 shows that it has better pedestrian facilities and well supported by government through USMID project. This is followed by Lubas road with walkability index of 5.2, Clive road (5.1) and Gokhale (4.8). The lowest walkability index was found with Alidina road of 3.7. This is because of the poor and unsecure walking conditions and pedestrian facilities including unprecedented path modal conflict as reflected in Table 9 below.

Table 9. Condition of pedestrian facilities on selected main roads in Jinja City.

Road	Nature of Pedestrian Facilities on the road	Walking conditions
Main street road	• It is a modern road with most of the modern infrastructure both for motorists and pedestrians • This is busy road and is occupied by many vendors • Some of the pedestrian facilities such as s zebra crossings and path ways have been eroded or disappeared	• Has modern walk ways safe for walking • Secure at the centre but most parts are in insecure for walking at night • This road is difficult to cross as motorists do not respect zebra crossings
Kutch road	• This is one of the busiest tarmacked roads in Jinja city centre with business shops all along the way on both sides. It is also along business centre for Jinja city • There are no facilities for walking • No street or traffic lights	• Lights are provided by buildings at night which is safe for walking despite having no walk ways • The road has some walk ways but is worse with high pedestrian traffic on both sides of the road including vendors with much merchandise displayed on the road sides causing traffic jam.
Alidina road	• The Jinja City central market is situated along this road and the vendors use the same fairly well tarmacked road for business especially in the • evenings causing a lot of chaos and congestion. • The central market was poorly designed with no parking. URA and Jinja City authorities have tried to chase away vendors from the street but in vain	• There is a lot of walking path modal conflict and road is not secure for walking throughout the day due to congestion caused by central market vendors. Pedestrians are locked up with heavy traffic especially in the evening causing a lot of delays • There are no street lights and existing walk ways on the road are overtaken by vendors

Continued

Lubas road	• There is no single facility for pedestrians except for motorists only. • The road is located in residential area with very few business entities	• No walk ways for pedestrians. Most walking is along the main road in conflict with motorists • It is safe to walk during day due to few motorists, few vendors and boda boda cyclists
Nizam Road	• The road infrastructure is suitable for pedestrians with walk ways • The road is tarmacked but with some potholes and street lights	• There is a lot of footing/walking on this road as it is located in the residential area. Walking is safe although walkways are eroded
Clive road	• Is good model road with good tarmac and street lights but no traffic lights	• The road has some walkways
Rippon roads	• Busy road occupied by roadside vendors. It joins the market street road which makes it congested with many cars parked along the road sides	• The road has some walkways but no traffic lights and eroded zebra crossings. It is not safe for walking due to many cars
Gokhale East and West road	• Has good well organised street with road lights and road signs in main centre of city. It is also busy street but with few vendors and pedestrians	• The road has some walkways but no traffic lights and has some zebra crossings. It is safe for walking

Source: Primary data (August, 2022).

7.5. The Inventory of Pedestrian Facilities by Road in Jinja City

Table 10 below gives an inventory of the basic pedestrian facilities on the 8 selected roads in Jinja City.

Table 10. The inventory of pedestrian facilities on selected roads in Jinja City.

Road	Distance (KM)	Walk ways	Street lights	Traffic light	Curb ramps PWDs	Waiting shades	Tree lines	Public toilet
Kutch road	West (0.61), East (0.2)	Yes	No	No	No	No	No	No
Alidina road	0.35	Yes	No	No	No	No	No	No
Lubas road	0.96	Yes	No	No	No	No	No	Yes (1)
Clive road	West (0.85), East (0.62)	Yes	No	No	No	Yes	Yes for Clive Rd. West	Yes (1)
Rippon roads	0.630155	No	No	No	No	No	Yes	No
Gokhale East and West road	East (0.36), West (1.2)	Yes	No	No	No	No	No	No
Main street road	1.58	Yes	Yes	No	No	No	Yes	No
Nizam Road	East (0.2), West (0.61)	Yes	No	No	No	No	No	No

Source: Primary data (August, 2022).

7.6. Key Findings on the Observed Roads

- There are good tree lines along some major roads especially along Kiira Road and Crescent road. These roads are out of the city central business centre. However, roads within the central business district such as Lubas, Alidina and Kutch roads do not have tree lines due to their location in the city centre. Therefore, UNRA has embarked on a project of tree planting along the roads that they construct.
- Motorcyclists (boda-boda and bicycles) are not catered for in the road transport system of Jinja city. They share facilities with both pedestrians and motorists. While walking, people compete with vehicles and most people are knocked down by cars along the way. However, Jinja city has now allocated a budget for bicycle hire with bicycle shades for people to hire and ride within the city.
- New design of the Jinja city roads as reported by city leadership, the widths of the roads are now changing to cater for pedestrian walk ways as in the case with Main Street, Nalufenya and Lubas roads where people can now walk. The zebra crossing is now mandatory at the interval of 100 m in each road constructed or repaired. The Main Street road now meets the basic standards of the modern city road with pedestrian facilities. Generally, all roads under study in Jinja city are wide enough (10.5 m on average) and can accommodate good walkways. It was reported by the town clerk that, all roads in the city will have walkways. The well tarmacked roads in Jinja among other include Main Street, Zikusooka and Kampala roads.
- Engineering and works department has a small budget for maintenance of road infrastructure. However, with support from USMID as co-funder, there is some optimism that improvement in city roads to include walkways and cyclists will be achieved. USMID has a plan of modernising Jinja City roads with provision for pedestrian walkways and traffic lights and signals.

7.7. Public perceptions towards Walkability in Jinja Central Business District

7.7.1. The Behaviour of Motorists on The Roads

Behaviour of motorists on the roads in Jinja City is very bad. Motorists do not respect the zebra crossings causing a number of accidents that mostly affect pedestrians. Reports from the traffic police indicated that, most of the drivers and cyclists on the roads do not have driving permits/licenses. The interview with one of the boda boda cyclist interdicted by Police Officers along Kutch road revealed that, he had just bought the motorcycle and he was on the road the same day. The Photo Plate 1 below shows the bad walking conditions along the market area in Jinja Centre due to the level of existing walking path modal conflict between cyclists, motorists, pedestrians and vendors.

7.7.2. Public Attitude towards Walking in Jinja City

- Some city residents fear walking due to the rampant accidents in the dark spots on some of the roads.

The Photo Plate 1. Walking path modal conflict between cyclists, motorists, pedestrians and vendors around market area. Source: Primary Data (August, 2022).

- Some city residents have preferred walking as a need to reduce carbon foot print and healthy life style as well as a way to save transport money. Transport takes a big chunk of money in the daily household budgets/expenditures. This is common with low income factory workers who have no accommodation and cannot afford to pay for taxis or BodaBodas and therefore walk back daily to their homes
- Jinja city central market is a busy area with poor access to pedestrian walking. The place is congested and unsafe for people to walk. The place is infested with many thieves and pick-pocketers causing negative public perception about walking in such areas.
- Jinja city residents mostly rely on walking and public transport for daily travel as cheap means of transport. About 70% of people in Uganda cities commute by foot especially the low income earners.
- The general condition of the existing pedestrian facilities in Jinja city such as road signs, waiting shades, walkways, zebra crossing, traffic devices/lights, curb ramps, tarmac and other amenties is that most of them are old and eroded.

7.7.3. Rating of the Conditions of Pedestrian Facilities in Jinja City

When pedestrians were asked whether they agreed or not with the current conditions of the pedestrian facilities in Jinja city, **Figure 8** below shows that, 45.6% confirmed that all existing walkways and sideways are at the standard width followed by 43% who agreed that there is proper signage for all existing pedestrian facilities. While 41.8% agreed that, pedestrian facilities are well maintained, 29.1% were positive about non conversion of walkways into vendor areas. Only 7.6% supported the idea that traffic lights are working well and yet there are virtually no traffic lights on any main road of Jinja city. Additionally, 40.5% believed that there are curb ramps installed for PWDs on major roads in Jinja city. The public still believes that persons with disabilities are not well catered for in the city. The safety of the walkways is rated at 44.3% taking into consideration the walking path modal conflict among the motorists, cyclists and vendors. The safety of walking in Jinja city rated at 51.8% is also attributed to adherence to city laws and

regulations on use of pedestrian facilities as well as general knowledge and public awareness about pedestrian facilities in the city. Most pedestrians (63.3%) also reported that, they find it convenient walking along the roads of Jinja city due to lack of traffic jam on most of the roads.

As earlier on reported, in general, the study has established that the existing pedestrian facilities in Jinja city are not well maintained. Additionally, most of these pedestrian facilities in most roads have been over taken by vendors. This is where the Jinja city authorities should take drastic actions to rectify the current plight of vendors in the city. The vendors are among the urban poor in Jinja city whose occupation in the city is mainly petty trade to support their livelihoods. It was also established that while some roads such as Main Street road has all the standard pedestrian facilities, others like Lubas Road do not have any.

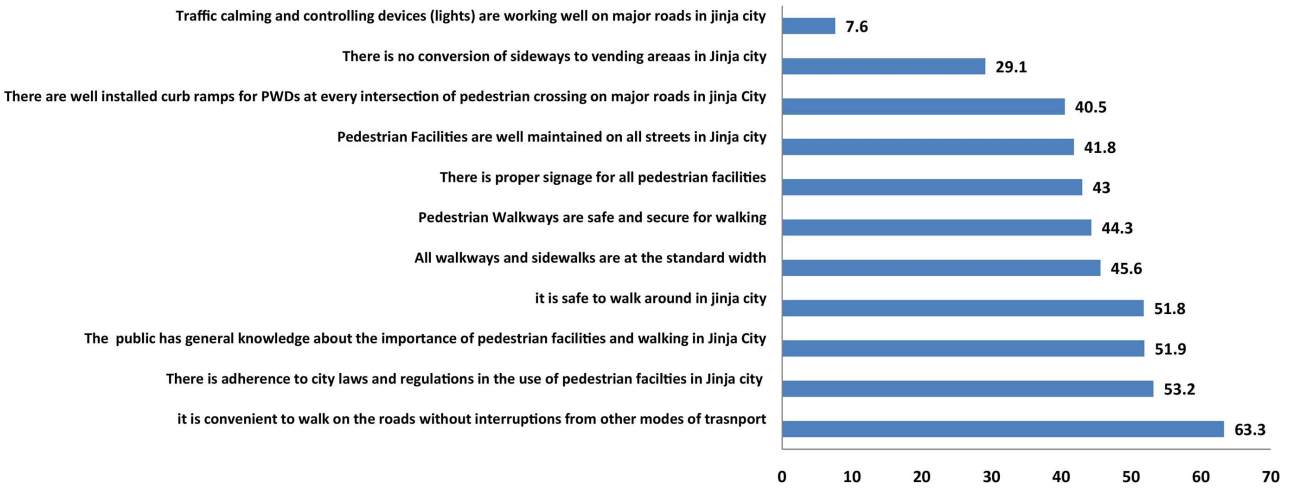


Figure 8. Perception (%) of the Pedestrians who agree with the current Conditions of Existing Pedestrian Facilities on Selected Roads in Jinja City. Source: Primary data (August, 2022).

The walkability parameters based on studies were considered in this regard with adjustments to fit the situation of Jinja in order to establish the perceptions and feeling of pedestrians towards their walking environment in the central business district.

Main Obstructions on Major Roads That Affect the Pedestrians walking along the Roads in Jinja Central Business District

The study has identified the major obstructions on the roads in Jinja city and they include the following namely:

- Big cars parked on both sides of the roads
- Cyclists especially numerous bodabodas and vendors using the same roads some of which do not have pedestrian facilities
- Some kiosks have been put along the walkways of some major roads especially the market street road near the main Jinja city market.

Poor road surfaces due to eroded tarmac and potholes with poor drainage along some roads.

8. Appropriate Policy Recommendations on How Non-Motorised Transport Could Be Fostered and Promoted in Jinja City and other Newly Created Cities in Uganda

This section highlights the strategies being put forward to promote NMT in Jinja city, the challenges, the best practices and policy recommendations.

8.1. Strategies to Promote Non-Motorised Transport in Jinja City

- Promote awareness creation about the advantages of Non-motorised transport (NMT) in Jinja city.
- Promote and establish a culture of walking days including car free days (CFDs) as part of initiative and role model by the political elite especially the mayors.
- Implement the desired plans for the road infrastructure including pedestrian road facilities. There is need to also provide signal lights for all roads both for pedestrian and motorists as well as inclusive facilities for people with disabilities (PWDs). There is need to link production to transport modes facilities which also includes walking in the city.
- Provide effective enforcement of traffic laws on the roads to curb rampant accidents caused by errant motorists and obstructions from merchandise dealers and hawkers along the roads.
- The consortium of UMEME, NWSC and other agencies should always plan together before a road is constructed or repaired by giving a road map of their infrastructure to avoid disruptions on pedestrian facilities.

8.2. Challenges

- Hindrances for walking in Jinja city are due to lack of proper infrastructure. The roads are mostly made for vehicles while some roads with pedestrian infrastructure were eroded away. Some engineers look at walkways as additional costs to their project work and yet it is a social safe guard.
- The road development in Jinja city is 100% dependent on central government grants while external grants sourcing strategy has been stopped by government. Therefore, the potential for fixing pedestrian facilities on the roads will still be a long term plan of the city. The World Bank has been the main funder. Besides, very few development partners do fund government road infrastructure. The Jinja City Authority reported that, local revenue generated cannot do any road works. The LGs in Uganda have no capacity to fund their own roads. Additionally, the harsh economic situation in the country is affecting private public partnership initiatives to fund the roads.
- Some walkways in some roads such as Alidina and Market street roads in Jinja city have been overtaken and captured by business people/road vendors in terms of kiosks, vegetable gardens, chicken cages, etc. including the verandas. Both sides of the roads and walkways have been occupied by vendors and packed vehicles leaving narrow path along the main roads and are each

charged UGX 500 by Jinja City Authorities. This curtails pedestrian transport which is key in urban movement. There is much conflict of transport modes (pedestrians, bodabodas, cyclists, wheel barrows, parked cars, hawkers, etc.) along the road

- There are many accidents caused on the pedestrians because of too many vehicles, cyclists and vendors using the roads. At the same time the roads are too bad without appropriate pedestrian facilities for walking such as zebra crossings, road signs, security lights, humps, traffic control devices and waiting shades among others. Sometimes accidents are caused due to lack of knowledge or respect by the pedestrians and motorists about existence of pedestrian facilities. Additionally, some of the roads are poorly maintained while others are narrow in some sections making them prone as black spots for accidents.
- The roads in Jinja city are not adequately maintained and some existing pedestrian facilities are getting old and eroded while some facilities have been destroyed and or used by vendors making them unsafe for walking.

8.3. Best Practices on NMTs

- The TUMI-GIZ -project implemented BRT system in Dar es Salaam in Tanzania is a success story so far.
- Mozambique is already promoting cycling project which is a success story.
- South Africa because of their wide streets is promoting car free days (CFD) project. The aim is to encourage people to walk freely for greater health benefits.
- Ethiopia is promoting the sealing of some roads mainly for pedestrians.
- In Uganda, the sealing of roads has been successful in Namirembe road in the central business centre of Kampala Capital City mainly to accommodate the pedestrian walking freely.

9. Conclusion

Jinja Town has a good road network with a chess board grid pattern. The roads are wide enough to allow for provision of drainage, pedestrian side walk, cycling lanes and carriage way/lane for vehicles. These have since got dilapidated and maintenance is wanting through with little or hardly any support. In light of the roads under this assessment, the Main Street and Clive Roads have benefited from funding/support from USMID and this can be seen from the quality of the roads. Nonetheless, the facilities to promote walking on these roads are inadequate and the provisions have been abused by the roadside vendors and developers who go against their building lines.

Jinja is increasingly growing in population attracted by industrialisation, tourism and accommodation. The pressure on facilities as well increases and in the end, they are abused. There is need to renovate the roads and provide for facilities that will promote walking since the space is available.

10. Policy Recommendations

Establishment of diverse walkable approaches for the city through involving a series of comprehensive urban policies, actions that affect the urban quality and city plans as well as innovative interventions that encourage the development of walkable communities. Temporary removal of vehicles from cities can transform roads into open spaces. This could be possible by having car free initiatives. Car free days have been trialled across the globe and so many cities with efficient transport systems have adopted it. In Paris, car free events have been successful and their city government vowed to implement a permanent downtown ban on diesel cars by 2030. As part of the Eco Mobility World Festival, an area of Swon City in South Korea was converted into an Eco mobile neighbourhood with the aim of providing residents with a taste of car-free urban living.

Institutionalising of non-motorised transport units into the city structure. This could promote a more understanding of non-motorised transport issues. Jinja is largely hindered by the lack of information on non-motorised transport and public perception and demand for NMT among the city residents. Institutional responsibilities for pedestrian mobility and infrastructure are fragmented. Different city departments are responsible for roads, pedestrian crossings, parks among others. This leads to negligence leading to under provision and deterioration of the available pedestrian infrastructure.

Provision of specific spaces for vending and parking. Many sidewalks in Jinja Central Business District are occupied by vendors and parked vehicles. There should be reconciliation between street vending and pedestrian walkability. Clearly, if sidewalks are crowded with stalls and parked vehicles, pedestrians cannot walk easily and quickly along corridors which were constructed for their benefit. However, it should be noted that pedestrians are not just moving from origin to destination. Rather, they are the main consumers of especially street food, groceries and other items sold on street. Therefore, in the quest to reallocate the vendors from streets, the proposed alternative spaces should directly and continuously be accessible by their primary markets, the pedestrian consumers.

Adoption of technological tools and innovative approaches contributing to a city's monitoring and evaluation. The public realm and outdoors are more accessible and appealing to the public through digital platforms that make it easier for them to understand their state and plan. Real-time data allows users to assess features such as noise or crowds of a place and smarter booking platforms make booking and planning activities easier. Mobile phone applications and computer algorithms analysing vast quantities of data are now able to evaluate abstract yet important metrics like walkability. These provide a useful resource for urban planners, transport planners, architects and decision-makers in designing spaces and routes that suit the needs of pedestrians by also considering the softer or more psychological aspects of route and mode choice. In Copenhagen Denmark, they adopted the talking street sign navigation concept. This is particularly beneficial to the blind and partially sighted people. These interactive street signs provide an

audio recording of street names along with illumination of the component sounds helping pedestrians to pronounce complex Danish place names.

All the roads coming to town should have cycling and walking mechanisms. All roads in Jinja city should have cycling lanes and walkways as cycling have not been achieved in Jinja city.

Establishing strategies and proposals that encourage the active and emotional participation of citizens in everyday urban life. A bottom-up community driven participatory planning process is a fundamental tool to place making. Thus, it is absolutely essential to listen to people and shape their values into the places they love or want to love more. Practically, a phenomenological approach towards community engagement should be encouraged. This is because great places are embedded in people's memories and experiences.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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