

## **ANALYSING CHALLENGES OF USING NON-MOTORIZED TRANSPORT IN RAPIDLY GROWING CITIES: THE CASE OF DODOMA CITY, TANZANIA**

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### **Abstract**

This study investigates the infrastructure and usability of non-motorized transport in Dodoma, Tanzania, amidst increasing urbanization and mobility challenges. The primary objective was to assess the conditions of pedestrian pathways and cycling infrastructure, focusing on user experiences and safety concerns. Utilizing a mixed-methods approach, data were collected through questionnaires, field observations, and remote sensing, involving 151 respondents. Results indicated that 85.4% of respondents primarily use walking as their mode of non-motorized transport, while 14.6% utilize cycling. However, 81.5% reported the absence of separated pedestrian pathways, with only 18.5% acknowledging their existence. Of those, a mere 2 out of 28 respondents confirmed that these pathways connect to bus stops. Moreover, all respondents indicated that there are no dedicated cycling tracks in the central business district. The size and condition of pathways were rated as poor by 63.6% of participants, highlighting significant infrastructure deficiencies. Additionally, 66.2% felt there were insufficient traffic signs to guide non-motorized users. Findings reveal that the lack of infrastructure contributes to safety risks and deters active transport use. These outcomes align with global studies demonstrating that inadequate facilities impede non-motorized transport adoption. The research highlights the necessity for local governments to prioritize the development and maintenance of pedestrian and cycling infrastructure, ensuring integration into urban planning strategies. This research emphasizes the urgent need for improved non-

motorized transport infrastructure in Dodoma. The findings are significant for policymakers, providing a framework for enhancing urban mobility and public health by promoting active transport modes. Enhanced infrastructure not only improves safety but also fosters a more sustainable urban environment.

**Keywords: community engagement; infrastructure development; pedestrian safety; traffic management; urban mobility.**

## 1. INTRODUCTION

As urban populations continue to swell, cities worldwide face pressing challenges related to mobility and sustainability. Non-motorized transport encompassing walking, cycling, and other forms of travel that do not rely on motor vehicles. [1] and [2] stated that this transport emerges as a vital solution to mitigate congestion, reduce environmental impact, and promote healthier lifestyles [3]; [4]. These transport modes are increasingly recognized not only for their environmental benefits but also for their role in enhancing social equity and community well-being [5]; [6]. However, the integration of non-motorized transport systems varies significantly across different contexts, particularly between developed and developing countries.

In developed countries, cities like Amsterdam and Copenhagen exemplify successful models of non-motorized transport integration [7]; [8]. These urban centres have prioritized cycling and walking through comprehensive infrastructure investments, including dedicated bike lanes and pedestrian-friendly urban designs [9]. For instance, Copenhagen boasts a cycling mode share of approximately 62%, significantly contributing to lower greenhouse gas emissions and improved public health [10]. In contrast, many developing countries face substantial hurdles in promoting non-motorized transport. Rapid urbanization, inadequate infrastructure, and safety concerns often limit the effectiveness of these modes, particularly in rapidly growing cities across sub-Saharan Africa, South Asia, and Latin America [11], [12].

In Tanzania, the challenges of non-motorized transport are not only confined to Dodoma, the capital [13]. Other cities such as Dar es Salaam, Arusha, Mwanza, and Mbeya also grapple with similar issues [14]. For example, Dar es Salaam experiences significant traffic congestion and limited infrastructure for walking and cycling, despite ongoing efforts to enhance non-motorized transport options [15]. Similarly, Arusha, a city known as a gateway to wildlife parks, faces urbanization pressures that strain existing transport systems [16].

The urgency for effective transport solutions is particularly pronounced in these rapidly growing cities. As urban centres expand, the demand for efficient and accessible transport options escalates [17]; [18]. In Dodoma, the transition from a relatively small town to the designated capital has outpaced the development of appropriate transport infrastructure, leading to increased traffic and safety concerns [19]. Yet these challenges also present opportunities for innovative solutions that can reshape urban mobility [20].

This study aims to investigate the specific challenges facing non-motorized transport across various cities in Tanzania, with a particular focus on Dodoma.

Examining barriers such as safety issues, infrastructure deficits, and cultural attitudes, this research seeks to provide actionable recommendations that can inform local planning efforts. Additionally, successful case studies from other rapidly growing cities will be explored to offer valuable insights applicable to Tanzania's unique context. This research contributes to a broader understanding of sustainable urban transport, highlighting the critical role of non-motorized options in creating inclusive and resilient cities. Insights gained from this study will be relevant not only locally but also in similar urban contexts worldwide.

## **2. LITERATURE REVIEW**

Non-motorized transport plays a vital role in the mobility systems of many emerging nations. In Indian cities such as Ahmedabad, Bangalore, Delhi, and Mumbai, walking and cycling account for approximately one-third of all trips, highlighting the significance of these modes in urban mobility. Similarly, in several Latin American cities, including Santiago, Chile, and Rio de Janeiro, Brazil, more than one-third of trips are made through walking and cycling [21].

In underdeveloped countries, reliance on walking as the primary mode of transport often stems from a lack of accessible and affordable alternatives, particularly for individuals from lower socioeconomic backgrounds. For instance, in Santiago, over 50% of trips made by low-income residents involve non-motorized options, compared to only about 10% for high-income counterparts. In Nairobi, many slum dwellers depend on walking due to the high costs of motorized transport. This trend highlights the importance of non-motorized modes, especially for vulnerable populations such as women and children, who disproportionately rely on walking in many African cities [22].

Research indicates that non-motorized transport is essential for reducing greenhouse gas emissions in rapidly urbanizing areas [23]. [24] reviewed a substantial body of literature on the benefits of facilities for non-motorized transport and highlighted the urgent need for further research on their role in climate change mitigation. In a comprehensive analysis, [25] emphasized the critical need to promote these modes in developing countries, where the contribution of the passenger transport sector to global emissions is increasing rapidly.

Despite their importance, cities in less affluent countries often face significant challenges regarding non-motorized transport infrastructure. Dedicated corridors for walking and cycling are frequently encroached upon for commercial development or repurposed for motorized traffic. Issues such as inadequate sidewalks, poor lighting, and overcrowding contribute to unsafe walking conditions in many regions [26]. Ineffective speed enforcement exacerbates the dangers posed by fast-moving vehicles, while the lack of segregated infrastructure deters cycling and compromises safety for cyclists.

The overall shortage of provision and maintenance for facilities related to non-motorized transport remains fundamental in developing countries. These facilities are often perceived as non-revenue-generating investments, leading to reluctance from private investors and funding institutions to support their development. In contrast to many Asian cities, African cities generally lack essential amenities such as bike storage, cycle tracks, and shower facilities [27]. The absence of these facilities can discourage weekday commuters from opting for cycling over personal vehicles. In Nairobi, for instance, there are virtually no marked cycling lanes, and non-motorized options are often deprioritized in urban planning. Although some

areas feature pedestrian walkways, these are frequently discontinuous and fail to connect key destinations, limiting their effectiveness [28].

Moreover, the street environments in African cities, including Nairobi, often lack adequate lighting, secure storage for non-motorized options, and surveillance measures, which creates unsafe conditions for pedestrians [29]; [30]. Most offices and bus terminals lack secure bicycle parking, which is vital for encouraging cycling. Providing convenient and safe bicycle parking can significantly improve public perceptions of cycling, making it a more attractive transport option [31].

Concerns about traffic accidents and fatalities further hinder the adoption of non-motorized transport. Pedestrians and cyclists account for a substantial proportion of road fatalities in Asia and Africa, with many incidents occurring during street crossings [32]. The risks associated with cycling are compounded by the fact that cyclists often receive less respect from motorists and struggle for space on the road [33].

In Africa, pedestrians and cyclists represent 44% of all road traffic fatalities, with road fatalities per capita significantly higher than in other regions [34]. In Kenya, cyclists constitute approximately 5% of all traffic fatalities, indicating the urgent need for improved infrastructure and safety measures to meet the objectives of any non-motorized transport strategy in Nairobi City [35].

Despite the critical role of non-motorized transport in urban mobility and its potential for reducing greenhouse gas emissions, there remains a significant gap in the literature regarding the specific challenges and infrastructure deficiencies faced by rapidly growing cities, particularly in the context of Dodoma, Tanzania. Existing studies primarily focus on larger urban centres or specific regions, often overlooking smaller cities that are experiencing rapid urbanization. Additionally, the current body of research tends to emphasize the benefits of non-motorized options without adequately addressing the infrastructural barriers, safety concerns, and socio-economic factors that inhibit their effective utilization. This study aims to fill this gap by investigating the unique challenges and opportunities for improving non-motorized transport in Dodoma, thereby contributing valuable insights to the discourse on sustainable urban mobility in developing contexts.

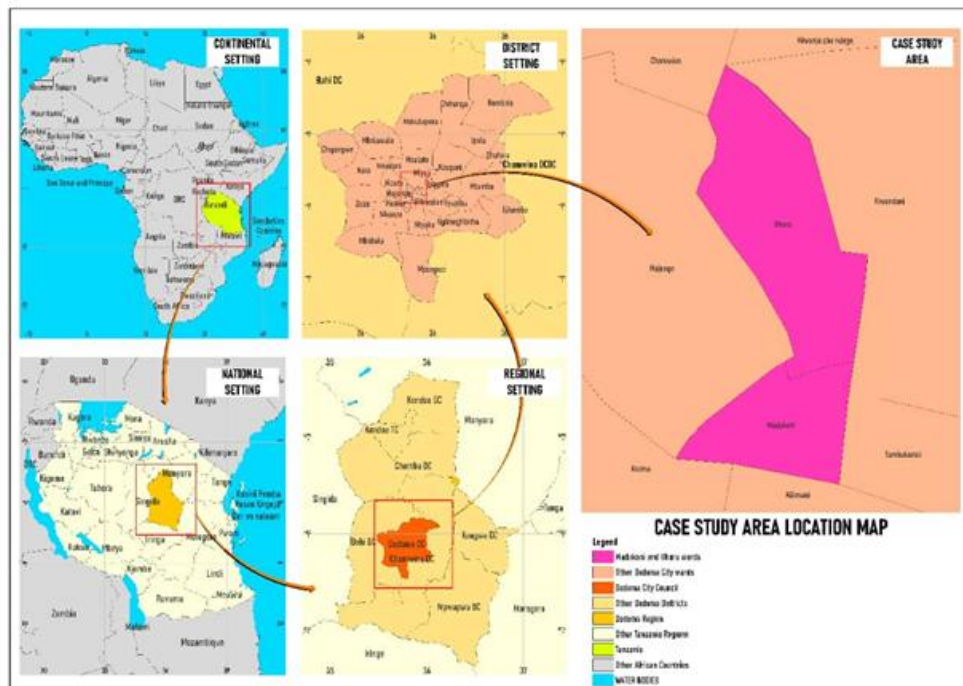
### **3. METHODOLOGY**

#### **3.1 Study area**

This study was conducted in Dodoma City, Tanzania, situated at approximately 6° S latitude and 35° E longitude (Fig. 1). The selection of Dodoma as the case study for this research was guided by specific research questions rather than random choice. Identifying a case that offers substantial information is crucial for generating meaningful data and gaining a deeper understanding of the issues being examined. Key considerations in this process included the relevance of the case to the study's objectives, its capacity to address specific research questions, and the availability of accessible data.

Several other cities were evaluated before choosing Dodoma, including Dar es Salaam, Mbeya, Mwanza, Arusha, and Tanga. This study focuses on the viability of non-motorized transport in urban areas experiencing rapid growth, characterized by stagnant population increases, limited housing development, traffic congestion (with the exception of Dar es Salaam), and a lack of effective government project implementation. Dodoma scored highly across several criteria: it has a current population increase rating of 5, indicating significant in-migration. The city also received a score of 5 for rapid housing transformation, a score of 4 for traffic

congestion, and 5 for accessibility. Furthermore, it scored 5 for the current number of implemented government projects, yielding a total score of 24. In contrast, Dar es Salaam, while populous, had a total score of 20, and other cities like Mbeya, Arusha, Mwanza, and Tanga scored significantly lower. Given these favourable metrics, Dodoma was selected for this study due to its unique urban dynamics and potential for developing effective non-motorized transport solutions.



**Fig. 1: Map illustrating the study area. Source**

Source: National Bureau of Statistics (2022)

### 3.2 Data collection

A mixed-methods approach was employed, integrating both qualitative and quantitative techniques to comprehensively address the research questions.

The sampling process involved two primary sources of data: the Dodoma City Council and local community members. The Dodoma City Council, previously known as the Capital Development Authority, plays a significant role in the planning of non-motorized transport infrastructure. Purposeful sampling was applied to gather information from planning officers and key informants who possess relevant knowledge about non-motorized transport. In contrast, an opportunistic sampling method was used for community respondents, selecting individuals based on their availability and willingness to participate during the data collection period.

The sample size for individual respondents was determined using Cochran's (1977) formula (Eq. 1), given the unknown exact population of people entering the Central Business District (CBD) daily. With a confidence level of 95% and a desired margin of error of 8%, the calculated sample size was approximately 151 respondents. In addition to community members, the research purposively selected four key informants: three town planners and one officer from the

Tanzania Rural and Urban Road Authority (TARURA), along with six ward-level informants, including two Ward Executive Officers and four Street Chairpersons.

$$n = \frac{Z^2 pq}{e^2} \quad (1)$$

Where  $n$  represents the sample size,  $z$  corresponds to the standard value for a 95% confidence level (1.96),  $e$  indicates the desired level of precision, which is 8% (or 0.08), and  $p$  is the estimated proportion of the population, set at 0.5.

Substituting these values into the formula in Eq. 2 resulted in a calculated sample size of 151 respondents.

$$n = \frac{(1.96)^2 \times 0.5 \times 0.5}{(0.08)^2} = 151 \quad (2)$$

Data were collected from both primary and secondary sources, with primary data being essential for analyzing barriers to effective non-motorized transport. Primary data were gathered directly from the field, while secondary data served to support these findings, primarily through published reports and online resources. A variety of techniques were employed to collect primary data, including questionnaires, in-depth interviews, physical observations, and photographic documentation, each designed to provide a comprehensive understanding of how non-motorized transport is integrated into urban planning.

In-depth interviews were conducted with key informants using guided questions to explore officials' perspectives on the feasibility of non-motorized transport in Dodoma's planning practices. Insights were gathered from municipal officials and local leaders regarding the historical context and initiatives supporting non-motorized transport. Structured interviews utilized pre-defined questions to provide both qualitative and quantitative data, focusing on individual characteristics, existing infrastructure, relevant policies, and the impact of limitations within the transport system.

Questionnaires were distributed among community members to collect information regarding their experiences with non-motorized transport, complementing data obtained from in-depth interviews. Photographic documentation visually captured the existing conditions of non-motorized transport facilities in Dodoma, assessing pathways, parking spaces, and storage facilities. Field observations were conducted to validate and supplement data collected through other methods, systematically recording findings using notes and photographs to focus on the practical implementation and usability of non-motorized transport infrastructure.

A thorough review of literature and documentary sources, including the 1976 Dodoma Master Plan and various government reports, aimed to identify stakeholders involved in non-motorized transport, infrastructure designs, and the objectives of related initiatives. This review provided foundational knowledge to understand existing gaps in research and emerging issues relevant to non-motorized transport in Dodoma. Combining these diverse data collection techniques facilitated a comprehensive analysis of the challenges and opportunities associated with non-motorized transport in Dodoma City, contributing valuable insights for urban planning practices.

A data collection matrix summarized the study's variables, indicators, measurements, and methods aligned with the research objectives. To ensure the

quality of the collected data, the study focused on reliability and validity. Reliability was maintained through thorough documentation of research activities, including details of interviews and photographic records. Validity was addressed by establishing causal connections among the variables and employing complementary data to rule out alternative explanations, as well as cross-validating findings with geographic maps. This approach enhanced the robustness of the research outcomes.

### **3.3 Data Cleaning, Coding and Analysis**

The data cleaning process began by verifying the completeness and accuracy of responses collected from each questionnaire. Each questionnaire was systematically numbered and categorized to facilitate efficient data entry. Responses were then classified for analysis. To assess the state of non-motorized transport infrastructure in Dodoma City, Remote Sensing data from Land-Sat levels 04, 05, and 08 were employed. The analysis utilized logistic regression to explore factors influencing non-motorized transport usage. This model was used in regressing the usage of non-motorized transport against various independent variables, capturing the relationships between different factors affecting transport choices.

To evaluate the goodness of fit of the model, the likelihood ratio (LR) test was employed. This test compared the log likelihoods of unconstrained and restricted models, allowing for the calculation of LR. A higher calculated LR indicated a significant explanatory power of the independent variables, supporting the rejection of the null hypothesis. Hypothesis testing was conducted to determine the validity of relationships between independent and dependent variables. P-values obtained from the logistic regression analysis guided this process, with established thresholds for significance:  $P\text{-values} \leq 0.01$ ,  $\leq 0.05$ , and  $\leq 0.10$  indicated varying levels of significance, informing the acceptance or rejection of the hypotheses.

## **4. RESULTS**

### **4.1 Uses of non-motorized transport and infrastructure**

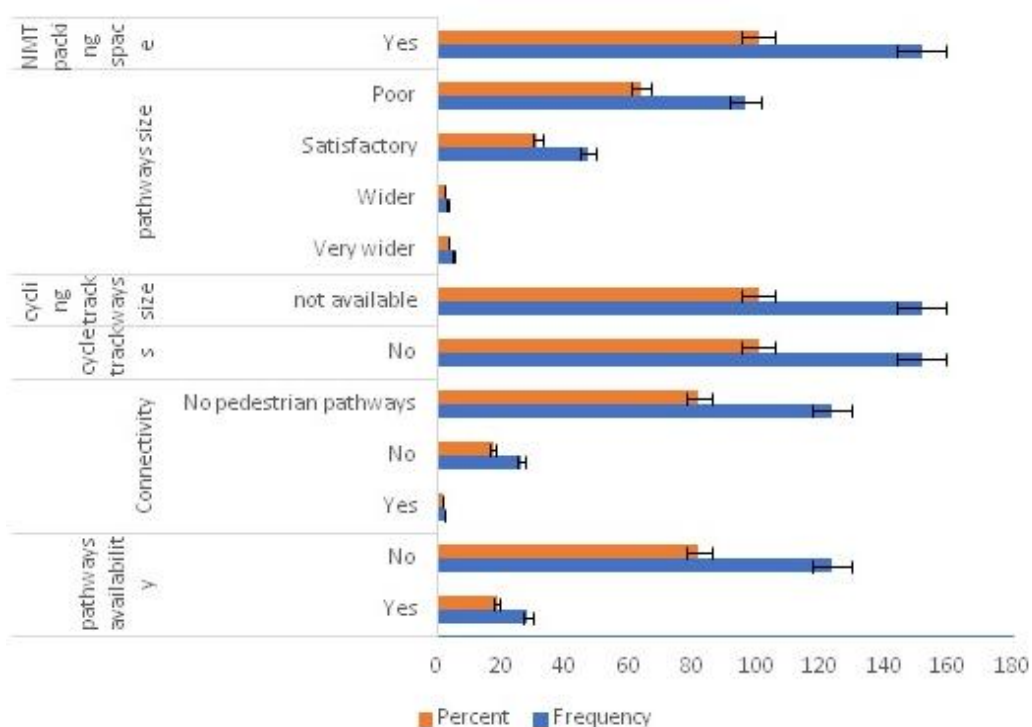
The study revealed that all respondents utilize some form of non-motorized transport. A significant majority, 85.4%, primarily use walking, while 14.6% rely on cycling (Table 1). This indicates a strong preference for walking within the community.

Regarding non-motorized transport infrastructure, respondents provided insights on pathways for walking and cycling, their connectivity to major roads, and the availability of parking spaces for non-motorized transport. The results indicate varying conditions of pathways and connectivity, highlighting the need for improvements in infrastructure to better support walking and cycling. Fig. 2 illustrates the specific features and accessibility of non-motorized transport facilities based on respondent feedback.

**Table 1: Distribution of non-motorized transport usage among respondents**

Modes of transport	Frequency	Percent (%)
Walking	129	85.4
Walking on wheels-cycling	22	14.6
Total	151	100

Source: Survey Data (2024)



**Fig. 2: Integrated non-motorized transport infrastructure in Dodoma City**

Source: Survey Data (2024)

#### 4.2 Pedestrian pathways and cycling tracks in the locality

The findings reveal that a significant majority of respondents (81.5%) reported the absence of separated pedestrian pathways in their locality, while only 18.5% acknowledged their presence. Those who identified locations with separated pathways mentioned specific areas such as Road 6 and Road 11. However, among those who recognized the existence of separated paths, only two respondents stated that these pathways connect to bus stops or terminals, with the majority (26) indicating that they do not. The locations mentioned as having connections to bus stops included the General Hospital and Nyerere Square.

In terms of cycling infrastructure, the study indicated a complete lack of cycling tracks in the CBD, as all respondents (100%) confirmed this absence. Key informant interviews supported these findings, with one noting that "there are very

*few places that have pedestrian roads, and cyclists and their carts do not have access to the same routes; they usually use the motorways."* Observations during fieldwork confirmed the absence of cycling infrastructure, forcing bicycle users to share lanes with motor vehicles, which poses significant safety risks (see Plate 1). A town planner emphasized the severity of the issue, stating, *"There is no cycling infrastructure in CBD roads; bicycle users and other non-motorized transport users share the same lane with motor vehicles."* Additionally, a planner from the Ministry of Land, Housing, and Human Settlement explained that while the 1976 Master Plan for Dodoma included provisions for non-motorized transport infrastructure, implementation has faced challenges due to funding delays. This has resulted in obstacles in certain areas, particularly where residents have encroached on designated routes, with affected areas including Area D, Airport, and Ipagala Ward. A cyclist expressed frustration, stating, *"Among those who face significant challenges on the road are us cyclists; we lack dedicated infrastructure and feel unrecognized by the law, which leads to constant problems on the road."*



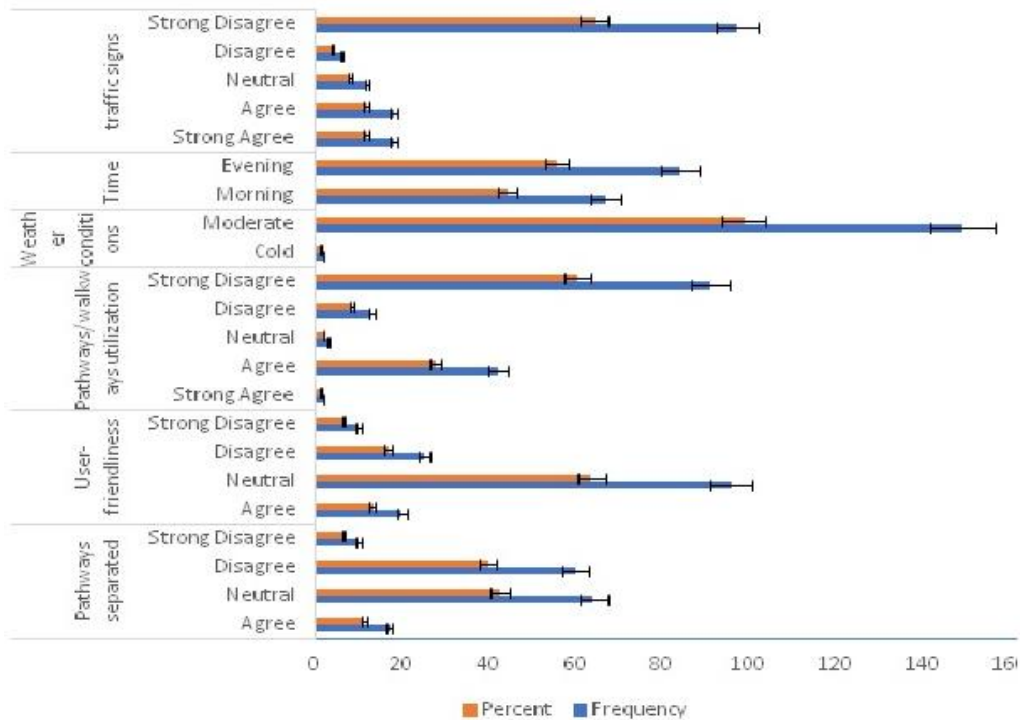
**Plate 1:** The image illustrates the situation in which cyclists must share roadways with motor vehicles, highlighting the lack of dedicated cycling infrastructure. This

poses serious safety risks for cyclists, who navigate the same lanes as cars and trucks. The absence of proper facilities for non-motorized transport users emphasizes the challenges they face in Dodoma's Central Business District. The data supporting this observation is derived from both field studies and remote sensing analysis.

**4.3 Pathway and Parking Space Conditions for Non-Motorized Transport**

The findings indicate that a significant majority of respondents (63.6%) rated the size of pathways and walkways as "poor," while only 36.4% described them as satisfactory or wide. This perception may be influenced by the presence of other users and activities that encroach on these pathways, a challenge that will be explored further in subsequent sections.

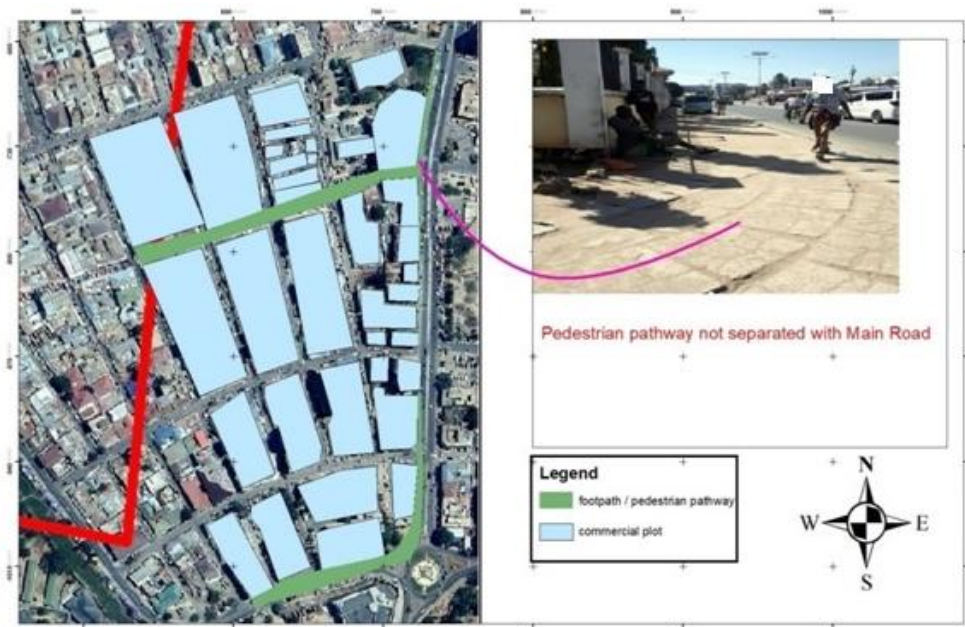
In contrast, respondents reported that there is available parking space for non-motorized transport in Dodoma's Central Business District, specifically mentioning Nyerere Square. This observation is supported by remote sensing data, which indicates that a designated area exists for pedestrians to rest. Given the high volume of foot traffic in the area having a resting space like Nyerere Square is essential for users who walk long distances. Additionally, the study assessed various safety concerns related to non-motorized transport, including the separation of pathways from main roads, the user-friendliness of these pathways, the effects of weather conditions, and the presence of traffic signs. The results are illustrated in Fig. 3.



**Fig. 3: Safety and usability concerns for non-motorized transport**  
 Source: Survey Data (2024)

#### 4.4 Separated Pathway for Safety

The results in Plate 2 indicate that a significant portion of respondents (46.3%) disagreed with the notion that pathways are adequately separated from the main road to ensure user safety, while only 11.3% agreed. Additionally, 42.4% of respondents remained neutral on this issue. During interviews with key informants, one respondent emphasized the scarcity of pedestrian pathways, stating, "There are very few places that have pedestrian roads, and cyclists often have no dedicated route, sharing the same roads instead. The existing footpaths are only slightly elevated and remain unsafe." Another informant pointed out that the lack of dedicated cycling paths forces cyclists to use the same roads as motorized vehicles, contributing to a sense of danger while on the road. These findings are further illustrated by accompanying observations and photographs taken during the study.

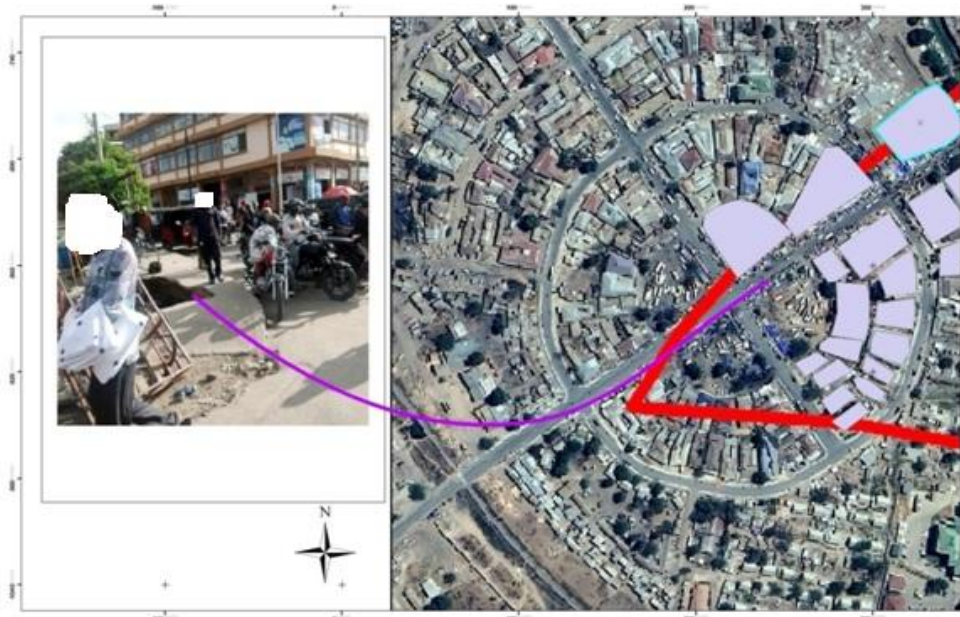


**Plate 2:** This image illustrates the lack of separation between pedestrian pathways and the main road, highlighting the safety concerns for non-motorized transport users. The close proximity of footpaths to vehicular traffic poses risks to pedestrians and cyclists alike. As shown here, pedestrians are at risk of accidents due to the absence of safe, designated pathways, as there is no separation between pedestrian walkways and motorcycle lanes.

#### 4.4 User Friendliness of Pathways

The results presented in Plate 3 indicate that 23.2% of the respondents felt that the pathways and walkways were not user-friendly, while only 13.2% disagreed. Additionally, 63.6% of the respondents expressed neutrality regarding the user-friendliness of these pathways. This suggests that a significant portion of respondents are ambivalent about the comfort and accessibility of the walkways. Field observations revealed that many pedestrian pathways are indeed unfriendly to users, with some in such disrepair that they become unusable (see Plate 3). This highlights the inadequate state of pedestrian infrastructure, which discourages

people from utilizing these paths. The lack of priority given to non-motorized transport infrastructure by implementers not only compromises user safety but also increases the risk of accidents. Notably, Plate 3 depicts a large hole in the middle of the pathway, creating a significant hazard, especially at night. Interviews with town planners indicated that numerous challenges hinder the comfort of users on non-motorized transport infrastructure. Many pedestrian paths lack continuity due to encroachments, with buildings obstructing these routes and limiting access for pedestrians. Additionally, observations revealed that several pedestrian infrastructures are not properly maintained, lacking essential features like shade trees that would encourage walking.



**Plate.3: Condition of Pathway (Unfriendly to Users).**

Source: Survey Data (2024) and Remote Sensing Data

#### **4.5 All-Weather Walkways and Traffic Signs**

The results depicted in Figure 4.3 reveal that a significant majority of respondents (68.9%) believe that pathways and walkways cannot be utilized throughout the year, regardless of weather conditions. Only 29.1% disagreed with this view, while 2% remained neutral. Furthermore, 98.7% indicated that non-motorized transport is more frequently used during moderate weather. The findings also suggest that respondents prefer to use non-motorized transport in the evenings compared to mornings, with no participants claiming that utilization decreases during the day. One respondent noted that the hot sun in Dodoma, especially in the afternoon, makes walking or cycling tiring and uncomfortable.

Traffic signs play a critical role in guiding and informing all road users, including those using non-motorized transport. However, in Dodoma's Central Business District, there are only a limited number of traffic signs specifically intended for these users. The most common sign is the pedestrian crossing sign, but the overall scarcity of signs diminishes awareness of non-motorized transport rights and road

safety. Accordingly, 66.2% of respondents disagreed with the notion that there are enough traffic signs to ensure safety for those using non-motorized transport when interacting with motorized traffic. Only 23.8% agreed, while 7.9% were neutral on this matter. Key informants highlighted that while some main roads, such as Nyerere Road and Eleventh Road, do have crossing signs; there are many areas without proper signage for pedestrians. Specifically, it was mentioned that although there are pedestrian crossings near important locations like Nyerere Square and the General Hospital, other roads lack necessary signage to assist users.



**Plate 4:** Pedestrian Crossing Sign at Uhuru and Madukani Wards  
Source: Field Survey, 2024

## 5. DISCUSSION

### 5.1 Synthesis of the study findings

The findings of this study highlight significant challenges regarding the infrastructure and usability of non-motorized transport in Dodoma, revealing critical insights into user experiences and safety concerns. The results indicate that a majority of respondents (85.4%) utilize walking as their primary mode of non-motorized transport, with cycling following at a lesser frequency (14.6%). This reliance on walking highlights the importance of pedestrian-friendly infrastructure to support this mode of transport [36].

The absence of separated pedestrian pathways was a notable concern, as 81.5% of respondents reported that such pathways are lacking in their localities. The few respondents who acknowledged the existence of separated pathways indicated limited connectivity to bus stops and terminals, with only 2 out of 28 affirming this connection. This aligns with findings from similar studies in urban settings, such as the work by [37], which highlighted that insufficient infrastructure, contributes to lower rates of active transport, thereby undermining public health and mobility objectives.

Cycling infrastructure is virtually nonexistent in Dodoma's central business district, with all respondents confirming the absence of dedicated cycling tracks. This situation mirrors findings from studies in other cities, such as the research

conducted by [38], which found that inadequate cycling infrastructure leads to heightened safety risks and deters potential cyclists. Observations in Dodoma revealed that cyclists share the same lanes as motor vehicles, increasing the likelihood of accidents and discomfort [39]. The insights gained from town planners emphasize that despite existing plans to incorporate cycling and pedestrian facilities, challenges such as funding delays and encroachment on pathways have hindered implementation [40].

Furthermore, the study's examination of pathway conditions revealed that 63.6% of respondents rated the size of pathways as poor. This is particularly concerning as damaged and poorly designed pathways can deter users and increase the risk of accidents [41]. Observations corroborated these concerns, noting that many pedestrian pathways are not only inadequately maintained but also lack essential features that enhance usability, such as shade trees. It also suggests that the quality of walking environments significantly affects pedestrian behaviour, emphasizing the need for municipalities to prioritize maintenance and improvements in non-motorized transport infrastructure.

The results also highlighted significant gaps in traffic signage for non-motorized users. A majority of respondents (66.2%) felt there were insufficient traffic signs to guide pedestrians and cyclists, further complicating safe navigation in urban spaces. This lack of adequate signage corresponds with findings from studies in cities like Toronto, where inadequate signage has been shown to negatively impact user safety and awareness [42].

The implications of these findings extend to both practical and policy frameworks. It is evident that local governments need to prioritize the development of safe, accessible, and well-maintained pedestrian and cycling infrastructure [43]. Implementing a comprehensive urban planning approach that integrates non-motorized transport into broader transportation strategies is essential [44]. Additionally, policies must focus on securing funding for infrastructure projects, while also engaging communities in planning processes to ensure that developments meet user needs [45].

## **5.2 Options for improving non-motorized transport in rapidly growing cities**

Enhancing non-motorized transport in rapidly growing cities like Dodoma and elsewhere requires a multifaceted approach that addresses infrastructure deficiencies, safety concerns, and user engagement. Establishing dedicated pedestrian and cycling pathways is crucial. Cities should prioritize the construction of well-designed, separated pathways that connect key destinations such as residential areas, schools, workplaces, and public transport hubs [46]. This not only improves safety but also encourages more people to adopt non-motorized modes of transport. Implementing clear signage and maintaining pathways can significantly enhance user experience and safety.

To improve the safety of non-motorized users, effective traffic management strategies must be employed. This includes installing adequate traffic signs and signals specifically for pedestrians and cyclists, along with creating pedestrian-only zones in high-traffic areas [47]. Implementing measures such as speed limits for motor vehicles in urban centres can further protect vulnerable road users [48]. Such initiatives have been successful in other cities, where reducing vehicle speeds has led to decreased accident rates and increased pedestrian confidence.

Raising awareness about the benefits of non-motorized transport is essential for fostering a supportive environment. Educational campaigns can inform the public about road safety and the importance of using dedicated pathways [49]. Engaging local communities in the planning process ensures that infrastructure meets the needs of users and promotes a culture of walking and cycling. Similar initiatives in other urban areas have demonstrated that community involvement can lead to more effective and widely accepted transport policies.

Local governments should integrate non-motorized transport planning into broader urban development policies. This includes allocating budgetary resources for infrastructure maintenance and improvements, as well as ensuring that zoning laws support walkable and bike-friendly neighbourhoods [50]. Collaboration with urban planners can lead to more holistic approaches that prioritize active transport in new developments. Cities that have adopted such integrated planning strategies have seen significant improvements in the quality of their urban environments.

Establishing mechanisms for ongoing assessment of non-motorized transport facilities can help identify areas for improvement. Regular surveys and data collection can provide valuable insights into user experiences and inform future infrastructure investments. Prioritizing infrastructure development, traffic management, community engagement, and policy integration can help cities foster a culture that embraces walking and cycling as viable transport options [51]. This, in turn, contributes to enhanced public health, reduced traffic congestion, and lower carbon emissions, aligning with sustainable urban development goals.

## **6. CONCLUSION**

The study highlights the critical role of non-motorized transport in urban mobility, particularly in rapidly growing cities like Dodoma. The findings reveal significant gaps in infrastructure, safety, and user-friendliness, with 81.5% of respondents indicating a lack of separated pedestrian pathways and 100% confirming the absence of cycling tracks. The data also emphasize the challenges posed by inadequate traffic signage, with 66.2% of respondents noting insufficient traffic signs for non-motorized users. These findings reflect a wider global trend, as numerous cities face challenges in accommodating non-motorized transport in the context of rapid urbanization.

To enhance non-motorized transport, cities must prioritize infrastructure development, ensuring safe, accessible pathways and dedicated cycling routes. Traffic management strategies should be refined to improve safety for all road users, while community engagement is essential to raise awareness and encourage walking and cycling. Integrating supportive policies that recognize the importance of non-motorized transport will further bolster these efforts.

Overall, this study serves as a call to action for urban planners and policymakers to rethink transport strategies, ensuring that non-motorized options are not only viable but also prioritized in urban development. Addressing these challenges will promote healthier lifestyles, reduce traffic congestion, and contribute to more sustainable urban environments.

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