

A System Designed for Whom?: Learnings from Engagement at a Citizen Level for Urban Transport Reform in Africa

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1. Abstract

While urbanisation and urban growth in sub-Saharan Africa provides enormous social and economic opportunities, urban transport networks are often struggling to cope. Weak governance and a largely unregulated operating model results in an inefficient allocation of resources, which is increasingly unsustainable in the face of ever growing demand.

Reform efforts in the region have often focused on supply-side improvements to public transport, focusing on system efficiency with little reference to citizen experiences and priorities, particularly of those citizens who use other modes. This paper analyses household transport surveys in Lusaka and Maputo to understand transport behaviours, journey experience and improvement priorities. It also considers perspectives on motorcycle use, as an emerging mode with a complex interrelation with urban transport.

It finds public transport use to be far from universal, with large populations walking long distances. Poorly performing networks have unexpected consequences, including strong preferences for direct services, and higher exposure to insecurity (due to a need to travel before daylight hours through dark neighbourhoods). Findings support a need for greater consideration of financial and spatial access to transport by poor populations on the urban periphery, and greater emphasis on a safe and functional walking environment at the last mile.

2. Introduction

Background

Whilst urbanisation and urban growth in major cities of sub-Saharan Africa provides enormous social and economic opportunities, it will continue to present significant challenges for transport networks to keep up with demand. These challenges are already clearly evident in most major African cities and are increasingly becoming unsustainable.

On the supply side, challenges include weak, fragmented, and underfunded authorities unable to provide sufficient formal transport, poorly maintained vehicles and roads, poor coverage and a reliance on largely unregulated and informal services that are dirty, unsafe, uncomfortable, and unreliable (Kumar and Barrett, 2008; Behrens et al., 2015). The impacts of this upon users are well documented and include long waits to board buses, journeys which terminate short of their destination, longer journey times due to chronic and worsening congestion, and travel patterns determined not by journey quality but by mitigating access, cost and safety concerns (Jennings and Behrens, 2017). This is exacerbated by ever

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increasing levels of demand, with growing populations and expanding and unplanned urban footprints competing for scarce road space. Motorcycles, the response in many cities to congestion and failing public transport, bring livelihoods opportunities on one hand, but also serious safety concerns and further congestion on the other (Ehebrecht et al. 2018).

Approaches to addressing the challenge

There is a fragmented delivery of urban transport in Sub-Saharan Africa, with paratransit having taken the place of formalised systems post-independence in most major cities (Kumar and Barrett, 2008). As this model reaches the limits of its functionality in emerging megacities, many city authorities in sub-Saharan Africa have sought to improve urban transport. In some cases, this has strived to improve operational characteristics of services within existing governance and business model characteristics (e.g. Maputo's cooperatives) (Machanguana, 2020). More ambitious schemes have sought to achieve greater benefits through changes to business and operational models with a 'system manager' approach, driven by the private sector to improve efficiency and service quality, such as Lagos Metropolitan Area Transport Authority (LAMATA) in Lagos (Cheeseman and de Gramont, 2017).

However, the extent of intervention is typically focused on supply-side improvements to public transport, essentially seeing transport as a business rather than an area of urban policy. For the most part, these do not consider the strategic level of urban transport planning, preventing a move from interventions based on 'predict and provide' to urban transport objectives based on 'vision and validate' (Jones, 2016)

Responding to this gap, this paper explores how considering travel patterns, experience and priorities from household level surveys can:

- Contribute to development of urban transport interventions in Maputo and Lusaka
- Support strategic decision making in broader urban mobility in Lusaka and Maputo
- Inform design of urban transport reform exercises elsewhere in sub-Saharan Africa.

3. Approach and method

City selection

Lusaka and Maputo were selected for this study. They are cities that are exploring public transport reform which enables the data from this study and research to support investment decisions in urban transport enhancements. The cities are in different but early stages of this exploration, enabling meaningful comparison alongside some contextual diversity.

Maputo

Maputo, the capital of Mozambique, is the country's main financial, business and commercial centre. Major growth in recent years has seen expansion across administrative boundaries into Matola, Boane and Marracuene, creating Maputo Metropolitan Area (Greater Maputo). Future growth of the conurbation is anticipated, with population expected to increase from 2.8 million in 2018 to almost 4.0 million in 2035. The city has a centralised economic structure, with jobs concentrated in the CBD, and housing growth focused on the periphery.

Urban and economic development has brought about increased mobility for people and goods without a proportional increase in infrastructure capacity, resulting in worsening congestion, increased pollution and declining road safety. The creation of the Metropolitan Transport

Agency (AMT) is intended to improve urban transport management and governance, and coordinate efforts for metropolitan level urban transport investments.

Lusaka

Lusaka is the capital and major urban centre of highly urbanised Zambia, where steady economic growth and political stability have spurred the country's productivity. The number of vehicles on Zambia's roads increased by almost 300% to 700,000 in the ten years up to 2016, with nearly half of those vehicles registered in Lusaka (JICA 2009). Most trips in Lusaka are made by walking (41%), followed by public transport (30%). Due to ineffective urban planning and weak enforcement of legal and policy provisions, investments in urban transport infrastructure have not matched demand, resulting in inadequate and inefficient transport services. This situation translates to urban mobility constraints for vulnerable groups like women, the disabled and urban poor whose ability to access socio-economic opportunities is affected by high transaction costs. These groups will face further constraints as Lusaka's rapid urbanization growth continues, spurred on by rising population, income and car ownership.

Data sources

This study is based on the analysis of two data sources, transport-focused household surveys and focus group discussions taken in August and September 2021 in the two cities.

Household survey

A household survey was taken of 1,500 interviewees each in Maputo and Lusaka, using local surveyors. The targeting of the survey locations was designed by the research team, with selection of three different urban contexts in each city (in terms of socioeconomic and spatial considerations). Within neighbourhoods, households were selected based on their location more than 500m from a bus stop, ensuring a meaningful consideration of last mile considerations. The locations of surveys are shown in [Figure 1](#), and described below.

Data was collected in Portuguese (Mozambique) and English (Zambia) by local enumerators using smartphones and tablets on the Epicollect 5 platform, which also provided georeferencing of interviews.

Maputo: Neighbourhoods in Maputo were selected if they were based within the broad catchment area of the proposed urban bus reform/BRT corridor, with a diversity of contexts between them. These were:

- Ndlavela (A), which is an established inner city neighbourhood, highly urban in nature with a medium rate of poverty
- Intaka 1 (B), which is an established urban neighbourhood on the outer areas of the city (just within the ring road). It has a medium-high level of poverty but is quite well connected by nature of its relative proximity to the N1 Avenida de Moçambique.
- Intaka 2 (C) which is an outer city, newer peri-urban area, which is currently of a lower density and which has a high level of poverty, with a population characterised by new arrivals to the metropolitan area.

Data was collected in August and September 2021, with a total of 1,517 validated responses

Lusaka: The three neighbourhoods selected in Lusaka were:

- Chazanga, an unplanned settlement located approximately eight kilometres north of the CBD. It is one of the oldest informal settlements in the city and is located outside of the formal Lusaka city boundary within Central Province. It is relatively poorly connected, approximately 3km from a main road, with poor quality infrastructure. It has high levels of poverty and informal employment.
- Matero East, which is a high-density, working-class neighbourhood located 4km north of the CBD. While it has sub-standard road networks and poor drainage system, it is also relatively well connected given its proximity to the main T2 trunk road. In recent years, the area has benefited from road, drainage and other infrastructure improvements.
- Kamwala South, a mixed area with a combination of high income, low density planned areas and lower income, higher density communities. It is located 4km south of the CBD although has limited road infrastructure and experiences regular flooding.

Data was collected in accordance with the Research Design protocol, with the majority of surveys conducted 6 to 11th August in anticipation of risks related to the presidential election (held on 12th August) and possible changes to COVID-19 related restrictions. Enumerators inputted data to Epicollect 5 software, allowing GPS referencing of data sources. A total of 1,506 responses were received to the household survey.

Figure 1 Location of the three neighbourhoods in Lusaka (left) and Maputo (right)



Focus group discussion

A focus group discussion (FGD) was held in each city with a selection of participants. This sought to provide qualitative insights into some of the key findings of the study. The FGD was held on 10th August 2021 in Lusaka (considering the election-related time constraints) and 8th September 2021 in Maputo, enabling some preliminary analysis of results.

4. Literature Review / Theoretical Framework

Urban transport governance and the need for a strategic view

Several models outline the governance of urban transport in the sub-Saharan Africa context. Cirolia and Harber (2021), for example, consider three 'sites' or urban statecraft in terms of regulatory agencies (responsible for high level vehicle regulation), metropolitans authorities (with a role around BRT systems) and agencies involved in the regulation of 'traditional'

(typically paratransit based) public transport, which are often the paratransit associations themselves. While helpful in practical terms of urban public transport reform, it does not offer a holistic framework which considers the breadth of the urban transport sector (e.g. walking, motorcycles), nor the range of functions a city could aspirationally seek to oversee.

Kumar and Agarwal (2008) are helpful in this respect, considering urban transport governance from three levels. At the highest level is the strategic, where goals and objectives are set for urban mobility. Below this is the tactical level, where goals and objectives are translated into actions, either in terms of investment or decisions and oversight of service delivery. At the lowest level is the operational, which sees the ongoing delivery of transport services and infrastructure to users. Seen in the context of the paratransit-based public transport systems that characterises many sub-Saharan African cities, governance of public transport is focused on the minimum required to allow the operational level to function (e.g. basic licensing, vehicle licensing and safety regulation to allow minibuses to operate). In considering the infrastructure network, public intervention is limited to provision of road networks, again with a basic regulatory function (e.g. traffic signals, traffic management) to ensure that the infrastructure is available for operation.

In this context, while the private sector does provide services to passengers, the absence of tactical management or strategic leadership of urban mobility means that operator incentives are business-led and not necessarily shaped to respond to the needs of servicing passengers and the broader socioeconomic benefits (such as urban agglomeration) (Beherens et al. 2015). This leads to market failures including overprovision/under-provision of capacity (particularly at peak times), journeys which stop short of their route ends, focus on more profitable short journeys, erratic driving and problems with traffic management as vehicles do not adhere to designated stops. In such a framework there has typically been an extremely limited set of tools for tactical system management or role for strategic planning and leadership in the urban transport system. Tools such as the usage of household or city-wide transport demand data scarcely exists

Nevertheless there are numerous examples on the continent city authorities taking back some degree of system management as part of urban transport improvements. In Lagos, the State of Lagos, Nigeria established the Lagos Metropolitan Area Transport Authority as the basis for the deployment of a BRT system (Kaenzig et al. 2010), Johannesburg reformed the minibus (taxi) market through its Rea Vaya BRT (McCaul and Ntuli, 2011), and Maputo, Mozambique has established the Agencia Metropolitana de Transportes (Metropolitan Transport Agency, AMT) with a view to strengthening institutional governance of public transport (Machanguana, 2020). As in the Latin American examples from the early 2000s (notably Bogota's TransMilenio), these agencies have focused on achieving reforms at the tactical (system management) level, reforming paratransit to provide greater oversight of service operation. In doing so, these projects have typically been designed to consider passengers and the 'market' for their services, from the perspective of delivering a business case of improvements to functional aspects to passengers (e.g. journey times, costs, capacity) as well as financial viability and broader contribution to urban social and economic benefits.

Yet while the move from regulator of operations to system manager has undoubtedly enhanced the performance of public transport along certain corridors, it perhaps remains a relatively blunt tool in the broader context of how the urban transport system can serve the city at a strategic level. It is likely that such systems on their own may be insufficient to benefit the most vulnerable populations given that public transport in sub-Saharan Africa is rarely a

universally accessible good in the context of the known economic, social, gender and spatial barriers to transport access in the region. The rise of individual transport, both in the form of motorisation and motorcycle taxis (as an intermediate mode between public transport and individual mobility), also presents challenges in reforming urban transport without taking a strategic view.

Key strategic considerations in the context of sub-Saharan Africa

The literature considers a range of factors of strategic relevance when considering tactical and strategic transport planning approaches from the citizen level. These are organised below.

Understanding mobility patterns: How people access mobility services

While using traditional passenger data or traveller interviews is sufficient at an operator level, public transport is not a universal good in the context of sub-Saharan Africa context, meaning that the equity and usefulness of transport investments need to consider that vulnerable and economically disadvantaged communities don't all travel as often, as far, or using motorised modes based on different spatial, socioeconomic variables. For example, in the Zambian context it is reported that for low-income youth, most daily mobility takes place within the vicinity of their neighbourhood and most trips are made on foot (Gough, 2008), and would not therefore benefit from radial public transport improvements. In a global assessment of BRT impacts (the model through which reform is often delivered), Venter et al. (2018) find that benefits are often skewed towards medium-income users and thus less progressive than they might be due to insufficient spatial coverage, and inappropriate fare policies.

Key decision-making factors in journey decisions

Typically, decision making in developed countries is driven principally by Generalised Cost (time, economic cost) (Wardmand and Toner, 2020), alongside adjustments for other affective (perceptions of modernity) and functional factors (e.g. journey comfort, availability of other amenities). Considering the vastly different cultural and economic context in African cities, understanding the local drivers of these decisions will be important in prioritising strategic planning and understanding the feasibility of tactical transport decisions in a particular cultural context.

Experiences and conceptions of the last mile in Sub-Saharan Africa

Within the decision-making factors, the last mile is often the 'forgotten section' in developing countries. As outlined in Venter (2020), who writes "while individual modes used during the first/last mile (1LM) trip, such as walking and feeder buses, have been widely studied, the multimodal and diverse nature of the 1LM environment is rarely dealt with". This paper will seek to contribute to that knowledge gap in the two cities, while contesting that the 'last mile' for public transport users is also likely to be the principal transport mode for others (who do not use public transport).

Understanding improvement priorities by people at neighbourhood level

While consultation is considered best practice in strategic and tactical level transport planning (Lindenau and Böhler-Baedeker, 2014), this is particularly the case in sub-Saharan Africa considering the complexity of decision making factors described above. If inappropriately designed, transport strategies and programmes result in networks and services that worsen the condition of the poor, harm the environment, ignore the changing needs of users, and exceed the capacity of public finances to maintain them. For example, in many of the main

cities in Zambia, and especially in Lusaka, pedestrians are relegated to the margin of the roads in inadequate and uneven, small dangerous spaces (Pedestrians First Zambia, s.d.) despite that, walking is the dominant mode of movement for home-based trips, accounting for 65% of the total daily urban movement, when public transport accounts for 23% and private transport 10% (JICA 2009). It is likely, therefore, that the population in general may give greater priority to last mile (pedestrian) mobility compared to exclusively public transport users.

The role of motorcycles in relation to public transport

The rise of motorcycles and motorcycle taxis as an 'intermediate' mode of urban transport presents challenges to urban transport systems. On a tactical level, they compete with bus-based modes in some market segments (Mutiso and Behrens, 2011), while also posing more strategic questions around the desired role of motorcycles in the urban transport system and management of the potential negative externalities that they bring in terms of pollution, road safety and contribution to congestion.

5. Results and discussion

This section shares some high-level findings from analysis of the household survey, organised in terms of the high-level

Understanding mobility patterns: How people access mobility services

Frequency and mode shares

In considering how people use mobility services, the residential origin-focused approach enables analysis by district as shown in Figure 2. At the highest level, the key metric considered is mode share for journey to work/education. In Lusaka, the study finds that public transport is the main mode in inner city areas (Matero East and Kamwala South), however people in peri-urban Chazanga use public transport far less (47.5% of journeys). Here there is a substantial proportion of long walks (classified as over 30 minutes), and 34% responding "other", understood principally to be those walking less than 30 minutes to access activities. The proportion making short walks for their journeys would imply the presence of education and economic activities in and around Chazanga. Household car ownership is also substantially lower in Chazanga (1%) compared to other surveyed neighbourhoods (9-10%).

Such large differentials were not found in the Maputo context (Figure 3), where public transport use mode share was similar in all three neighbourhoods. There was a difference in the number of people walking long distances, however, although this was related mostly to Intaka 1 (rather than lower density and poorly connected Intaka 2), a factor understood through the focus group discussions to relate to an increased propensity to walk to the main highway to take advantage of more direct buses.

In considering frequency of public transport use, there were limited conclusions that can be made from data in Maputo, where there were no defined patterns (Figure 4Figure 3). Here it proved much more useful to consider employment status as showing trends in the frequency of public transport use (Figure 5) where people in formal employment to be the most likely to use public transport every day, with informal ('other') workers and student also frequent public transport users. In Lusaka (Figure 6), location was however a relevant consideration in frequency of public transport use, with those in poorer and more peripheral Chazanga much less likely to use public transport regularly (44% daily or least three times per week compared to 75% in Matero East).

Figure 2 Transport mode to work or study by area (Lusaka)

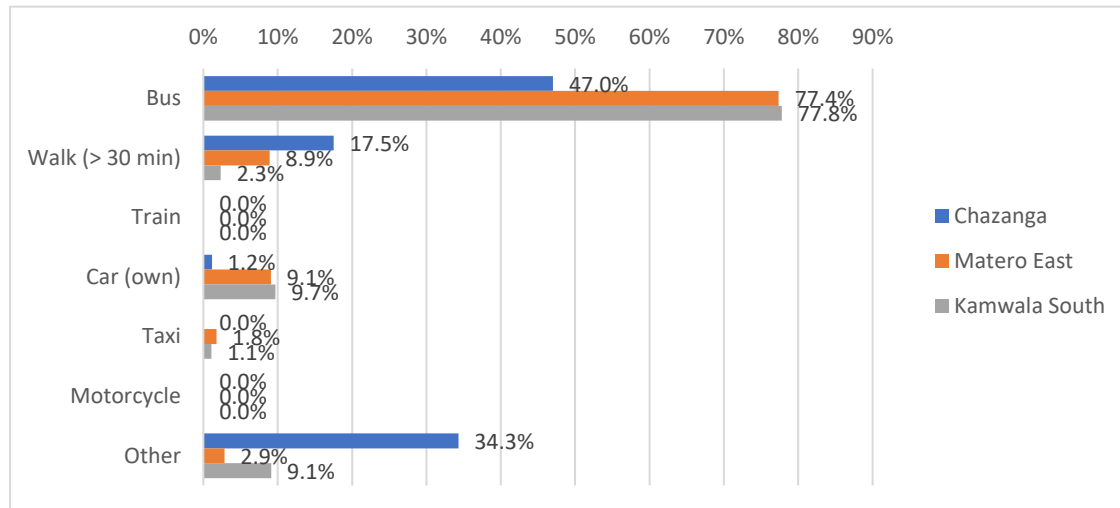


Figure 3 Transport mode to work or study by area (Maputo)

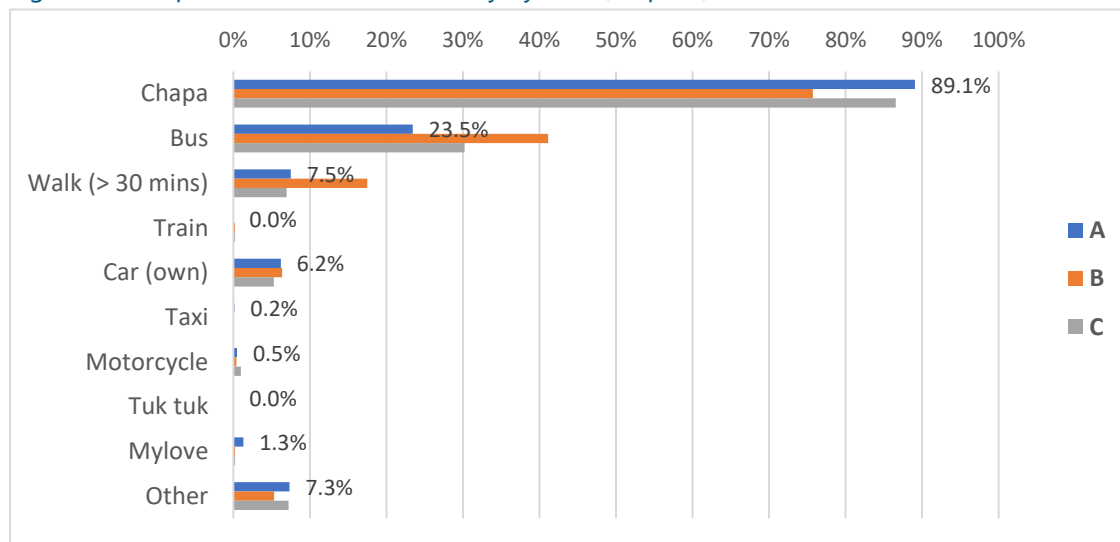


Figure 4 Frequency of PT use by residential location in Maputo

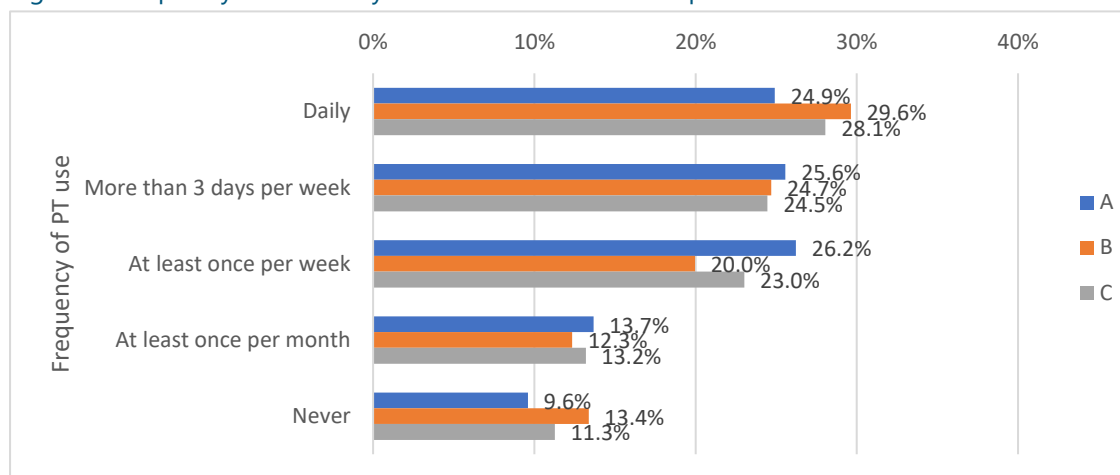


Figure 5 Breakdown of frequency of PT use by employment status in Maputo

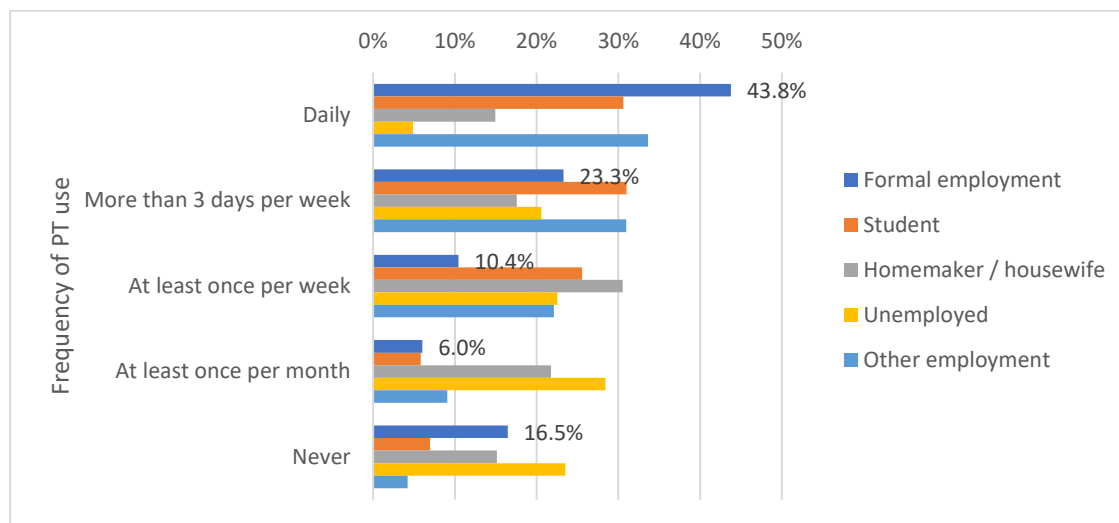
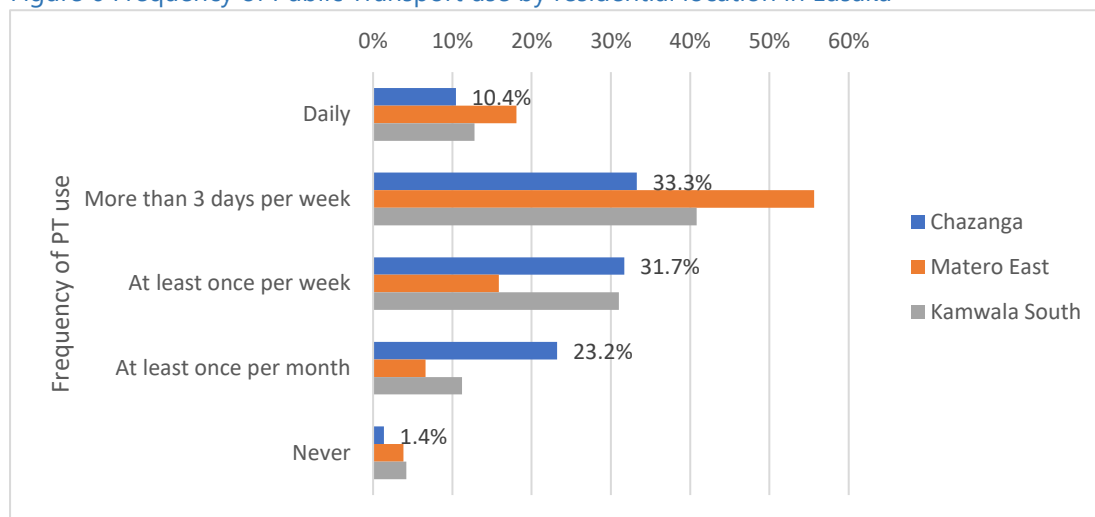


Figure 6 Frequency of Public Transport use by residential location in Lusaka



Reasons for long walks

With walking being the second major transport mode as shown in Figure 2 and Figure 3. This paper seeks to understand the reason for long walks (over 30 minutes), recognising that this may reflect economic wellbeing and social exclusion, particularly for women and people with disabilities. Considering the high share of walking journeys, particularly in Chazanga (Lusaka) and Intaka 1 (Maputo), disaggregation of reasons for walking (public transport coverage, cost or an affective preference for walking) would appear relevant. In the context of Lusaka (Figure 7) most cases of long walks are for coverage and/or cost reasons, however there is a marked difference across areas, with those in Chazanga far less likely to be ‘choice’ walkers. In Maputo (Figure 8), cost is less likely to be the driver of long walks, although is still a substantial factor (particularly in poor areas). An absence of coverage and ‘other’ (understood to principally be supply capacity constraints on public transport) are most heavily cited.

Figure 7 Reasons for walking more than 30 minutes in Lusaka neighbourhoods

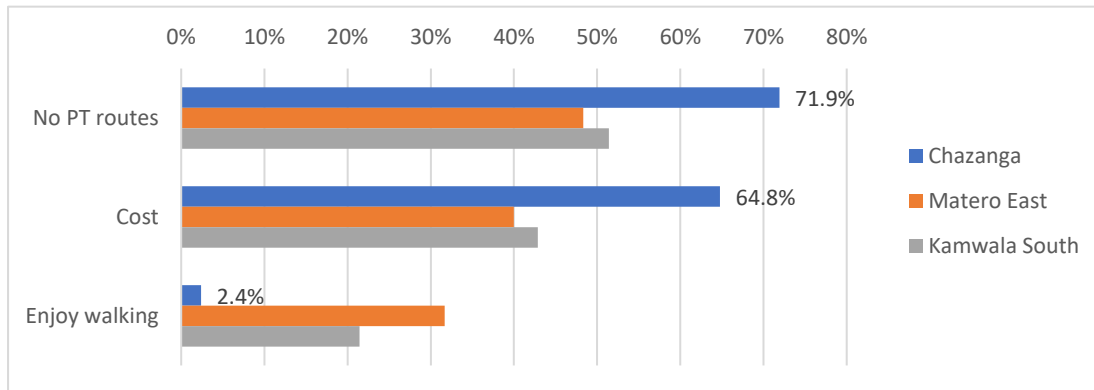
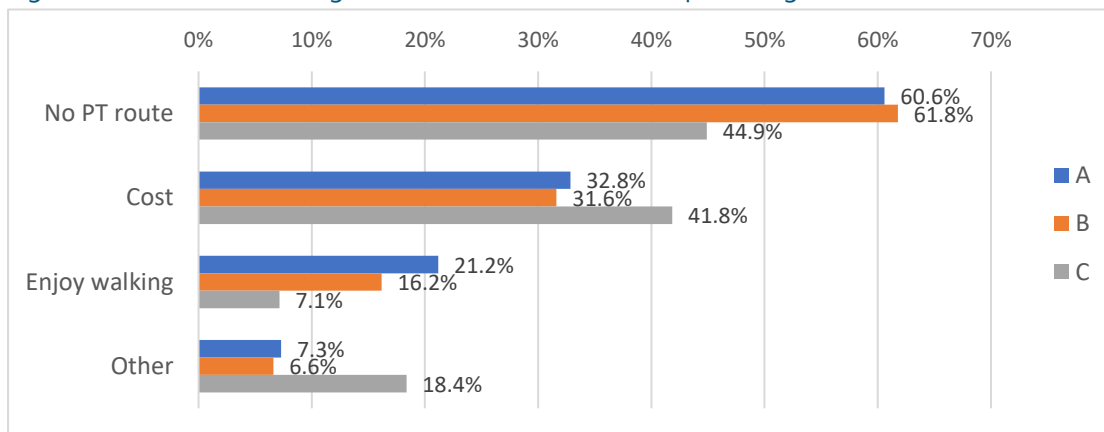


Figure 8 Reasons for walking more than 30 minutes in Maputo neighbourhoods



Key decision-making factors in journey decisions

In considering decision making factors, the study made an analysis of the first, second and third cited decision-making factors. This found that, in the Lusaka context (Figure 9), the principal consideration was the shortest walk to the PT stop (46% of first preferences, and 85% selecting in top 3), ahead of both overall journey time (18%/63%) and cost (17%/59%), suggesting a high preference for convenience and aversion to long walks where possible. While Maputo (Figure 10) followed a similar pattern, there was more balanced range across the factors, with cost being a strong driver and a very strong preference for direct routes.

Figure 9 Top three factors in deciding which public transport trip to take (Lusaka)

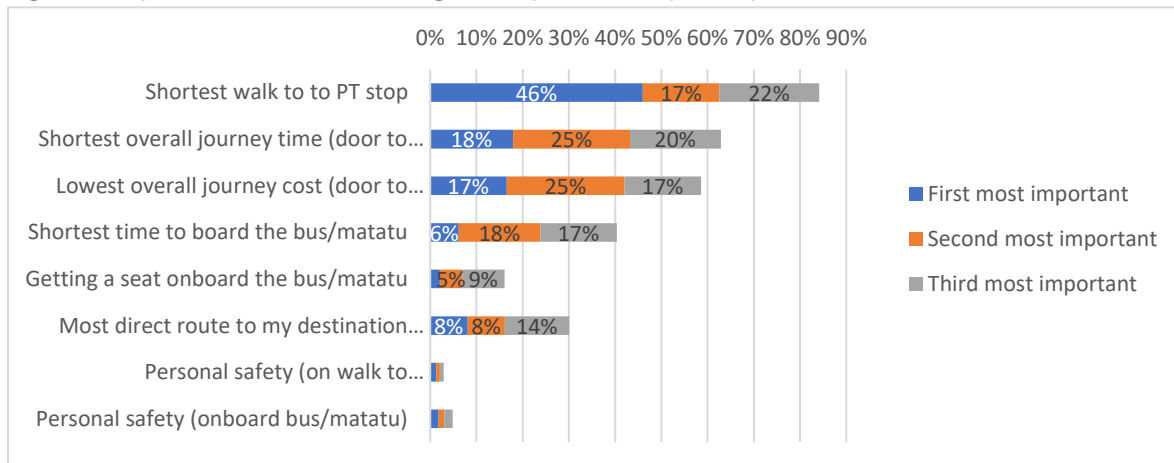
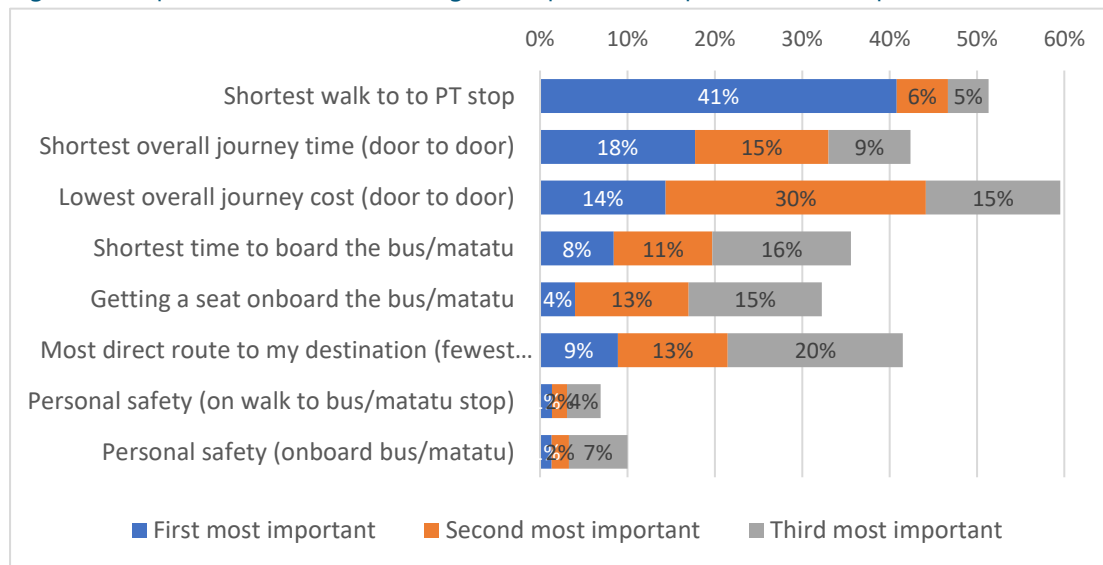


Figure 10 Top three factors in deciding which public transport to take (Maputo)



Further analysis of people’s perceptions of interchange was conducted in the Maputo context to better understand the preference for direct services, finding that high time penalties to interchange an issue (56% of interchanges taking 15 minutes or longer, including 28% of which over 30 minutes). In a fixed fare system, approximately 75% of respondents considered that interchange (requiring an additional journey segment) also made journeys too expensive. It can therefore be seen that decision making factors in public transport are complex in poorly functioning (in this case supply constrained) systems.

Perceptions of journeys at first and last mile

Last mile journeys were made by walking in 95% of cases in Maputo and 98% in Lusaka (with the remainder made up by car journeys and, in Maputo, ‘other’ (understood to be in the back of pick-ups and trucks, known as ‘myloves’). People’s walking experience, which was found to vary extensively between cities and neighbourhoods.

Regarding safety from crime and harassment (Figure 11), residents in Lusaka felt safer than those in Maputo, with 25% considering the walk to feel slightly or very unsafe compared to 44% who felt the same way in Maputo. As shown in Figure 12, however, this masks great differences between safer, more wealthy Kamwala South and peripheral areas like Chazanga. Similar differentials were found in the case of Maputo, although in this case physical security issues were perceived to be worse in inner city areas. Reflecting on the experience of women participating in the focus group in Maputo, it was found that the safety and harassment is linked to the quality of the public transport offer, with many feeling unsafe travelling very early in the morning, which is necessary in order to get a space on the bus/chapa in the context of extreme capacity constraints.

Figure 11 Perceptions of safety from crime and harassment on the journey to the stop

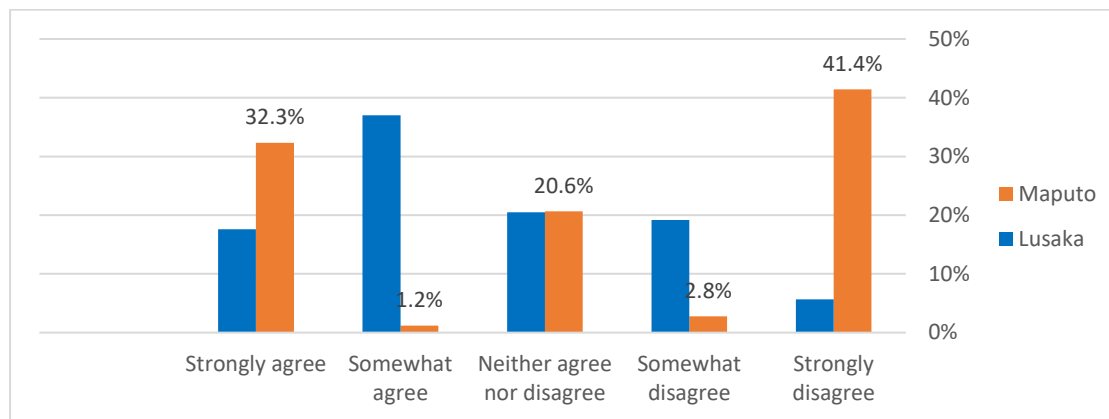
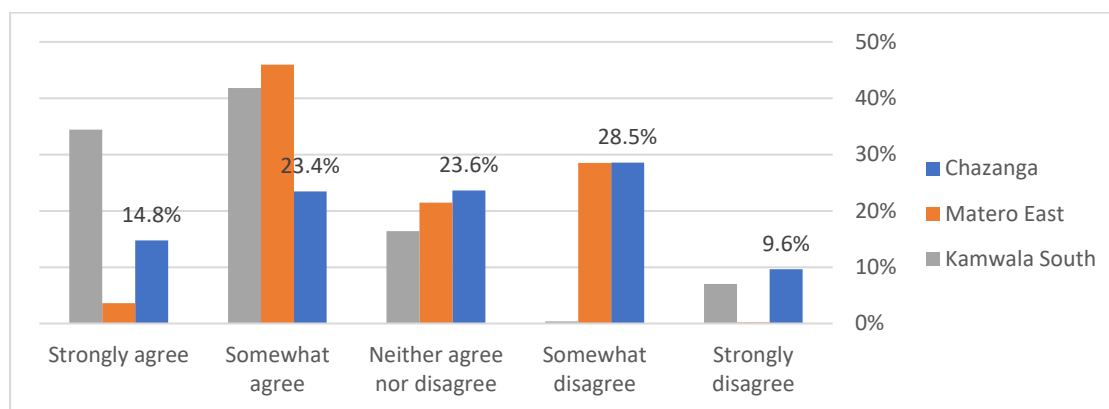
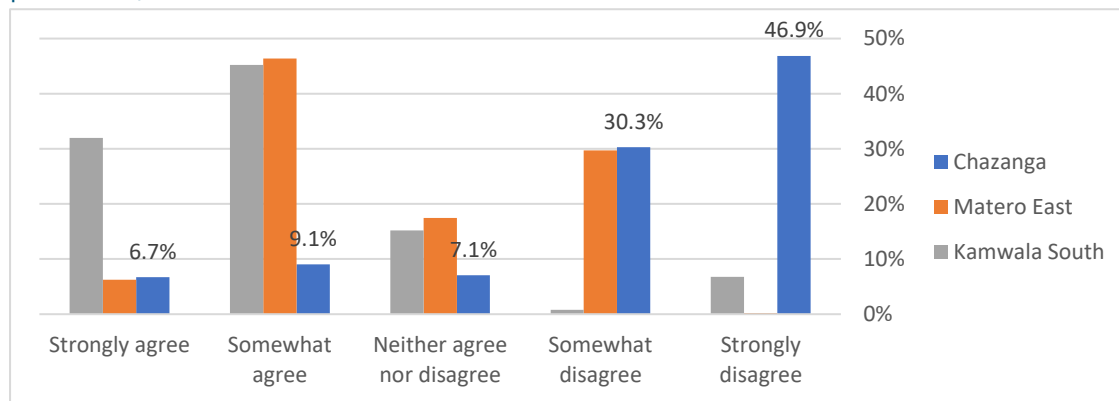


Figure 12 Perception of safety from crime and harassment on the journey to the stop in Lusaka



Road safety was also considered an issue in some contexts, as shown in Figure 13. Of particular note was that 47% of residents in Chazanga, Lusaka reported not having sufficient space to walk and feeling unsafe from road traffic, particularly significant given the high rate of walking (and low rates of public transport use) by residents in the area (and the long distances which many people travel from outer areas to the city centre). In Maputo, Intaka 1 was perceived to have worse road safety and pedestrian space availability, found during the focus group to relate to challenges in accessing public transport stops across a major new highway (Estrada Circular). It was also noteworthy that respondents generally perceived themselves to have sufficient space to walk and to be safe from road traffic despite a near absence of dedicated sidewalks in most areas. While this may be reflective of a culture of harmonious driver-pedestrian sharing of street space, it may also be due to respondents not having an expectation of segregated pedestrian space in their neighbourhoods in the context of their lived experience.

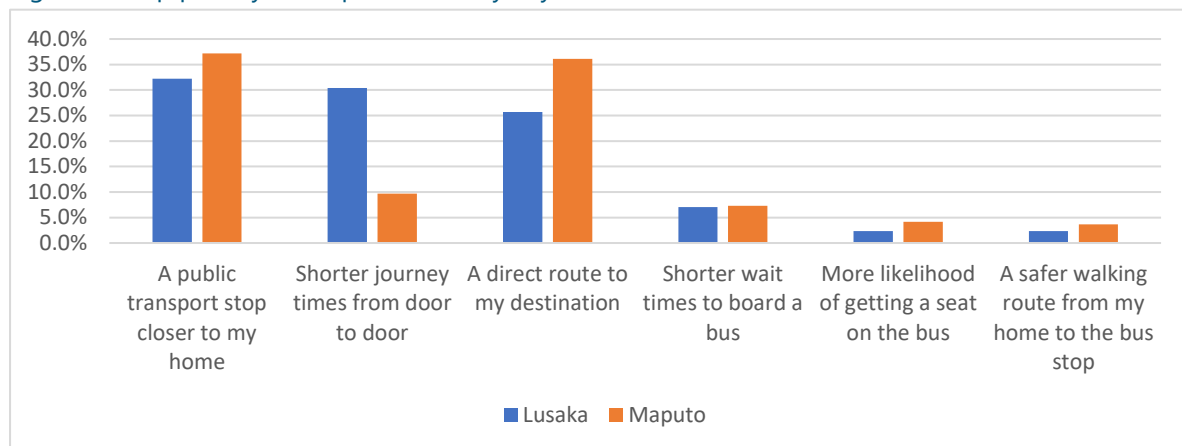
Figure 13 The extent to which respondents felt there was enough space for me to walk (e.g. pavements) in Lusaka



Improvement priorities by people at neighbourhood level

Reviewing peoples' priorities for public transport improvement, coverage (i.e. a public transport stop closer to home) was the top selected priority (as shown in Figure 14) in both cities. Shorter journey times were also important in Lusaka (despite Lusaka having much shorter average journey times than Maputo), while residents of Maputo put strong weight on having a direct route to their destination, perhaps considering the extreme overcrowding which creates a large time penalty to changing vehicles, alongside the cost implication.

Figure 14 Top priority for improvement by city

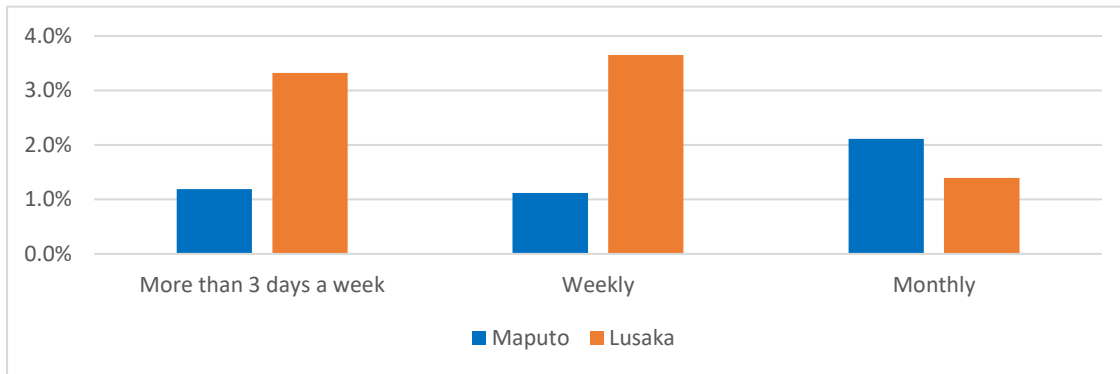


Considering a greater degree of nuance by preference (first, second and third) and across the different geographical areas produced some noteworthy results. In Maputo, the most selected priority (in the top three) in all three areas was a direct route to destination, with shorter wait times being second in both Ndvela and Intaka 2. Respondents in Intaka 2 put the greatest focus on the desire for a direct service (82% selected overall, 43% as top priority), perhaps in order to address the time and cost implications of the current transport arrangement.

The role of motorcycles as a form of public transport

Motorcycle use is still a minority activity in both Maputo and Lusaka (as shown in Figure 2), with 4% of Maputo residents and 8% of Lusaka residents reporting using a motorcycle at least once per month. Interestingly, there was parity across the genders in terms of motorcycle use in Lusaka, while in Maputo it was predominantly a mode used by men (8% compared to 2% for women). Yet while both are relatively low levels, this does imply a significant penetration of motorcycling (particularly in Lusaka), likely to be comparable to private cars.

Figure 15 Rates of motorcycle use by city



Examining perceptions around motorcycles as a transport mode, cost did not appear to be a universal barrier to motorcycle uptake, with only 40% (Maputo) and 36% (Lusaka) actively considering it unaffordable (although in Lusaka only 22% considered it affordable). Safety is perhaps the biggest perceived issue facing motorcycles in the two cities, with only 11% and 18% of residents (in Maputo and Lusaka respectively) considering it a safe transport mode (see Figure 11). It is noteworthy that safety is perceived markedly worse in Maputo, where an associated study of motorcycle riders found much lower levels of helmet use and licence-holding, and much higher likelihood of drivers having previously been involved in a serious crash. Motorcycle use rates are higher in Lusaka (relative to Maputo), where public transport fares are significantly higher.

6. Conclusions

The study validates the conventional assumptions that public transport is the major mode for accessing employment and education in Maputo and Lusaka, two sub-Saharan African cities. However, it does also suggest that this is not universally the case in peripheral areas (e.g. Chazanga in Lusaka). It highlights – both explicitly and implicitly – that access to public transport is not a universally accessible good (particularly in Lusaka). This study also adds visibility to those people, predominantly in peripheral areas, who walk to access employment and education and whose needs (safety, security and quality of pedestrian environment) are not captured by public transport reform.

The study demonstrates two very different urban models, with Maputo having much more long-distance radial journey flows for employment in the centre. This results in long journeys for those living in peripheral areas of the city, but conversely is likely to reduce social and economic segregation compared to Lusaka where work and study are more localised, even though public transport journey times appear to be more reasonable (75% of door-to-door journeys being less than 1 hour long). By contrast, fares in Maputo are far lower at \$0.16-0.23 per journey compared to \$0.58-0.87 in Lusaka.

Yet Maputo, with its centralised urban economy and low transport fares, also shows that mobility does not automatically translate into economic efficiency or quality of life. Passengers are subject to very long journey times, exacerbated by poor coverage and a vastly inadequate public transport supply which creates long waits to board a vehicle and time penalties to interchange. This has secondary consequences, with people more exposed to risks to their personal safety and security navigating unlit roads in the early morning and late evening.

Relevance to policymakers

The high-level findings of this study offer insights for policymakers both in the planning of tactical interventions and in more strategic planning of urban mobility. In both cities, a system management approach provides opportunity to consider how urban transport services can be made more accessible for poorer peripheral areas (e.g. through a flat fare structure and other implicit fare market segmentation) and how to redesign the system so as to reduce interchange or improve the interchange experience (particularly in terms of cost, but also time and comfort). The study also informs system managers of the social consequences of issues such as supply constraints (e.g. on citizen security) and need to consider the pedestrian environment significantly beyond the immediate transport stop, station or corridor (and the value of this for the broader community as well as transport service users).

Considering a more ambitious strategic level of transport planning, this study offers cross learning between the cities. Neither the highly centralised urban economy of Maputo nor the subsistence-based economy of those unable to afford mobility in Lusaka are desirable, and the answer to these challenges lie in strategic actions at metropolitan governance level in the transport and land use field. As cities growth and congestion pressures increase, strategic level action will become increasingly necessary to prioritise mass transit (e.g. bus lanes) to prevent worsening spatial inequalities in peripheral areas.

This task is likely to be made more challenging for urban policymakers considering a potential mass proliferation of motorcycles within the urban transport mix. Experience from other cities finds that these can bring positive economic benefits alongside challenges in road safety, congestion and competition with mass public transit. With the data suggestive of a nascent motorcycle taxi market in Lusaka, alongside a large-scale increase in motorcycle imports to Mozambique, both cities would be wise to consider strategically and tactically how to manage this phenomenon, noting that efforts to increase actual and perceived motorcycle safety may go concurrently with increased motorcycle uptake. The response of both cities should also consider how public transport reforms can provide a functionally and financially competitive alternative to motorcycle use.

Learning for future study

While only focusing on high level analysis, this study has been valuable in exploring the household level transport experience and what this can offer policymakers in the design of tactical actions and strategic policymaking. Based off a household survey with large sample size it has benefited from offering statistically significant insights across a variety of contexts. Yet it is clear that the challenges of these paratransit based public transport systems result in complex dynamics which make it difficult to distil the true determinants of behaviours and preferences (e.g. reasons for prioritising direct services due to cost or capacity constraints). Future implementation of such studies should incorporate a greater number of in depth focus groups to fully understand these issues.

While the study offers worthwhile insights to strategic planning activities, replicating this study to be representative of a large metropolitan area would require significant resources. City authorities in sub-Saharan Africa will need the support of both Government and or developmental partners to implement study findings. Future citizen-focused strategic planning research should therefore be conducted within the context of a supportive policy framework and with availability of economic and human resources for plan implementation.

Bibliography

- Bruun, E., Del Mistro, R., Venter, Y., & Mfinanga, D. (2015). The state of public transport systems in three Sub-Saharan African cities. In *Paratransit in African Cities* (pp. 42-74). Routledge.
- Behrens, R., McCormick, D., & Mfinanga, D. (2015). An introduction to paratransit in Sub-Saharan African cities. In *Paratransit in African Cities* (pp. 17-41). Routledge.
- Cheeseman, N., & de Gramont, D. (2017). Managing a mega-city: learning the lessons from Lagos. *Oxford Review of Economic Policy*, 33(3), 457-477.
- Cirolia, L. R., & Harber, J. (2021). Urban statecraft: The governance of transport infrastructures in African cities. *Urban Studies*, 00420980211028106.
- Ehebrecht, D., Heinrichs, D., & Lenz, B. (2018). Motorcycle-taxis in sub-Saharan Africa: Current knowledge, implications for the debate on “informal” transport and research needs. *Journal of transport geography*, 69, 242-256.
- Gough, K. V. (2008). 'Moving around': the social and spatial mobility of youth in Lusaka. *Geografiska Annaler: Series B, Human Geography*, 90(3), 243-255.
- Japan International Cooperation Agency. (2009). The Study on Comprehensive Urban Development Plan Urban (Final Report Volume II).
- Jones, P. M. (2016, June). Transport planning: turning the process on its head. From 'predict and provide' to 'vision and validate'. Radical Transport Conference.
- Jennings, G. (2017). Share the Road Global outlook on walking and cycling, October 2016.
- Jennings, G., & Behrens, R. (2017). The case for investing in paratransit: Strategies for regulation and reform.
- Kaenzig, R., Mobereola, D., & Brader, C. (2010). Africa's First Bus Rapid Transit System. *Transportation research record*, 2193(1), 1-8.
- Kumar, A., & Barrett, F. (2008). Stuck in traffic: Urban transport in Africa. *AICD Background paper*, 1.
- Lindenau, M., & Böhler-Baedeker, S. (2014). Citizen and stakeholder involvement: a precondition for sustainable urban mobility. *Transportation Research Procedia*, 4, 347-360.
- Machanguana, C. A. (2020). *A Governança dos Transportes Públicos Urbanos em Moçambique: Estudo de Caso da Empresa Municipal de Transportes Rodoviários de Maputo, Emtpm, EP, na Área Metropolitana de Maputo* (Doctoral dissertation, Universidade de Lisboa (Portugal)).
- McCaul, C., & Ntuli, S. (2011). Negotiating the deal to enable the first Rea Vaya bus operating company: Agreements, experiences and lessons. *SATC 2011*.
- Mutiso, W., & Behrens, R. (2011). 'Boda Boda' bicycle taxis and their role in urban transport systems: case studies of Kisumu and Nakura, Kenya. *SATC 2011*.
- Pedestrians First Zambia, United National Development Programme <https://www.undp.org/zambia/projects/pedestrians-first-zambia> [accessed 29/06/2022]
- Venter, C. J. (2020). Measuring the quality of the first/last mile connection to public transport. *Research in Transportation Economics*, 83, 100949.

Venter, C., Jennings, G., Hidalgo, D., & Valderrama Pineda, A. F. (2018). The equity impacts of bus rapid transit: A review of the evidence and implications for sustainable transport. *International Journal of Sustainable Transportation*, 12(2), 140-152.

Wardman, M., & Toner, J. (2020). Is generalised cost justified in travel demand analysis?. *Transportation*, 47(1), 75-108.