

Determinant Urban Mobility Needs of Components of the Vulnerable Population in Nigerian Cities**By****¹Ogwo Nwokeka Eme, ¹Ejem A. Ejem, ¹Christopher C. Ikeogu, ¹Callistus C. Ibe, ²Nwokedi Theophilus C.****¹Department of Logistics and Transport Technology, Federal University of Technology, Oweri****²Department of Maritime Science and Technology, Federal University of Technology, Oweri****Abstract**

Urban mobility plays a critical role in fostering inclusivity, social participation, and sustainable urban development. However, the exclusion of vulnerable populations—such as the elderly, the physically and cognitively disabled, visually impaired persons, school children, and low-income unemployed groups—from transport planning in Nigeria has led to significant immobility, marginalization, and economic deprivation. This study examined the determinant mobility needs of the vulnerable population in Nigeria’s frontline cities (Lagos and Abuja) with the aim of identifying key factors that can inform inclusive transport policy and planning. Primary data were collected from 364 respondents across different components of the vulnerable population using a structured questionnaire. The data were analyzed using Principal Component Analysis (PCA) to identify the major determinants of urban mobility needs. Findings reveal that access to safety infrastructure, affordability, location proximity, reduced travel time, comfort, safety and security, ease of access, and availability of public transport services are critical factors influencing mobility among vulnerable groups. Variations were observed among groups—for instance, the physically disabled prioritized accessibility and modal alternatives, while the elderly emphasized affordability and safety. It recommends that Nigerian transport policymakers adopt inclusive urban mobility frameworks that integrate universal design principles, enhance infrastructure accessibility, and implement equity-oriented transport subsidies. These measures would promote social inclusion, reduce poverty, and foster sustainable urban transport development in Nigeria.

Keywords: urban mobility, vulnerable population, inclusive transport, mobility needs, Nigeria

1.0 Introduction

Urban mobility is central to social inclusion, economic participation, and sustainable development. However, the mobility needs of vulnerable populations—such as the poor, elderly, children, and people with disabilities—are often excluded from prevailing transport policies, infrastructure development, and operational systems (Lambros, Karolemeas, Tsigdinos, Vassi, & Bakogiannis, 2023). This exclusion results in immobility challenges that not only restrict individual access to transport but also generate multiplier negative effects on society at large.

One of the most critical implications of immobility is the restriction of vulnerable groups from participating fully in economic activities. Transportation has long been recognized as a forerunner of economic participation and development, and where access is limited, economic opportunities are correspondingly reduced (Scheiner et al., 2012; Gaunt, 2013). In the Nigerian context, barriers to mobility hinder vulnerable groups from accessing entrepreneurship and enterprise programs, education, employment, agricultural initiatives, and other socio-economic opportunities. The result is a cycle of poverty, marginalization, and long-term economic deprivation (Mercado et al., 2007; Hammond & Musselwhite, 2013). For instance, an unemployed youth who cannot afford transport fares to attend interviews or reach industrial zones is likely to remain excluded from the job market, thereby perpetuating poverty.

The consequences of immobility extend beyond individual deprivation to broader societal impacts. The loss of productivity and economic output due to the exclusion of able but immobile populations diminishes overall national growth. Idle time among working-age individuals who cannot access transport translates into output losses that negatively affect Gross Domestic Product (GDP) at both state and national levels. This underscores the need for inclusivity in the design and operation of urban transport systems to ensure equitable access across all social groups (Solanke, 2013; Adeyinka, 2013; Loukaitou, 2013; Nwokedi et al, 2022).

Inclusive mobility is therefore critical in reversing the marginalization of vulnerable populations. Developing such systems requires empirical evidence on the extent of access to transport among different vulnerable groups, the barriers they face, and the socio-economic costs of their immobility. Studies have emphasized the need to quantify the losses and opportunity costs of immobility, as well as to identify which groups—whether the disabled, elderly, children, or low-income populations—face the greatest barriers in accessing urban transport (Badiora & Odufuwa, 2019; Nwokedi et al 2020). Unfortunately, existing transport planning and policy frameworks in Nigeria have yet to provide adequate data or design systems that address these challenges.

This study is conceived to fill this gap by investigating the determinant mobility needs of vulnerable populations in Nigerian cities. It seeks to generate the empirical knowledge necessary to inform policy design, guide urban and regional planning authorities, and support both public and private transport operators. By identifying the specific mobility needs of groups such as the physically challenged, visually and hearing impaired, cognitively disabled, elderly, children of school age, and low-income unemployed populations, the study will provide justification for developing inclusive transport systems.

Ultimately, ensuring that vulnerable groups can access and use urban transport equitably will reduce economic deprivation, break cycles of poverty, and enhance national productivity. It will foster a healthier, wealthier, and more mobile urban population while contributing to GDP growth and sustainable economic development in Nigeria. In line with this, the primary objective of the study is to identify the determinant mobility needs of components of the vulnerable population in Nigerian cities.

2.0 Literature Review

2.1 Inclusive Mobility Concept and Urban Public Transport Needs of the Vulnerable Population

The concept of inclusive mobility has emerged as a core principle in sustainable urban transportation planning, emphasizing equal access to mobility for all segments of society. According to the UK Department of Transport (UK DOT, 2021), inclusive mobility refers to the design and implementation of transport systems that guarantee accessibility to passengers and pedestrians across diverse social groups, including children, senior citizens, women, people living with disabilities, the unemployed, the poor, and ethnic minorities. The UK DOT (2021) emphasizes

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that inclusive transport frameworks must integrate barrier-free pedestrian environments and accessible public transport services that provide both physical and informational access. This requires regular policy review and infrastructural adaptation to ensure inclusivity for evolving urban demographics.

The inclusive mobility agenda extends beyond physical accessibility; it addresses systemic challenges that render certain groups more vulnerable in urban transport environments. Such groups are often disadvantaged by health, socio-economic, or cultural conditions, which reduce their competitive advantage in accessing public transport, thereby excluding them from economic and social participation (UK DOT, 2021). Vulnerable travelers, such as people with age-related impairments, those with hearing or vision impairments, and individuals experiencing race- or gender-based discrimination, frequently encounter barriers such as uneven sidewalks, absence of ramps, or lack of clear information systems. These barriers amplify existing inequalities, discouraging affected populations from participating in urban mobility (UK DOT, 2021).

Inclusive mobility also aligns with the United Nations Sustainable Development Goal (SDG 11), which mandates safe, affordable, and accessible transport systems for all, especially those in vulnerable situations. The three foundational pillars of inclusive mobility—safety, affordability, and accessibility—serve as benchmarks for evaluating transport inclusivity (United Nations, 2019). Supporting attributes such as comfort, convenience, and timeliness complement these pillars in improving service quality. However, despite these global directives, inclusive mobility is underdeveloped in many African cities, including Nigeria, where policy implementation remains inconsistent.

The mobility needs of vulnerable groups differ according to the nature of their disadvantage. Ojekere et al. (2024) argue that while unemployed individuals primarily face fare affordability challenges, the physically challenged encounter comfort-related barriers, and visually impaired persons prioritize safety and navigation needs. Miller et al. (2018) and Ojekere et al. (2024) further highlight that affordability, safety, comfort, and the availability of supporting infrastructure (e.g., zebra crossings, pedestrian bridges) constitute the most critical needs across vulnerability types.

Quantitative evidence suggests that for the physically challenged, affordability and safety rank highest (70%), followed by safe-crossing infrastructure (60%) and comfort (40%). These needs reflect the intersection of economic, physical, and social vulnerabilities, requiring nuanced interventions. The United Nations Development Programme (UNDP, 2019) provides additional indicators of inclusive mobility, including affordability, journey time, comfort, modal alternatives, congestion factors, and transport security.

Empirical evidence from Nigeria underscores these findings. Ababio, Adams, and Anum (2022), in a study on Abuja, observed significant gender disparities in mobility access, with women facing more challenges in affordability, comfort, and safety. Men were generally more satisfied with transport services, underscoring the intersection of gender and mobility vulnerability. Similarly, Bokolo (2023) highlights the unmet mobility needs of senior citizens, noting inadequate infrastructure for elderly commuters and advocating for technology-driven solutions such as AI-based systems to enhance safety and inclusivity.

2.2 Public Transportation Options for the Vulnerable Population in Nigerian Cities

The definition of vulnerable populations in the context of mobility is multidimensional, encompassing economic, health, and social domains. According to AJMC (2006), vulnerable populations include the economically disadvantaged, racial minorities, low-income groups, the unemployed, children, the elderly, the homeless, people with HIV/AIDS, and individuals with chronic health conditions or severe mental illness. Such groups experience exclusion and reduced quality of life due to their limited access to essential services, including transportation. Burton et al. (2004) reinforce that vulnerable populations face barriers not only in healthcare or financial services but also in mobility, where inadequate transport access exacerbates poverty and inequality. Disability is widely

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considered a core component of vulnerability. LINKS (2021) redefines disability from a purely medical condition to a socially constructed disadvantage shaped by environmental, institutional, and attitudinal barriers. This perspective emphasizes that impairments become vulnerabilities when urban systems fail to accommodate them.

In Nigerian cities, vulnerable groups can be broadly categorized into:

- Economic domain: unemployed, low-income earners, uninsured individuals.
- Health domain: people with chronic diseases, physical or mental disabilities, or age-related impairments (Noland et al., 2016).
- Social domain: migrants, refugees, and socially excluded groups.

These classifications highlight the need for urban transport systems to incorporate tailored interventions that address the heterogeneous needs of vulnerable groups.

Nigeria's urban transport systems provide a range of options, including public buses, shared taxis, ride-hailing services, motorcycles, bicycles, and pedestrian pathways. Lagos, the country's commercial hub, has made limited advances in metro rail and Bus Rapid Transit (BRT) systems, though such modes remain largely unavailable in other cities (Mackett, 2021; Hwang, Reuscher & Wilson, 2016). While these services technically exist for the general population, vulnerable groups often struggle to access them due to affordability, infrastructural barriers, and competition with more advantaged commuters. For instance, the disabled and elderly are frequently crowded out of public buses or face difficulty navigating poorly designed stations and walkways (Mackett, 2017).

Globally recognized mobility support services such as travel training programs, volunteer transport schemes, or transport voucher systems remain absent in Nigerian cities. This contrasts sharply with practices in developed contexts where such schemes are integrated into social welfare programs. The absence of these services worsens the disadvantage of vulnerable groups, especially the disabled and unemployed, whose access to transport is not prioritized in practice despite existing policy frameworks.

Several policy documents highlight Nigeria's recognition of inclusive mobility needs, including the National Disability Act (2018), Lagos State Transport Sector Reform Law (2018), and the Nigerian National Transport Policy (2019). These policies stress the need for affordability, safety, and accessibility in public transport for vulnerable groups. However, the lack of enforcement and operationalization of these policies has led to persistent gaps in service delivery, resulting in a mobility crisis for vulnerable populations.

2.3 Access to Public Transport Services

Accessibility, a central concept in transport planning, is defined as the ease with which individuals can reach spatially distributed opportunities (Conway et al., 2018). It is both a measure of mobility potential and a determinant of social equity. Accessibility challenges often manifest in increased travel time, traffic congestion, high fare structures, or inadequate service coverage (Blanchard & Waddell, 2017). These challenges disproportionately affect vulnerable populations, particularly in Nigerian cities, where transport-land use dynamics are poorly coordinated. Accessibility measures are classified into infrastructure-based, person-based, utility-based, and place-based categories (Conway & Stewart, 2019). In practice, place-based measures dominate regional planning (Boisjoly & El-Geneidy, 2017). However, accessibility in Nigerian cities remains weak due to infrastructural deficiencies, poor enforcement of inclusive policies, and limited modal alternatives.

2.4 Synthesis of Literature and Research Gaps

The reviewed literature demonstrates consensus on three critical dimensions of inclusive urban mobility: safety, affordability, and accessibility (UK DOT, 2021; UNDP, 2019). However, studies also reveal that vulnerability in mobility is multidimensional, shaped by socio-economic, health, and cultural contexts (AJMC, 2006; Burton et al.,

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2004; LINKS, 2021). Nigerian cities exhibit systemic gaps in addressing these needs, with transport policies largely aspirational and weak in implementation (Mackett, 2017).

While global perspectives provide extensive frameworks for inclusive mobility, there is a paucity of localized studies examining how these principles translate into practice in Nigerian urban centers. Specifically, limited empirical research has investigated the differentiated mobility needs of vulnerable subgroups—such as women, the elderly and disabled populations—across diverse Nigerian cities. Furthermore, interventions like transport vouchers, travel training, or specialized service schemes that are prevalent in developed contexts remain unexplored in Nigeria.

This study seeks to address these gaps by examining the determinants of mobility needs of vulnerable populations in Nigerian cities, with a focus on identifying barriers, evaluating policy implementation, and exploring context-specific solutions.

3.0 Methodology

The study focused on the two most frontline cities in Nigeria constituting of the Federal Capital territory (FCT) Abuja located on latitude 9.0653 degrees north and longitude 7.4983 degrees east with a population of about 4026000 inhabitants and Lagos on latitude 6.52 and longitude 3.379 with population of about 15946000 inhabitants based on the 2006 census. Therefore, the study area of the research is the Nigeria frontline states of Lagos and Abuja.

The study used a survey research design method. The survey research design method involved the use of primary data obtained from the use of questionnaire as survey instrument to collected data from the sampled population of vulnerable and disabled components of the urban population residing in each of Lagos and Abuja on their preferred urban mobility needs. Primary data on the mobility needs of the vulnerable population was obtained through survey.

3.1 Sources of Data

This research relied upon primary sources of data for the study. Primary data on the preferred urban mobility needs of the components of the vulnerable population which include:

- (i) the poor-unemployed
- (ii) the physical and medically disabled
- (iii) the elderly and aging population
- (iv) the visually impaired and,
- (v) school children and other children with disability;

were sourced the respondents using questionnaire as survey instrument.

Primary data on the inclusive mobility needs of the components of the vulnerable population was obtained by the use of survey questionnaire and checklist. The inclusive mobility needs of the components of the variable population considered are in line with the United Nations Human Development programme (UNDP, 2019) identified key factors or indicators of inclusive mobility that cover the mobility needs of the vulnerable population and can be benchmarked to guarantee inclusive access to mobility which include:

- (i) Access to safety infrastructure (zebra crossing, pedestrian walk ways, etc)
- (ii) Affordability
- (iii) Location
- (iv) Travel/journey time (measured by the amount of delay)
- (v) Social groups (inclusion of social groups, e.g: gender, caste etc.)
- (vi) Comfort

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- (vii) Level of safety
- (viii) Public transport availability e.g: frequency of service.
- (ix) Availability of alternatives modes (option of modal choice)
- (x) Ease of access
- (xi) Transport deprivation index
- (xii) Congestion factors
- (xiii) Level of security in use of public transport

3.3 Population and sampling techniques

The study population consists of the vulnerable population in Lagos and Abuja metropolis, consisting of poor-unemployed population, the physically disabled and medical disabled, the vision impaired, the elderly and aging (those 70 years and above who are already retired from work), school children and other children with disability. These form the population of the study from which sample was drawn.

The study adopted purposive random (non-probability) sampling method. This is most appropriate for the research due to need to get responses only from the components of the vulnerable population. Each component of the vulnerable population identified above was deliberated/purposively sampled randomly and included in the study in order that responses on their preferred mobility needs are obtained. Thus, the research questionnaire was purposively administered to randomly selected members of the vulnerable populations in Lagos and Abuja facing challenges in meeting their mobility needs as aforementioned. To determine the appropriate sample size for large (infinite) population and uncertain number of individuals to administer the survey instruments to, the study used the z-score for unknown population. This is because the number of the vulnerable population having mobility difficulties in the two frontline cities is uncertain or unknown, even though the populations of the cities are known. The equation below was applied. The sample size for population of the study will be determined by using:

$$n = Z^2/4E^2$$

where; n = Sample size; Z = Z score at 95 percent level of confidence = 1.96

E = Maximum acceptable error = 0.05

Thus, we have:

$$N = 1.96^2/4(0.05)^2$$

n = 364 disabled/vulnerable population.

Thus, the number of questionnaires and checklist will be administered and responses collected from 364 randomly selected vulnerable people in the cities. This will consist of about 182 questionnaires to each of Abuja and Lagos. Similarly, each of the ten components of the vulnerable population will get at least 35 survey instruments (questionnaires) randomly

3.4 Testing Reliability of the Instrument

To measure the reliability and internal consistency of the survey instrument, we used the slit-half reliability correlation index. It was determined after administering the survey instrument once to overcome the problems associated with testing over multiple time periods. Reliability is will thus be determined using the slit-half reliability index. The split half estimate will be done by dividing up the test into two parts first half of the items/second half of the items), administering the two forms to the same group of individuals in the population and correlating the responses. The coefficient alpha is the mean (average) of all possible split half estimates while the existence of differences between the two would be used to assess reliability.

To estimate coefficient alpha (a), we use:

$$a = \frac{n}{(n-1)[1-\text{SumVar}(Y)/\text{Var}(X)]} \dots$$

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Where n = Number of items

Sum Var(Y) = Sum of item variances

Var(X) = Composite variance.

Since many respondents, about 364 raters will be indicating their mobility needs; correlating the responses of the respondents for each criteria of response, enables us to measure the reliability of the responses. A correlation coefficient of 0.77 was obtained which indicates about 77% high reliability.

3.3 Method of Data Analysis: Principal Component Analysis (PCA)

The objective of the study is to determine the significant mobility needs of the components of the vulnerable population (disabled, the elderly, the poor-unemployed, and children) in Nigerian frontline cities. The study actualized this objective by the use of the Principal Component Factor Analysis (PCA). The 13 indicators of the mobility needs of the vulnerable population as aforementioned in the empirical review (UNDP, 2019) which include:

- (i) Access to safety infrastructure (zebra crossing, pedestrian walk ways, etc)
- (ii) Affordability
- (iii) Location
- (iv) Travel/journey time (measured by the amount of delay)
- (v) Social groups (inclusion of social groups, e.g: gender, caste etc.)
- (vi) Comfort
- (vii) Level of safety
- (viii) Public transport availability e.g: frequency of service.
- (ix) Availability of alternatives modes (option of modal choice)
- (x) Ease of access
- (xi) Transport deprivation index
- (xii) Congestion factors
- (xiii) Level of security in use of public transport;

Will be investigated for significance from the perspectives of each components of the vulnerable population identified. Principal Component Factor analysis will used in this study to actualize the second and fourth objectives of the study.

4.0 Results and Discussion

Table 4.1: Percentage Rating of the Extent to which the Identified Needs Constitute Significant mobility needs of the Aged and Elderly (AEL) to be addressed by Urban Public Transport Planners

S/N	ASIPEZ	LOCPROX	AFORD	TTC D	SGIG	COMFT	IMSAF S	AVSERF	AVALT	EZACC	TRAIND
1	30	20	10	10	-	10	10	-	-	10	-
2	20	10	10	20	5	10	5	-	-	20	-
3	10	5	10	5	5	20	10	5	5	20	5
4	40	-	10	10		10	10	-	-	10	10
5	10	10	5	10	10	10	10	5	-	20	10
6	20	10	10	10	-	20	10	-	-	20	-
7	30	20	10	10		10	-	-	-	20	-
8	20	10	10	10		10	20	5	-	10	5

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9	20	-	10	-	-	10	10	10	10	30	-
10	30	10	20	10	10	10	-			10	-
11	20	10	10	10	5	10	10	5	-	20	-
12	10	10	10	10	-	10	10	10	10	10	10
13	30	10	10	-	-	10	20	-	-	20	-
14	30	20	10	10	-	10	10	-	-	10	-
15	20	10	10	20	5	10	5	-	-	20	-
16	10	5	10	5	5	20	10	5	5	20	5
17	40	-	10	10		10	10	-	-	10	10
18	10	10	5	10	10	10	10	5	-	20	10
19	20	10	10	10	-	20	10	-	-	20	-
20	30	20	10	10		10	-	-	-	20	-
21	20	10	10	10		10	20	5	-	10	5
22	20	-	10	-	-	10	10	10	10	30	-
23	30	10	20	10	10	10	-			10	-
24	20	10	10	10	5	10	10	5	-	20	-
25	10	10	10	10	-	10	10	10	10	10	10
26	30	10	10	-	-	10	20	-	-	20	-
27	20	10	10	10		10	20	5	-	10	5
28	20	-	10	-	-	10	10	10	10	30	-
29	30	10	20	10	10	10	-			10	-
30	20	10	10	10	5	10	10	5	-	20	-
31	10	10	10	10	-	10	10	10	10	10	10
32	30	10	10	-	-	10	20	-	-	20	-
33	30	20	10	10	-	10	10	-	-	10	-
34	20	10	10	20	5	10	5	-	-	20	-

Source: Field survey. 2025.

Table4.1 above shows the percentage rating of the extent to which the identified mobility needs constitute preferred mobility needs of the Aged and Elderly (AEL) component of the vulnerable population that must be addressed by urban public transport planners in order to have an inclusive urban public transport system that serve the aged and elderly population adequately. The table 4.1 shows that the aged and elderly component of the population identified Access to safety infrastructure (zebra crossing, pedestrian walk ways, etc.) (ASIPEZ), Affordability (AFORD), Location: proximity/bringing infrastructure closer to residential and work locations (LOCPROX), Travel/journey time (measured by the amount of CONGESTION delay) (TTCD), Social groups (inclusion of social groups, e.g: gender, caste etc.) (SGIG), Comfort (COMFT), Improved Level of safety and security of public transport (IMSAFS), Public transport availability such as frequency of service. (AVSERF), Availability of alternatives modes (option of modal choice) (AVALT), Ease of access (EZACC) and reduction in transport deprivation index (TRANDE) as some major needs that needs to be addressed to ensure inclusive urban transport system for the aged and elderly. Table4.1 was used to implement PCA in order to determine which among these identified needs constitute determinant mobility needs to the aged and elderly for purposes of designing urban public transport systems that meet the needs of inclusive mobility for the aged and elderly in Nigerian frontline cities.

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Table4.2 is attached as appendix-1 and shows the percentage rating of the extent to which the identified mobility needs constitute preferred mobility needs of the HDC (health disability challenges other than physical fractures, vision, cognitive challenges) component of the vulnerable population that must be addressed by urban public transport planners in order to have an inclusive urban public transport system that serve the HDC population adequately. The table 4.2 shows that the aged and elderly component of the population identified Access to safety infrastructure (zebra crossing, pedestrian walk ways, etc.) (ASIPEZ), Affordability (AFORD), Location: proximity/bringing infrastructure closer to residential and work locations (LOCPROX), Travel/journey time (measured by the amount of CONGESTION delay) (TTCD), Social groups (inclusion of social groups, e.g: gender, caste etc.) (SGIG), Comfort (COMFT), Improved Level of safety and security of public transport (IMSAFS), Public transport availability such as frequency of service. (AVSERF), Availability of alternatives modes (option of modal choice) (AVALT), Ease of access (EZACC) and reduction in transport deprivation index (TRANDE) as some major needs that needs to be addressed to ensure inclusive urban transport system for the HDC group. Table4.2 was used to implement PCA in order to determine which among these identified needs constitute determinant mobility needs to the HDC vulnerable group for purposes of designing urban public transport systems that meet the needs of inclusive mobility for the group in Nigerian cities.

Table4.3 is attached as appendix-11 and shows the percentage rating of the extent to which the identified mobility needs constitute preferred mobility needs of the children of school age without physical disability (CSA) component of the vulnerable population that must be addressed by urban public transport planners in order to have an inclusive urban public transport system that serve the population of children of school age without physical disability adequately. The table 4.3 shows that the children of school age without physical disability (CSA) component of the population identified Access to safety infrastructure (zebra crossing, pedestrian walk ways, etc.) (ASIPEZ), Affordability (AFORD), Location: proximity/bringing infrastructure closer to residential and work locations (LOCPROX), Travel/journey time (measured by the amount of CONGESTION delay) (TTCD), Social groups (inclusion of social groups, e.g: gender, caste etc.) (SGIG), Comfort (COMFT), Improved Level of safety and security of public transport (IMSAFS), Public transport availability such as frequency of service. (AVSERF), Availability of alternatives modes (option of modal choice) (AVALT), Ease of access (EZACC) and reduction in transport deprivation index (TRANDE) as some major needs that needs to be addressed to ensure inclusive urban transport system for the children of school age without physical disability (CSA). Table4.3 was used to implement PCA in order to determine which among these identified needs constitute determinant mobility needs to the children of school age without physical disability (CSA) for purposes of designing urban public transport systems that meet the needs of inclusive mobility for the aged and elderly in Nigerian frontline cities.

Table4.4 is attached as appendix-12 and shows the percentage rating of the extent to which the identified mobility needs constitute preferred mobility needs of the School Children with Physical Disability (SCPD) component of the vulnerable population that must be addressed by urban public transport planners in order to have an inclusive urban public transport system that serve the aged and elderly population adequately. The table 4.20 shows that the School Children with Physical Disability (SCPD) component of the population identified Access to safety infrastructure (zebra crossing, pedestrian walk ways, etc.) (ASIPEZ), Affordability (AFORD), Location: proximity/bringing infrastructure closer to residential and work locations (LOCPROX), Travel/journey time (measured by the amount of CONGESTION delay) (TTCD), Social groups (inclusion of social groups, e.g: gender, caste etc.) (SGIG), Comfort (COMFT), Improved Level of safety and security of public transport (IMSAFS), Public transport availability such as frequency of service. (AVSERF), Availability of alternatives modes (option of modal choice) (AVALT), Ease of access (EZACC) and reduction in transport deprivation index (TRANDE) as some major needs that needs to be addressed to ensure inclusive urban transport system for the School Children with Physical Disability (SCPD). Table4.4 was used to implement PCA in order to determine which among these identified needs constitute determinant mobility needs to the School Children with Physical Disability (SCPD) for purposes of designing urban

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public transport systems that meet the needs of inclusive mobility for the aged and elderly in Nigerian frontline cities.

Table4.5 is attached as appendix-13 and shows the percentage rating of the extent to which the identified mobility needs constitute preferred mobility needs of the Income Challenged Unemployed (INC) component of the vulnerable population that must be addressed by urban public transport planners in order to have an inclusive urban public transport system that serve the aged and elderly population adequately. The table 4.5 shows that the aged and elderly component of the population identified Access to safety infrastructure (zebra crossing, pedestrian walk ways, etc.) (ASIPPEZ), Affordability (AFORD), Location: proximity/bringing infrastructure closer to residential and work locations (LOCPROX), Travel/journey time (measured by the amount of CONGESTION delay) (TTCD), Social groups (inclusion of social groups, e.g: gender, caste etc.) (SGIG), Comfort (COMFT), Improved Level of safety and security of public transport (IMSAFS), Public transport availability such as frequency of service (AVSERF), Availability of alternatives modes (option of modal choice) (AVALT), Ease of access (EZACC) and reduction in transport deprivation index (TRANDE) as some major needs that needs to be addressed to ensure inclusive urban transport system for the Income Challenged Unemployed People (INC). Table4.5 was used to implement PCA in order to determine which among these identified needs constitute determinant mobility needs to the Income Challenged Unemployed People (INC) for purposes of designing urban public transport systems that meet the needs of inclusive mobility for the Income Challenged Unemployed People (INC) in Nigerian frontline cities.

Table4.6 is attached as appendix-14 and shows the percentage rating of the extent to which the identified mobility needs constitute preferred mobility needs of the People with Vision Impairment Disability (VID) component of the vulnerable population that must be addressed by urban public transport planners in order to have an inclusive urban public transport system that serve the population with Vision Impairment Disability (VID) adequately. The table 4.6 shows that the People with Vision Impairment Disability (VID) component of the population identified Access to safety infrastructure (zebra crossing, pedestrian walk ways, etc.) (ASIPPEZ), Affordability (AFORD), Location: proximity/bringing infrastructure closer to residential and work locations (LOCPROX), Travel/journey time (measured by the amount of CONGESTION delay) (TTCD), Social groups (inclusion of social groups, e.g: gender, caste etc.) (SGIG), Comfort (COMFT), Improved Level of safety and security of public transport (IMSAFS), Public transport availability such as frequency of service. (AVSERF), Availability of alternatives modes (option of modal choice) (AVALT), Ease of access (EZACC) and reduction in transport deprivation index (TRANDE) as some major needs that needs to be addressed to ensure inclusive urban transport system for the population with Vision Impairment Disability (VID). Table4.6 was used to implement PCA in order to determine which among these identified needs constitute determinant mobility needs to the VID group for purposes of designing urban public transport systems that meet the needs of inclusive mobility for the aged and elderly in Nigerian frontline cities.

Table4.7 is attached as appendix-15 and shows the percentage rating of the extent to which the identified mobility needs constitute preferred mobility needs of the vulnerable population with Hearing Disability (HID) that must be addressed by urban public transport planners in order to have an inclusive urban public transport system that serve the vision impaired population adequately. The table 4.7 shows that the VID component of the population identified Access to safety infrastructure (zebra crossing, pedestrian walk ways, etc.) (ASIPPEZ), Affordability (AFORD), Location: proximity/bringing infrastructure closer to residential and work locations (LOCPROX), Travel/journey time (measured by the amount of CONGESTION delay) (TTCD), Social groups (inclusion of social groups, e.g: gender, caste etc.) (SGIG), Comfort (COMFT), Improved Level of safety and security of public transport (IMSAFS), Public transport availability such as frequency of service (AVSERF), Availability of alternatives modes (option of modal choice) (AVALT), Ease of access (EZACC) and reduction in transport deprivation index (TRANDE) as some major needs that needs to be addressed to ensure inclusive urban transport system for the vision impaired group. Table4.7 was used to implement PCA in order to determine which among these identified needs

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constitute determinant mobility needs to the VID group for purposes of designing urban public transport systems that meet the needs of inclusive mobility for the vision impaired in Nigerian frontline cities.

Table4.8 is attached as appendix-16 and shows the percentage rating of the extent to which the identified mobility needs constitute preferred mobility needs of the Physically Disabled Component (PDC) of the vulnerable population that must be addressed by urban public transport planners in order to have an inclusive urban public transport system that serve the physically disabled population adequately. The table 4.8 shows that the PDC component of the population identified Access to safety infrastructure (zebra crossing, pedestrian walk ways, etc.) (ASIPEZ), Affordability (AFORD), Location: proximity/bringing infrastructure closer to residential and work locations (LOCPROX), Travel/journey time (measured by the amount of CONGESTION delay) (TTCD), Social groups (inclusion of social groups, e.g: gender, caste etc.) (SGIG), Comfort (COMFT), Improved Level of safety and security of public transport (IMSAFS), Public transport availability such as frequency of service (AVSERF), Availability of alternatives modes (option of modal choice) (AVALT), Ease of access (EZACC) and reduction in transport deprivation index (TRANDE) as some major needs that needs to be addressed to ensure inclusive urban transport system for the physically challenged (PDC). Table4.8 was used to implement PCA in order to determine which among these identified needs constitute determinant mobility needs to the physically challenged for purposes of designing urban public transport systems that meet the needs of inclusive mobility for the aged and elderly in Nigerian frontline cities.

Table4.9 is attached as appendix-17 and shows the percentage rating of the extent to which the identified mobility needs constitute preferred mobility needs of the cognitive disability (CDC) component of the vulnerable population that must be addressed by urban public transport planners in order to have an inclusive urban public transport system that serve the cognitive disability (CDC) population adequately. The table 4.9 shows that the CDC component of the population identified Access to safety infrastructure (zebra crossing, pedestrian walk ways, etc.) (ASIPEZ), Affordability (AFORD), Location: proximity/bringing infrastructure closer to residential and work locations (LOCPROX), Travel/journey time (measured by the amount of CONGESTION delay) (TTCD), Social groups (inclusion of social groups, e.g: gender, caste etc.) (SGIG), Comfort (COMFT), Improved Level of safety and security of public transport (IMSAFS), Public transport availability such as frequency of service (AVSERF), Availability of alternatives modes (option of modal choice) (AVALT), Ease of access (EZACC) and reduction in transport deprivation index (TRANDE) as some major needs that needs to be addressed to ensure inclusive urban transport system for the cognitive disability group. Table4.9 was used to implement PCA in order to determine which among these identified needs constitute determinant mobility needs to the CDC group for purposes of designing urban public transport systems that meet the needs of inclusive mobility for the aged and elderly in Nigerian frontline cities.

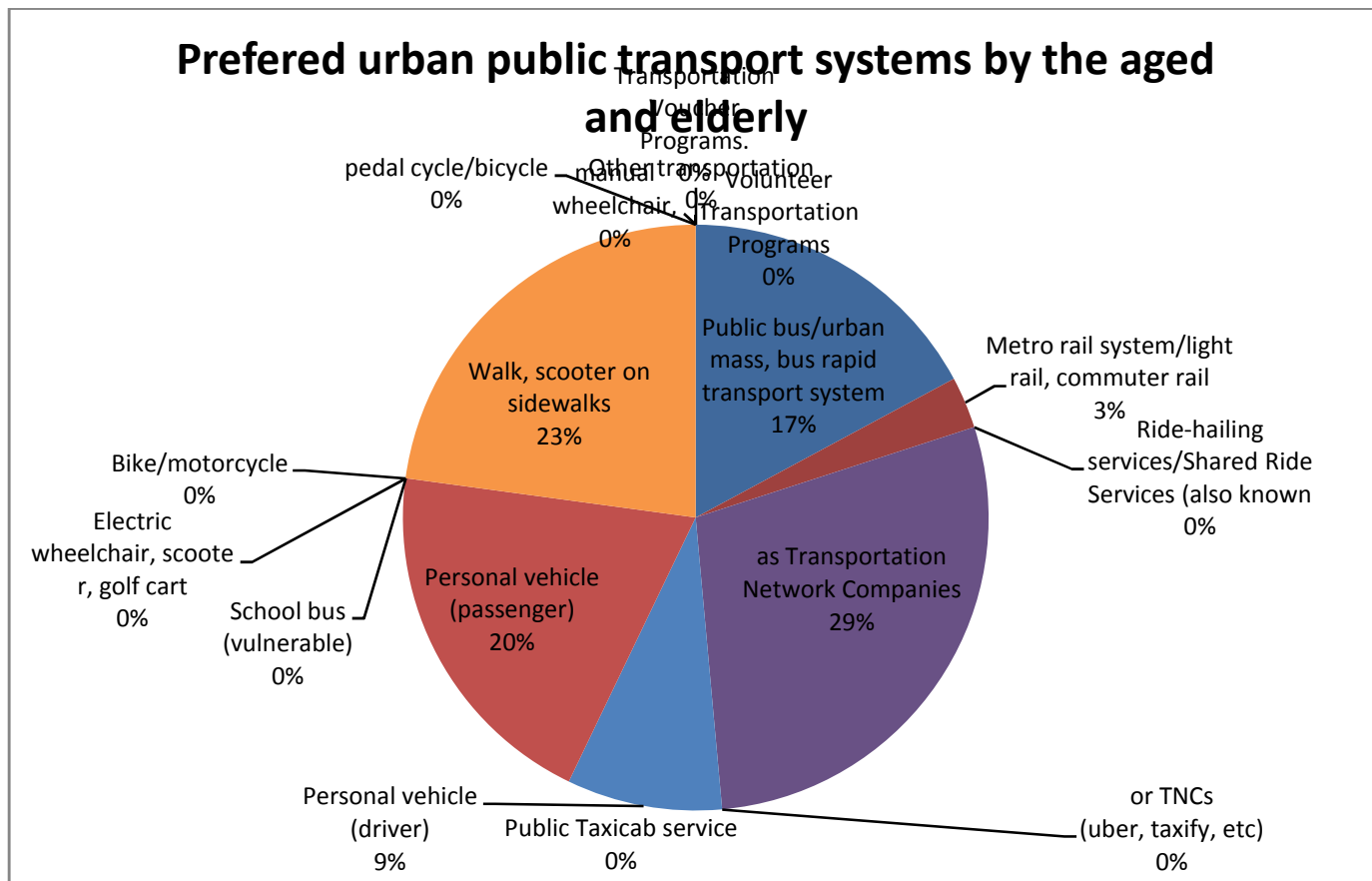


Figure1: Preference Scores of Public Transport Options by Aged and Elderly Component of the Vulnerable population. Source: Prepared by the Author.2025.

Figure1 above shows the preference scores for various public transport options by the aged and elderly component of the vulnerable population. The result indicates that the most preferred urban public transport option by the aged and elderly component of the vulnerable population in Nigerian frontline cities is use of transportation network companies (TNCs) which include the use Ride-hailing services/Shared Ride Services such as uber, bolt, taxify, etc., with preference score of 29%. This is followed by the use of pedestrian walkways and scooter on sidewalks with preference score of 23%. Public bus/urban mass, bus rapid transport system has a preference score of 17% while Personal vehicle (passenger) has preference score of 20%. Personal vehicle (driver) and Metro rail system/light rail, commuter rail has respective preference scores of 9% and 3% respectively.

Figure2 below shows the preference scores of the urban public transport options for the health status disability (e.g. pregnancy, health disability challenges) HDC component of the vulnerable population.

Prefered urban transport system by HDC vulnerable group

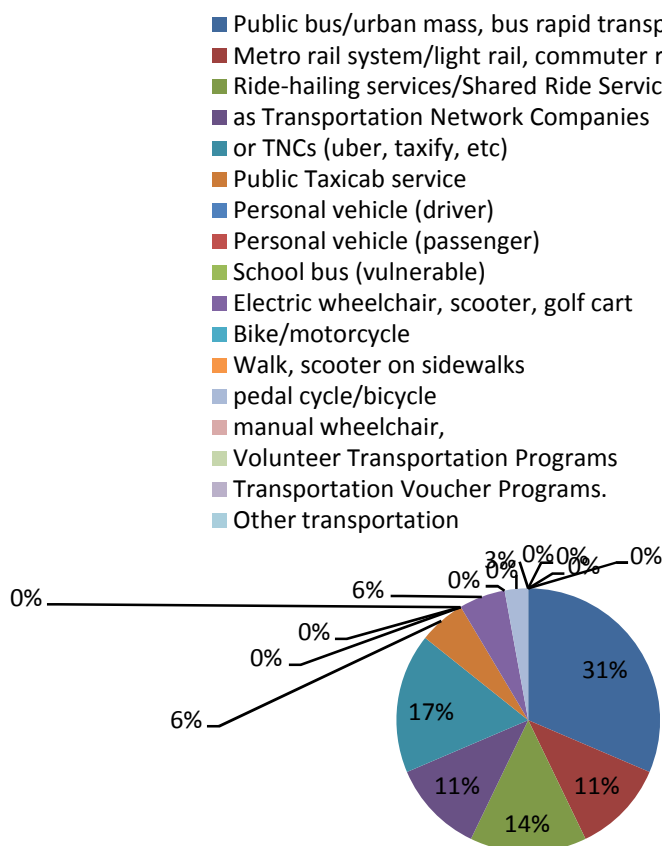


Figure2: Preferred urban transport system by HDC vulnerable group.

Source: Prepared by the author.2025.

The preference scores of the urban public transport options for the hearing-impaired component of the vulnerable population. It shows preference score of 31% for urban public mass transit system and 17% for TNCs (urber, taxify, bolt, etc.); 11% for personal vehicle passenger and 11% for pedestrian walk and sidewalk among others.

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The most preferred urban transport system by the children of school age without physical disability (children of school age) (CSA) as a component of the vulnerable population is personal vehicle (passenger) with preference score of 68%

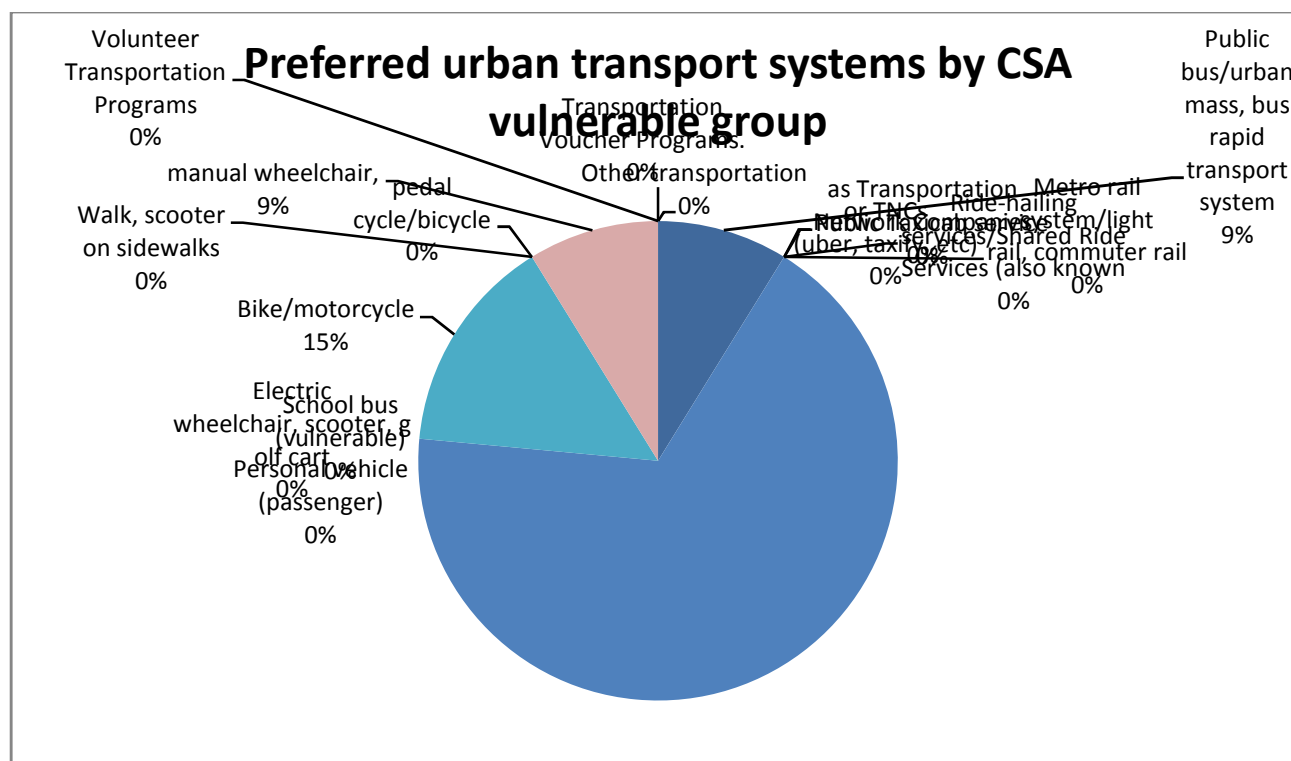


Figure3: Preferred urban transport systems by CSA vulnerable group.

Source: Prepared by the author.2025.

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Table4.10: Preferred mobility options for transportation in Cities by other components of the Vulnerable Population

s/n	Transportation option/preference score:	SCPD (%)	INC (%)	VID (%)	HID (%)	PDC (%)	CDC (%)
1	Public bus/urban mass, bus rapid transport system	2.94	23.53	0	14.71	11.11	8.82
2	Metro rail system/light rail, commuter rail	0	8.82	0	11.77	8.33	0
3	Ride-hailing services/Shared Ride Services (also known as Transportation Network Companies or TNCs (uber, taxify, etc)	0	0	36.36	26.47	0	14.71
4	Public Taxicab service	0	0	0	0	0	0
5	Personal vehicle (driver)	0	0	27.27	11.77	0	0
6	Personal vehicle (passenger)	0	0	21.21	8.82	22.22	52.94
7	School bus (vulnerable)	58.8	0	0	0	0	0
8	Electric wheelchair, scooter, golf cart	23.53	0	0	0	36.11	0
9	Bike/motorcycle	0	11.77	0	0	0	0
10	Walk, scooter on sidewalks	0	11.77	12.12	6	0	14.71
11	pedal cycle/bicycle	0	8.82	0	0	0	0
12	manual wheelchair,	0	0	0	0	13.89	0
13	Volunteer Transportation Programs	14.71	5.88	0	0	0	8.82
14	Transportation Voucher Programs.	0	29.41	3.03	8.82	8.33	0

Source Authors calculation. 2025.

Table4.10 above shows the result of the study showing the preference scores of the various urban mobility systems by the various components of the vulnerable population. For the school children with physical disability, the most preferred urban mobility service in school bus with preference score of 58.8%. This is followed by electric wheelchair and golf cart with preference score of 23.53% while volunteer transportation program has the preference score of 14.71%.

For the income challenged and unemployed component (INC) of the vulnerable population, the most preferred urban mobility option is the Transportation Voucher Programs with preference score of 29.41% followed by Public bus/urban mass, bus rapid transport system with preference score of 23.53%. Each of Bike/motorcycle and pedestrian Walk cum scooter on sidewalks has preference scores of 11.77% each. The preference score for pedal cycle/bicycle by the INC component of the vulnerable population is 8.82%.

For the vision impaired disability (VID) component of the vulnerable population and the hearing-impaired disability (HID) group, the respective most preferred urban mobility types is Ride-hailing services/Shared Ride Services (also known as Transportation Network Companies or TNCs (uber, taxify, etc) with preferred score of 36.36 for the VID and 26.47 for the HID component of the vulnerable population.

Lastly the most preferred urban mobility option for the physically disabled component (PDC) of the vulnerable population Electric wheelchair, scooter, golf cart with preference score of 36.11% followed by Personal vehicle (passenger) with preference score of 22.22% while the most preferred urban mobility system for the cognitive disability component (DCD) of the vulnerable is Personal vehicle (passenger) with preference score of 52.94. This is followed by pedestrian Walk cum scooter on sidewalks with preference score of 14.71.

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Table-4.11: Determinant Mobility Needs of the Various Components of the Vulnerable Population in Nigerian Frontline Cities

Vulnerability type	Mobility needs/factors	Factor loading
Aged and Elderly (AGE)	ASIPEZ	-0.872
	LOCPROX	-0.713
	TTCD	-0.817
	COMFT	0.890
	IMSAFS	-0.701
HDC	ASIPEZ	0.619
	TTCD	-0.847
	COMFT	-0.607
	TRAIND	.888
	EZACC	-0.695
CSA	ASIPEZ	-0.795
	LOCPROX	0.817
	AFORD	-0.738
	TTCD	-0.926
	EZACC	0.622
SCPD	TRAIND	0.840
	EZACC	0.779
	AVALT	0.558
	ASIPEZ	-0.664
	LOCPROX	0.680
INC	AFORD	-0.630
	AFFORD	0.943
	COMFT	-0.901
	LOCPROX	-0.732
	TTCD	-0.817
	EZACC	0.607

Source: Author’s calculation. 2025.

Table4.11 above is a presentation of the result of the study on the determinant mobility needs of the Various Components of the vulnerable population in Nigerian frontline cities. The result reveals that for the aged and elderly group of the vulnerable population, Access to safety infrastructure (zebra crossing, pedestrian walk ways (ASIPEZ), proximity/bringing infrastructure closer to residential and work locations (LOCPROX), Travel/journey time (measured by the amount of CONGESTION delay) (TTCD) and comfort each have factor loading greater than 0.5. As a result, they constitute the determinant mobility needs of the aged and elderly group of the vulnerable population. Therefore, urban transport systems/options that will serve adequately the purpose of inclusive transportation system for the aged and elderly must prioritize the safety, proximity, reduction in travel time delay and comfort of the aged and elderly group of the vulnerable population.

For the HDC group of the vulnerable population, safety infrastructure (ASIPEZ), reduction in travel time delay (TTCD), comfort (COMFT), reduced transport deprivation index (TRAINDE) and ease of access (EZACC) to UPTS constitute the determinant mobility needs which planners of inclusive public transport system must strive to ensure it availability for the HDC component of the vulnerable population in Nigerian frontline cities.

The determinant mobility needs of the children of school age without physical disability (CSA) in Nigerian frontline cities include safety infrastructure (ASIPEZ), location/proximity/bringing infrastructure closer to residential and

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work locations (LOCPROX), affordability (AFORD), Travel/journey time (measured by the amount of congestion delay) (TTCD) and the Ease of access (EZACC).

Similarly, while the determinant mobility needs of the school children with physical disability (SCPD), include reduction in transport deprivation index experiences of the children (TRAINDE), ease of access to UPTS (EZACC), Availability of alternatives modes (option of modal choice) (AVALT), safety infrastructure (ASIPEZ), proximity (LOCPROX) and affordability; the determinant mobility needs for the income challenged and unemployed components of the vulnerable population are affordability (AFFOD), comfort (COMFT), location/proximity (LOCPROX), reduction in travel time and traffic congestion delay (TTCD) and ease of access (EZACC) to UPTS each with loading factor greater than 0.5.

The implication is that to ensure the provision of inclusive transport options for all the components of the vulnerable population in Nigerian frontline cities, the mobility needs of the individual groups of the vulnerable population need to be adequately addressed.

Table-4.12: Determinant/major Mobility Needs of other Components of the Vulnerable Population in Nigerian Cities

Vulnerability type	Mobility needs/factors	Factor loading
VID	ASIPEZ	0.880
	LOCPROX	0.810
	TTCD	0.890
	SGIG	0.750
	MSAFS	0.598
	AVALT	0.613
	EZACC	0.553
HID	LOCPROX	0.778
	COMFT	0.686
	IMSAFS	0.891
	AVSERF	0.716
	TRAIND	0.651
PDC	ASIPEZ	0.764
	LOCPROX	0.659
	COMFT	0.849
	AVALT	0.876
	EZACC	0.695
CDC	EZACC	0.689
	IMSAFS	0.655
	SGIG	0.671
	LOCPROX	0.680
	TTCD	0.649

Source: Author’s calculation. 2025

The result of the study on table4.12 above shows that the determinant mobility needs of the vision impaired disabled (VID) components of the vulnerable population include Access to safety infrastructure (zebra crossing, pedestrian walk ways, etc) (ASIPEZ), affordability (AFORD), Location: proximity/bringing infrastructure closer to residential and work locations (LOCPROX), Travel/journey time (measured by the amount of congestion delay) (TTCD), Social groups (inclusion of social groups, e.g: gender, caste etc.) (SGIG), improved Level of safety and security of public transport (IMSAFS), public transport availability e.g: frequency of service. (AVSERF), availability of alternatives modes (option of modal choice) (AVALT) and

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Ease of access (EZACC). These needs should be prioritized in order to ensure the provision of inclusive urban transport services to the vision impaired disabled components of the vulnerable population in Nigerian cities.

For the hearing impaired disabled (HID) components of the vulnerable population, the determinant mobility needs include Comfort (COMFT), reduced transport deprivation index (TRANDE), and improved Level of safety and security of public transport (IMSAFS), public transport availability e.g: frequency of service. (AVSERF) and Location: proximity/bringing infrastructure closer to residential and work locations (LOCPROX). These needs must be prioritized in the provision of inclusive mobility options for urban travels for the HID components of the vulnerable population.

For the physically challenged (PDC) group of the vulnerable population, the determinant mobility needs include Access to safety infrastructure (zebra crossing, pedestrian walk ways, etc.) (ASIPEZ), affordability (AFORD), location: proximity/bringing infrastructure closer to residential and work locations (LOCPROX), comfort (COMFT), Availability of alternatives modes (option of modal choice) (AVALT) and ease of access (EZACC). In order to provide inclusive urban public transport services to serve the needs of the physically challenged and disabled (PDC) group of the vulnerable population in Nigerian frontline cities, these determinant needs of the PDC group must be prioritized.

4.2 Discussion of Result

On the preference of UPTS by components of the vulnerable population, the study found varying preferences of different vulnerable groups necessitate a differentiated policy approach: the Aged and Elderly (AEL) Population for have preference for ride-hailing services score of 29% which suggests the need for government-subsidized ride-share programs and incentives for senior-friendly transportation initiatives. A strong preference for urban mass transit (31%) by the hearing-impaired group (HID) suggests policies should focus on improving accessibility within existing bus and rail systems through visual alerts and digital signboards. For the Children of School Age without physical disability, a high preference for personal vehicles (68%) suggests that school transport policies should enhance and expand school bus services to reduce dependence on private vehicles and for Physically Disabled (PDC), a 36.11% preference for electric wheelchairs, scooters, and golf carts implies the need for dedicated pathways and designated transport lanes for mobility aids.

For the Income-Challenged Groups, the 29.41% preference for transportation vouchers suggests that social welfare policies should incorporate transport assistance programs for low-income earners. For the visually impaired, a 36.36% preference for ride-hailing services indicates that policies should encourage TNCs to integrate accessibility features like audio navigation and trained drivers for visually impaired passengers. The findings provide strong evidence for the need to reform Nigeria's urban transport policies to enhance accessibility for vulnerable populations. Through increased infrastructure investment, safety improvements, anti-discrimination measures, and tailored transport solutions for various vulnerable groups, policymakers can create a more inclusive, equitable, and efficient urban public transport system in Nigeria's frontline cities.

The findings of the study on the economic implications of immobility of the vulnerable population suggest significant financial cost for the Vulnerable Population in Nigeria. The research findings underscore the urgent need for inclusive urban transport policies that ensure equitable access to mobility for all components of the vulnerable population. The significant financial burden faced by these groups due to transport immobility highlights the necessity of policies aimed at reducing transport exclusion. This includes the adoption of universal design principles in public transportation systems, ensuring accessibility for individuals with disabilities, the elderly and low-income populations. Given the high economic cost of immobility, substantial investment in urban transport infrastructure is required. The government should prioritize the development of accessible transportation facilities, including wheelchair-accessible buses, improved pedestrian walkways, and inclusive transport hubs. These investments would

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significantly reduce the financial burden of transport immobility and enhance economic participation among vulnerable groups.

5.0 Conclusion and Recommendations

5.1: Conclusion

The study concludes that the mobility needs of Nigeria’s vulnerable populations remain inadequately addressed in existing urban transport frameworks. Principal Component Analysis identified affordability, accessibility, safety infrastructure, comfort, proximity of services, and modal availability as the most critical determinants of mobility for vulnerable groups in urban areas. The findings emphasize that immobility among these groups not only restricts social participation but also results in substantial economic losses due to reduced productivity and exclusion from employment and educational opportunities. Therefore, inclusive mobility should be regarded as an essential pillar of sustainable urban transport policy in Nigeria. To achieve this, Federal and State Ministries of Transportation must prioritize investment in inclusive transport infrastructure—such as wheelchair-accessible buses, improved pedestrian walkways, and multimodal public transport systems—while enforcing universal design standards. Policies must also ensure affordability through targeted subsidies and integrate accessibility features in both public and private transit systems. Promoting inclusive mobility will significantly enhance economic participation, reduce inequality, and advance Nigeria’s progress toward the Sustainable Development Goals (SDGs) on reduced inequalities, sustainable cities, and economic growth.

5.2 Recommendations

It is recommended in line with the findings of the study that:

- (i) The Federal and State Ministries of transportation should prioritize the development of inclusive mobility options for all components of the vulnerable population by investment in infrastructure that support the preferred urban transport systems of each group of the vulnerable population.
- (ii) Nigerian authorities, ministries and Departments of transportation should prioritize the development of policies and provision of urban public transport services that address each of the significant barriers to UPTS transport accessibility identified by the individual vulnerable groups.
- (iii) The urban public transport regulators and administrators in Nigerian frontline cities should develop urban public transport management policy instruments that ensure that the determinant mobility needs of each of the disability groups are factored into the urban public transport policies for purposes of ensuring inclusive urban public mobility systems in Nigeria.
- (iv) Transport policies should enforce accessibility standards, ensuring that both public and private transit providers comply with universal design principles that will guarantee components of the vulnerable population adequate access to urban public services in Nigerian frontline states. This is to reduce the extent of lack of access to urban public transport services by components of the vulnerable population.

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APPENDEXES
APPENDIX-1
Table4.2: Percentage Rating of the Extent to which the Identified Needs constitute major mobility needs of the HDC (health disability challenges other than physical fractures, vision, cognitive challenges) group to be addressed by Urban Public Transport Planners

S/ N	ASIPE Z	LOCPROX	AFORD	TTC D	SGIG	COMFT	IMSAF S	AVSERF	AVALT	EZACC	TRAIND
1	10	10	10	20	0	20	5	0	5	20	0
2	0	20	0	20	0	30	10	0	0	20	0
3	5	30	5	10	0	20	10	0	0	10	10
4	10	10	10	10	5	10	10	10	5	10	10
5	0	20	5	10	0	20	10	0	5	20	10
6	10	30	10	-	5	10	10	5	0	20	0
7	5	30	5	10	5	10	10	10	5	10	0
8	10	10	0	20	0	20	10	10	0	20	0
9	10	10	10	20	0	20	10	0	0	10	10
10	5	20	10	20	0	10	10	5	0	20	0
11	5	30	10	10	5	20	10	0	0	10	0
12	10	30	10	10	0	10	10	0	0	20	0
13	0	20	5	20	0	10	10	5	5	20	5
14	10	10	10	20	0	20	5	0	5	20	0
15	0	20	0	20	0	30	10	0	0	20	0
16	5	30	5	10	0	20	10	0	0	10	10
17	10	10	10	10	5	10	10	10	5	10	10
18	0	20	5	10	0	20	10	0	5	20	10
19	10	30	10	-	5	10	10	5	0	20	0
20	5	30	5	10	5	10	10	10	5	10	0
21	10	10	0	20	0	20	10	10	0	20	0
22	10	10	10	20	0	20	10	0	0	10	10
23	5	20	10	20	0	10	10	5	0	20	0
24	5	30	10	10	5	20	10	0	0	10	0
25	10	30	10	10	0	10	10	0	0	20	0
26	0	20	5	20	0	10	10	5	5	20	5
27	10	10	0	20	0	20	10	10	0	20	0
28	10	10	10	20	0	20	10	0	0	10	10
29	5	20	10	20	0	10	10	5	0	20	0
30	5	30	10	10	5	20	10	0	0	10	0
31	10	30	10	10	0	10	10	0	0	20	0
32	0	20	5	20	0	10	10	5	5	20	5
33	10	10	10	20	0	20	5	0	5	20	0

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34 0 20 0 20 0 30 10 0 0 20 0

Source: Field survey. 2025.

APPENDIX-2

Table4.3: Percentage Rating of the Extent to which the Identified Needs constitute major mobility needs of the children of school age without physical disability (CSA) to be addressed by Urban Public Transport Planners

S/ N	ASIPE Z	LOCPROX	AFORD	TTC D	SGIG	COMFT	IMSAF S	AVSERF	AVALT	EZACC	TRAIND
1	20	10	20	10	0	10	10	5	0	10	5
2	10	5	10	20	5	5	10	10	5	10	10
3	20	0	10	20	5	10	10	10	0	10	5
4	20	5	20	10	10	5	5	10	0	10	5
5	10	10	10	20	0	10	20	10	0	10	0
6	20	5	20	10	5	10	20	5	0	5	0
7	30	0	10	5	0	10	20	5	0	10	10
8	10	10	10	10	10	10	10	0	10	20	0
9	30	0	20	5	0	5	10	10	0	10	10
10	10	10	20	10	0	10	20	0	5	10	5
11	20	5	10	20	5	10	10	10	0	10	0
12	20	10	20	10	0	10	10	5	5	10	0
13	10	5	20	20	0	10	20	5	0	10	0
14	20	10	20	10	0	10	10	5	0	10	5
15	10	5	10	20	5	5	10	10	5	10	10
16	20	0	10	20	5	10	10	10	0	10	5
17	20	5	20	10	10	5	5	10	0	10	5
18	10	10	10	20	0	10	20	10	0	10	0
19	20	5	20	10	5	10	20	5	0	5	0
20	30	0	10	5	0	10	20	5	0	10	10
21	10	10	10	10	10	10	10	0	10	20	0
22	30	0	20	5	0	5	10	10	0	10	10
23	10	10	20	10	0	10	20	0	5	10	5
24	20	5	10	20	5	10	10	10	0	10	0
25	20	10	20	10	0	10	10	5	5	10	0
26	10	5	20	20	0	10	20	5	0	10	0
27	20	5	20	10	5	10	20	5	0	5	0
28	30	0	10	5	0	10	20	5	0	10	10
29	10	10	10	10	10	10	10	0	10	20	0
30	30	0	20	5	0	5	10	10	0	10	10

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31	10	10	20	10	0	10	20	0	5	10	5
32	20	5	10	20	5	10	10	10	0	10	0
33	20	10	20	10	0	10	10	5	5	10	0
34	10	5	20	20	0	10	20	5	0	10	0

Source: Field survey. 2025.

APPENDIX-3

Table 4.4: Percentage Rating of the Extent to which the Identified Needs Constitute Major Mobility Needs of School Children with Physical Disability (SCPD) to be Addressed by Urban Public Transport Planners

S/ N	ASIPE Z	LOCPROX	AFORD	TTC D	SGIG	COMFT	IMSAF S	AVSERF	AVALT	EZACC	TRAIND
1	5	30	10	10	0	20		0	10	20	10
2	0	10	5	10	5	10	20	5	20	10	5
3	10	20	5	10	5	10	20	0	20	10	5
4	0	20	5	10	10	20	10	0	10	20	0
5	10	10	10	10	0	10	20	0	20	10	0
6	5	20	10	5	5	20	10	0	20	20	10
7	10	10	10	10	0	10	5	0	20	10	0
8	5	20	10	20	10	10	10	10	10	10	10
9	10	20	5	10	0	20	5	0	10	20	5
10	5	10	5	10	0	20	10	5	20	20	0
11	0	20	0	10	5	10	20	0	10	10	0
12	5	30	10	10	0	20	10	5	20	20	0
13	10	10	0	10	0	20	20	0	10	20	5
14	5	30	10	10	0	20	10	0	10	20	10
15	0	10	10	10	5	10	20	5	20	10	5
16	10	20	5	10	5	10	20	0	20	10	5
17	0	20	5	10	10	20	10	0	10	20	0
18	10	10	5	10	0	10	20	0	20	10	0
19	5	20	10	5	5	20	10	0	20	20	10
20	10	30	10	10	0	10	5	0	20	10	0
21	5	10	10	20	10	10	10	10	10	10	10
22	5	30	10	10	0	20	5	0	10	20	5
23	0	10	5	10	0	20	10	5	20	20	0
24	10	20	5	10	5	10	20	0	20	10	0
25	0	20	0	10	0	20	10	5	10	20	0
26	10	20	10	10	0	20	20	0	20	20	0

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27	5	10	0	5	5	20	10	0	20	20	10
28	10	20	10	10	0	10	10	0	10	10	10

Source: Field survey. 2025.

APPENDIX-4

Table4.5: Percentage Rating of the Extent to which the Identified Needs constitute major mobility needs of the Income Challenged Unemployed People (INC) to be addressed by Urban Public Transport Planners

S/ N	ASIPE Z	LOCPROX	AFORD	TTC D	SGIG	COMFT	IMSAF S	AVSERF	AVALT	EZACC	TRAIND
1	10	10	30	5	0	5	5	10	10	10	5
2	5	10	20	5	5	10	5	5	10	20	10
3	0	10	10	0	5	10	0	10	10	20	20
4	5	10	40	0	10	10	0	5	10	10	10
5	10	10	10	0	0	10	0	10	10	20	10
6	5	20	20	0	5	5	0	10	5	10	20
7	0	10	30	0	0	5	0	10	10	5	30
8	10	10	20	10	10	0	10	10	20	10	10
9	0	20	20	0	0	10	0	5	10	5	20
10	10	20	30	5	0	0	5	10	10	10	10
11	5	10	20	0	5	10	0	10	10	20	20
12	10	20	10	5	0	5	5	10	10	10	20
13	5	20	30	0	0	5	0	10	10	20	10
14	10	20	30	0	0	5	0	10	10	10	20
15	5	10	20	5	5	10	5	5	10	20	10
16	0	10	10	0	5	10	0	10	10	20	20
17	5	10	40	0	10	10	0	5	10	10	10
18	10	10	10	0	0	10	0	10	10	20	10
19	5	20	20	0	5	5	0	10	5	10	20
20	0	10	30	0	0	5	0	10	10	5	10
21	10	10	20	10	10	0	10	10	20	10	10
22	0	20	20	0	0	10	0	5	10	5	10
23	10	20	30	5	0	0	5	10	10	10	10
24	5	10	20	0	5	10	0	10	10	20	20
25	10	20	10	5	0	5	5	10	10	10	20
26	5	20	30	0	0	5	0	10	10	20	10
27	5	20	20	0	5	5	0	10	5	10	20
28	0	10	20	0	0	5	0	10	10	5	30
29	10	10	30	10	10	0	10	10	20	10	10

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30	0	20	20	0	0	10	0	5	10	5	10
31	10	20	10	5	0	0	5	10	10	10	10
32	5	10	30	0	5	10	0	10	10	20	20
33	10	20	10	5	0	5	5	10	10	10	20
34	5	20	10	0	0	5	0	10	10	20	10

Source: Field survey. 2025.

APPENDIX-5

Table4.6: Percentage Rating of the Extent to which the Identified Needs Constitute Major Mobility Needs of the People with Vision Impairment Disability (VID) to be Addressed by Urban Public Transport Planners

S/ N	ASIPE Z	LOCPROX	AFORD	TTC D	SGIG	COMFT	IMSAF S	AVSERF	AVALT	EZACC	TRAIND
1	10	20	10	0	0	20	10	5	5	20	0
2	10	20	20	10	0	10	10	0	5	10	5
3	5	30	5	5	0	5	20	0	0	20	10
4	5	20	5	10		10	20	10	0	20	0
5	10	30	10	0	0	10	10	0	10	10	10
6	10	20	10	0	10	10	20	0	10	10	0
7	5	10	10	5	5	10	10	0	5	20	10
8	10	20	10	0	0	10	20	0	10	20	0
9	10	20	10	10	5	10	10	5	5	10	5
10	0	30	5	5		10	20	0	10	20	0
11	10	20	10	0	0	20	10	5	5	20	0
12	10	20	20	10	0	10	10	0	5	10	5
13	5	30	5	5	0	5	20	0	0	20	10
14	5	20	5	10		10	20	10	0	20	0
15	10	30	10	0	0	10	10	0	10	10	10
16	10	20	10	0	10	10	20	0	10	10	0
17	5	10	10	5	5	10	10	0	5	20	10
18	10	20	10	0	0	10	20	0	10	20	0
19	10	20	10	10	5	10	10	5	5	10	5
20	0	30	5	5		10	20	0	10	20	0
21	10	20	10	0	0	20	10	5	5	20	0
22	10	20	20	10	0	10	10	0	5	10	5
23	5	30	5	5	0	5	20	0	0	20	10
24	5	20	5	10		10	20	10	0	20	0
25	10	30	10	0	0	10	10	0	10	10	10
26	10	20	10	0	10	10	20	0	10	10	0

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27	5	10	10	5	5	10	10	0	5	20	10
28	10	20	10	0	0	10	20	0	10	20	0
29	10	20	10	10	5	10	10	5	5	10	5
30	0	30	5	5		10	20	0	10	20	0
31	10	20	10	0	0	20	10	5	5	20	0
32	10	20	20	10	0	10	10	0	5	10	5
33	5	30	5	5	0	5	20	0	0	20	10
34	5	20	5	10		10	20	10	0	20	0

Source: Field survey. 2025.

APPENDIX-6

Table4.7: Percentage Rating of the Extent to which the Identified Needs Constitute Major Mobility Needs of the Hearing Disability (HID) Group to be Addressed by Urban Public Transport Planners

S/ N	ASIPE Z	LOCPROX	AFORD	TTC D	SGIG	COMFT	IMSAF S	AVSERF	AVALT	EZACC	TRAIND
1	10	5	20	0	5	20	20	5	0	5	0
2	10	0	20	5	0	20	30	5	0	10	0
3	10	10	10	0	10	10	10	0	10	20	10
4	5	0	10	10	0	20	30	10	0	10	5
5	10	10	20	5	0	20	10	0	5	10	10
6	10	5	10	5	5	20	20	10	0	10	5
7	10	10	10	10	0	10	20	5	5	10	0
8	10	5	20	10	0	10	20	5	10	10	0
9	10	10	10	10	0	20	20	5	5	10	0
10	5	5	10	5	5	20	20	10	5	10	5
11	10	0	10	5	5	20	20	10	0	20	10
12	5	5	5	10	10	10	20	10	0	10	5
13	10	10	20	10	0	10	10	10	5	10	5
14	10	5	20	0	5	20	20	5	0	5	0
15	10	0	20	5	0	20	30	5	0	10	0
16	10	10	10	0	10	10	10	0	10	20	10
17	5	0	10	10	0	20	30	10	0	10	5
18	10	10	20	5	0	20	10	0	5	10	10
19	10	5	10	5	5	20	20	10	0	10	5
20	10	10	10	10	0	10	20	5	5	10	0
21	10	5	20	10	0	10	20	5	10	10	0
22	10	10	10	10	0	20	20	5	5	10	0
23	5	5	10	5	5	20	20	10	5	10	5
24	10	0	10	5	5	20	20	10	0	20	10
25	5	5	5	10	10	10	20	10	0	10	5

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26	10	10	20	10	0	10	10	10	5	10	5
27	10	5	20	0	5	20	20	5	0	5	0
28	10	0	20	5	0	20	30	5	0	10	0
29	10	10	10	0	10	10	10	0	10	20	10
30	5	0	10	10	0	20	30	10	0	10	5
31	10	10	20	5	0	20	10	0	5	10	10
32	10	5	10	5	5	20	20	10	0	10	5
33	10	10	10	10	0	10	20	5	5	10	0
34	10	5	20	10	0	10	20	5	10	10	0

Source: Field survey. 2025.

APPENDIX-7

Table 4.8: Percentage Rating of the Extent to which the Identified Needs constitute major mobility needs of the Physically Disabled Component (PDC) to be addressed by Urban Public Transport Planners

S/ N	ASIPE Z	LOCPROX	AFORD	TTC D	SGIG	COMFT	IMSAF S	AVSERF	AVALT	EZACC	TRAIND
1	10	20	0	10	0	20	10	0	10	20	0
2	10	10	10	5	5	20	10	5	10	10	5
3	10	20	5	10		30	5	0	0	20	0
4	20	20	0	5	0	20	10	0	10	10	5
5	10	10	10	5	0	20	20	5	10	10	0
6	5	20	5	0	0	30	5	10	5	20	0
7	10	20	10	0		20	5	0	5	20	10
8	10	10	0	10	0	30	10	10	10	10	0
9	10	10	0	10	10	20	10	0	10	20	0
10	10	20	5	5	5	10	10	10	5	10	0
11	10	20	0	10	0	20	10	0	10	20	0
12	10	10	10	5	5	20	10	5	10	10	5
13	10	20	5	10		30	5	0	0	20	0
14	20	20	0	5	0	20	10	0	10	10	5
15	10	10	10	5	0	20	20	5	10	10	0
16	5	20	5	0	0	30	5	10	5	20	0
17	10	20	10	0		20	5	0	5	20	10
18	10	10	0	10	0	30	10	10	10	10	0
19	10	10	0	10	10	20	10	0	10	20	0
20	10	20	5	5	5	10	10	10	5	10	0
21	10	20	0	10	0	20	10	0	10	20	0
22	10	10	10	5	5	20	10	5	10	10	5

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23	10	20	5	10		30	5	0	0	20	0
24	20	20	0	5	0	20	10	0	10	10	5
25	10	10	10	5	0	20	20	5	10	10	0
26	5	20	5	0	0	30	5	10	5	20	0
27	10	20	10	0		20	5	0	5	20	10
28	10	10	0	10	0	30	10	10	10	10	0
29	10	10	0	10	10	20	10	0	10	20	0
30	10	20	5	5	5	10	10	10	5	10	0
31	10	20	5	10		30	5	0	0	20	0
32	20	20	0	5	0	20	10	0	10	10	5
33	10	10	10	5	0	20	20	5	10	10	0
34	10	20	10	0		20	5	0	5	20	10

Source: Field survey. 2025.

APPENDIX-8

Table4.9: Percentage Rating of the Extent to which the Identified Needs Constitute Mobility Needs of the Cognitive Disability (CDC) Group to be Addressed by Urban Public Transport Planners

S/ N	ASIPE Z	LOCPROX	AFORD	TTC D	SGIG	COMFT	IMSAF S	AVSERF	AVALT	EZACC	TRAIND
1	20	5	10	5	0	10	20	0	20	10	0
2	10	5	10	0	0	20	20	10	10	10	5
3	20	0	5	0	0	5	30	5	5	20	10
4	20	0	5	10		5	20	10	10	20	0
5	10	10	10	0	0	10	30	0	10	10	10
6	10	10	10	0	10	10	20	0	10	20	0
7	20	5	5	0	5	10	10	5	10	10	10
8	20	10	10	0	0	10	20	0	10	20	0
9	10	5	10	5	5	10	20	10	10	10	5
10	20	10	0	0	0	5	30	5	10	20	0
11	20	5	10	5	0	10	20	0	20	10	0
12	10	5	10	0	0	20	20	10	10	10	5
13	20	0	5	0	0	5	30	5	5	20	10
14	20	0	5	10		5	20	10	10	20	0
15	10	10	10	0	0	10	30	0	10	10	10
16	10	10	10	0	10	10	20	0	10	20	0
17	20	5	5	0	5	10	10	5	10	10	10
18	20	10	10	0	0	10	20	0	10	20	0
19	10	5	10	5	5	10	20	10	10	10	5
20	20	10	0	0	0	5	30	5	10	20	0

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21	20	5	10	5	0	10	20	0	20	10	0
22	10	5	10	0	0	20	20	10	10	10	5
23	20	0	5	0	0	5	30	5	5	20	10
24	20	0	5	10		5	20	10	10	20	0
25	10	10	10	0	0	10	30	0	10	10	10
26	10	10	10	0	10	10	20	0	10	20	0
27	20	5	5	0	5	10	10	5	10	10	10
28	20	10	10	0	0	10	20	0	10	20	0
29	10	5	10	5	5	10	20	10	10	10	5
30	20	10	0	0	0	5	30	5	10	20	0
31	20	0	5	0	0	5	30	5	5	20	10
32	20	0	5	10		5	20	10	10	20	0
33	10	10	10	0	0	10	30	0	10	10	10
34	10	10	10	0	10	10	20	0	10	20	0

Source: Field survey. 2025.