Inclusive Mobility among School Children with Disabilities in Benin City Nigeria

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Abstract

Children with disabilities (CWDs) constitute a significant segment of the global population, with estimates ranging from 93 to 150 million. In Benin City, Nigeria, CWDs face substantial educational exclusion, with less than 10% of CWDs enrolled in primary school, leaving a staggering 90% entirely outside the public primary and secondary school system. Compounding this exclusion are significant mobility barriers that impede CWDs' access to and utilization of mainstream public transportation for their daily school commutes. This study adopts a mixed-methods research approach to examine the mobility barriers experienced among 114 children with physical, visual, hearing, and learning impairments enrolled in public primary and secondary schools in Benin City, Nigeria. The findings revealed that 59.6% of CWDs rely on caregivers for their mobility to and from school, while only 40.4% are self-sufficient in their movement. Surprisingly, 59.6% of the respondents were unaware of the existence of inclusive mobility-related policies that safeguard them against discrimination by public transport drivers. Furthermore, 64.9% have never received any form of government mobility support, and 87.8% spend at least 15 minutes to an hour traveling to and from school. Notably, 98.2% of CWDs lack access to school buses and rely on various alternative modes of transportation, such as minibuses, comrade buses, taxis, tricycles, and non-motorized transport (NMT), for their school commute. To address the mobility barriers of CWDs, the study recommends a POST strategy that focuses on, prioritizes, offers, sustains, and trains for inclusive mobility for schoolchildren with disabilities.

***Keywords**: Mobility barriers, Inclusive mobility, school children with disabilities, Benin City, Nigeria.*

1.0 Background

Children living with disabilities are a ubiquitous presence across human societies. Globally, between 93 million and 150 million children live with a disability (ACPF, 2014; Their world, 2020). The term "children with disabilities" (CWDs), as used in this context, encompasses individuals under the age of 18 who experience long-term physical, visual, hearing, or intellectual impairments that, in conjunction with various societal barriers, hinder their full participation in society on an equal basis with children without disabilities (WHO, 2015). In many cities across low- and middle-

income countries (LMICs), CWDs are often overlooked, disregarded, and undervalued. The institutionalization of CWDs has persisted worldwide (Petrowsk et al., 2016). Globally, it is estimated that one in three children in institutional homes is a CWD (UNICEF, 2022). Studies have attributed this to cultural barriers in the form of beliefs, norms, and practices that see children with disabilities as burdens (Elshabrawi et al., 2021; Muhanna, 2018). Most of these CWDs disproportionately come from impoverished backgrounds and face significant challenges in accessing primary education (Stephen et al., 2019). The United Nations Educational, Scientific, and Cultural Organization (UNESCO) (2007, 2015) alarmingly reported that 9 out of 10 CWDs in LMICs are deprived of educational opportunities.

In Nigeria, there are no fewer than 7 million CWDs (Joint National Association of Persons with Disabilities, 2015). Sadly, less than 10% of all CWDs receive basic or primary education, while a staggering 90% remain entirely excluded from the education system (Their World, 2020; UNICEF, 2021). CWDs have a fundamental right to education without discrimination, as enshrined in the Convention on the Rights of the Child (CRC) and the Convention on the Rights of Persons with Disabilities (CRPD). These international conventions require states to adopt all necessary measures to ensure the full enjoyment of CWDs of all human rights and fundamental freedoms on an equal basis with other children (articles 7 and 24) (Handicap International, 2018).

Additionally, Nigeria is a signatory to the 17 Sustainable Development Goals (SDGs), specifically Goal 4, which targets that by 2030, all school-age children, including those with disabilities, must have access to quality, functional, and effective basic education (Joint National Association of Persons with Disabilities, 2015). To fully realize their right to education on an equal basis with other children, CWDs require inclusive mobility options that address the barriers they face in accessing and utilizing transportation systems. These options should be tailored to their specific needs and ensure their safe and timely arrival at school.

1.1 Review of related literature

Like their non-disabled counterparts, CWDs require mobility to travel to and from school, often relying on public transportation systems or walking. However, in most cities in LMICs, public transportation systems often disregard the unique travel needs of CWDs (Neelima, 2008; Omirin and Ojekere, 2017). A study by Sagahutu (2008) revealed the prevalence of poorly maintained roads and inadequate public transportation options for CWDs in LMIC cities. Additionally, the study highlighted the inaccessibility of school environments for many children with mobility impairments. These inaccessible and poorly designed structures create physical and architectural barriers that hinder the mobility of CWDs and their families, restricting their access to schools, services, and facilities (Anjlee, 2020).

Consequently, CWDs continue to face significant mobility barriers while commuting to and from school, rendering them the most vulnerable group to road traffic crashes (RTCs), injuries, and fatalities (Access Exchange International, 2017). Smith *et al.* (2021) emphasized that while mobility plays a crucial role in promoting well-being by connecting individuals to various destinations and

opportunities, it is not without its obstacles, particularly for vulnerable groups like CWDs. The rights of CWDs to access and experience places of opportunity, including schools, are often compromised by inadequate public transportation systems and by social norms and values rooted in ableism, which perceives CWDs as incapable and ill-equipped to utilize mobility systems (Dunn, 2021). Furthermore, institutional barriers such as discriminatory laws, policies, strategies, or practices continue to hinder the inclusion of CWDs in the public system (Ariyo and Joseph, 2017; Yohanna, 2019). Additionally, Kett and Deluca (2016) and Lubitow, Rainer, and Bassett (2017) found that a lack of empathy among public transport drivers and assistants discourages CWDs from using public transportation to and from school. In alignment with the Sustainable Development Goals (SDGs), Target 11.2 specifically aims to achieve safe, affordable, accessible, and sustainable transport systems for all, including children with disabilities (CWDs), by 2030. This target promotes an inclusive public transport approach that prioritizes meeting the transportation needs of all individuals, ensuring that no one is left behind, particularly vulnerable groups like CWDs. Moreover, Article 9 of the United Nations (UN) Convention on the Rights of Persons with Disabilities (CRPD) (2006) mandates countries to identify and eliminate obstacles and barriers that hinder the mobility of people with disabilities, including CWDs. This includes ensuring that CWDs are included and have access to their environment, transportation, public facilities and services, as well as information and communication technologies (Handicap International, 2018).

Inclusive mobility, in this context, refers to public transport systems, such as minibuses, taxis, tricycles, motorcycles, and other modes of transport, that are specifically designed to meet the mobility needs of CWDs. These systems aim to eliminate travel barriers while providing equal access to socioeconomic opportunities and aspirations. Velas-Suarin (2021) similarly defines inclusive transportation as a transportation system that facilitates mobility for all individuals, regardless of their circumstances. Key attributes of inclusive mobility include accessibility, affordability, availability, reliability, attractiveness, comfortability, and safety (Serra, Sarrió, and Magallon, 2022). Such mobility options are crucial for CWDs, as they enable them to travel to and from school with ease and participate fully in their communities. While studies like Wheeler (2009), Haveman (2013), Ross *et al*. (2020), Buliung *et al.* (2021), and Chan (2022) have explored various aspects of mobility barriers faced by schoolchildren with disabilities in developed countries, there is a lack of comprehensive research on mobility barriers faced by school children with disabilities in LMICs. Like their non-disabled counterparts, the lives, mobility, education, and future aspirations of CWDs are equally important and deserve to be addressed.

Therefore, this study aims to address this gap by investigating the mobility barriers and needs of school children with disabilities in Benin City, Nigeria. Specifically, it seeks to answer the following research questions: What do we know about the mobility barriers faced by school children with disabilities? What are the mobility needs of school children with disabilities? What strategy or option

exists for enhancing inclusive mobility among school children with disabilities? Besides, the study examines this hypothesis: Are there significant differences in mobility barriers experienced among different categories of school children with disabilities?

2.0 Universal design as a framework for inclusive mobility design among school children with disabilities

Enhancing inclusive mobility for school children with disabilities in LMIC cities requires a thorough understanding of their specific mobility needs. Universal design (UD) emerges as a crucial approach in designing mobility systems that cater to the needs of all users, regardless of their abilities or limitations. UD principles aim to create products, buildings, and environments, including transportation systems, that are accessible and usable by everyone to the greatest extent possible, without the need for further adaptations (University of Buffalo, 2023). In other words, UD seeks to design mobility systems that are inherently inclusive and accommodate the diverse needs of all users (North Carolina State University, 2008; Burgstahler, 2021).

Marie (2013) aptly describes UD as a value-based strategy for achieving an inclusive society where everyone has a place and the opportunity to participate fully. This notion encapsulates the essence of UD: to foster an inclusive society where everyone, regardless of their age, abilities, or disabilities, has equal opportunities to participate in all aspects of life (Nygaard, 2018). In the context of designing a safe and accessible mobility chain for school children with disabilities in LMIC cities, UD principles provide a valuable framework (Anjlee, 2020). UD advocates for prioritizing the specific mobility needs of school children with disabilities at every stage of the design process, from understanding their needs to planning, implementation, and evaluation (DFT, 2018; TUMI, 2019).

This approach ensures that the needs of students with disabilities are considered when retrofitting existing urban public transport systems or implementing new ones. By integrating UD principles into the design of mobility systems, LMIC cities can effectively address the mobility barriers faced by school children with disabilities, ensuring their protection and inclusion in school attendance and participation in all aspects of city life. The table below outlines the key principles of UD that can be applied to design inclusive and safe mobility solutions for school children with disabilities:

Table 1: Application of principles to inclusive mobility design for school children with disabilities

S/N	UD principles	Application to inclusive mobility design for school CWDs
1	Equitable use	This principle allows for the design of an urban public transport system to provide fair and just access for schoolchildren with disabilities.
2	Intuitive and easy-to-use	This principle allows for the design of an urban public transport system to be easily understood and used by schoolchildren with disabilities,

		regardless of their prior experience, knowledge, language skills, or current concentration level.
3	Flexibility in use	This principle allows for the design of urban public transport systems that accommodate a diversity of users' preferences and abilities.
4	Simple and intuitive	This principle allows for the design of an urban public transport system that eliminates extraneous complexity, which makes it suitable for schoolchildren with disabilities.
5	Perceptible information	This principle allows for the design of an urban public transport system such that travel information is organized in a way that is visible, consistent, accessible, and relatable to schoolchildren with disabilities.
6	Tolerance for error	This principle allows for the design of urban public transport systems to minimize hazards in the event of crashes or unintended actions by schoolchildren with disabilities.
7	Size and space for approach and use	This principle allows for designing an urban public transport system such that schoolchildren with disabilities, including wheelchair users, have enough space to be well accommodated.

Source: Authors' Compilation (2023).

Elaboration of universal design in inclusive mobility for children with disabilities. An urban public transportation system designed using the principles of universal design (UD) can significantly enhance the rights of school children with disabilities to inclusive mobility and ensure their safety in LMIC cities. Without inclusive mobility options, CWDs are less likely to attend and complete primary education in most LMIC cities (UNICEF, 2012; UNICEF, 2013).

3.0 Methodology

The Mixed-methods research (MMR) design was employed as the methodological framework for this study to effectively address its aim and objectives. MMR is an integrative research approach that combines both quantitative and qualitative research methods to comprehensively answer research questions within a single study (Aramo-Immonen, 2011; Kumar, 2015). The fundamental premise of MMR lies in its ability to facilitate a more comprehensive utilization of data, thereby providing a more holistic understanding of human behaviour and experiences related to the phenomena under investigation (Wisdom and Creswell, 2013). Kumar (2015) highlighted the strengths of MMR, emphasizing its inclusivity, pluralism, complementarity, and eclectic nature, which enhance its potential to effectively address critical research questions. The validity of the MMR approach in disability transport research has been established in various studies. For instance, Velho, Holloway, Symonds, and Balmer (2015) employed a mixed-methods analysis to explore the impact of transportation accessibility on the social inclusion of wheelchair users.

The target population for this research comprised public school children with disabilities aged 6-18 residing in Benin

City, Nigeria. Geographically, Benin City is situated within latitudes $6^0$26'N and $6^0$31'E and longitudes $5^0$35'E and $5^0$41'E, respectively. It encompasses three (3) urban local government areas (LGAs): Oredo, Ikpoba-Okha, and Egor (refer to Figure 1 below).

3.1 Sampling technique

The study adopted a cluster sampling technique. The cluster sampling technique is a probability sampling method in which the population is divided into smaller groups called clusters. A random sample of clusters is then selected, and all elements of the selected clusters are included in the sample (Lohr, 2019). Following this approach, Benin City, the study area, is divided into three urban Local Government Areas (LGAs): Oredo, Ikpoba-Okha, and Egor, and three peri-urban LGAs: Ovia North East, Ovia South-West, and Uhuwande (Figure 1). Within the city, there are two public special secondary schools and two public special primary schools that cater to students with disabilities (CWDs).

The public special secondary schools include Idia College and Iyogbe College, located in Oredo LGA, while the public special primary schools are Ivoire Primary School, also located in Oredo LGA, and the School for the Physically Impaired, located in Uhuwande LGA. Out of these four public special schools, two secondary schools, Idia College and Iyogbe College, were randomly selected from the Oredo LGA cluster, and one primary school, the School for the Physically Impaired, was randomly selected from the Uhuwande LGA cluster. GWDs enrolled in these three selected special public schools participated in the study. A cross-sectional research design was adopted, allowing researchers to collect data from a population at a specific point in time and draw inferences from the collected data.

3.2 Sample frame and size

The study included four categories of children with disabilities (CWDs): physically impaired, visually impaired, hearing impaired, and learning/speech impaired. The sample frame for this research was derived from the 2020 baseline survey of four public special schools in Benin City, Nigeria, where CWDs are enrolled. The sample frame from the baseline survey comprised 282 schoolchildren with disabilities. To determine the sample size for this study, 40% of the sample frame was selected, resulting in a total of 113 school children with disabilities.

3.3 Instrument for data collection

The primary instruments for data collection in this study were a structured questionnaire and a focus group discussions (FGDs) guide. The structured questionnaire, comprising closed-ended questions, was employed to gather quantitative data from respondents on their mobility barriers and needs, while FGDs were utilized to collect qualitative data on the lived experience of mobility among respondents. Each FGD included a minimum of one participant from each of the following categories: physically impaired, visually impaired, hearing impaired, and speech impaired. A total of ten (10) CWDs, aged 12 to 18, participated in the FGDs. The data obtained from the field survey were coded and analyzed using SPSS for quantitative analysis and Atlas Ti for qualitative analysis.

Descriptive and inferential statistics were employed to characterize the respondents and generate evidence for

enhancing inclusive mobility among school children with disabilities in Benin City, Nigeria.

3.4 Results and Analysis

3.4.1 Test for validity and reliability of data collection instrument

The validity of the quantitative instrument was tested using Pearson product-moment correlation (PPMC), with a significance level of < 0.05 indicating that the instrument is valid. On analysis, Pearson correlation gave a significance level of 0.000 < 0.05 for all variables. Hence, the instrument is valid for the research. Cronbach's alpha was used to test for reliability, with reliability statistics < 0.6 being the minimum acceptable coefficient, which implies that Cronbach's alpha > 0.6 indicates that the instrument is reliable. Cronbach's alpha on analysis had a value of 0.839 > 0.6. Hence, the instrument is reliable for the research.

Figure 1: Map of Benin City in the Context of Edo State, Nigeria

Source: Authors' Mapping (2023).

3.4.2 Socio-Demographic Characteristics of Respondents

Table 2: Socio-demographic characteristics of respondents

Characteristics		**No. = 114**	**%**
Sex	Male	57	50
	Female	57	50
Age group, years	6 - 12 Years	30	26.3
	13 – 18 Years	84	73.7
School	Primary school	46	41.4
	Secondary school	65	58.6
Local Government Area	Oredo	36	31.9
	Ikpoha-Okha	42	37.1
	Egor	26	23
	Others	9	8
Types of Disability	Physical Impairment	10	8.8
	Visual Impairment	34	29.8
	Hearing Impairment	55	48.2
	Speech Impairment	15	13.2
Cause of Disability	Birth defect	50	56.8
	Poliovirus	5	5.7
	Road crash/accident	6	6.8
	Disease of the eye	26	29.5
	Others	26	29.5
Duration of Disability	Since birth	40	35.7
	Less than 1 year	10	6.3
	1 – 5 years	10	8.9
	6 – 10 years	14	13.4
	11 – 15 years	26	23.2
	Above 16 years	14	12.5
School Trip Experience	Dependent on someone	68	59.6
	Not dependent on someone	45	40.4
Dependent on Who	Father	21	25.6
	Mother	35	42.7
	Brother	6	7.3
	Sister	5	6.1
	Family relative	6	7.3
	Neighbour	7	8.5
	Others	2	2.4

Source: Authors' Analysis (2023).

The demographic characteristics of the respondents revealed an even gender distribution, with 50% identifying as male and 50% identifying as female. In terms of age, 26.3% of the respondents were between 6 and 12 years old, while 73.7% were between 13 and 18 years old. Regarding school type, 41.4% of the respondents attended primary school, and 58.6% attended secondary school. The distribution of respondents' local government areas (LGAs) of residence indicated that 31.9% lived in Oredo, 37.1% in Ikpoha-Okha, 23% in Egor, and 8% in other LGAs. When examining the types of disabilities among the respondents, 48.2% identified as hearing impaired, 29.8% as visually impaired, 13.2% as speech impaired, and 8.8% as physically impaired. The primary causes of disability were identified as birth defects (56.8%), eye disease (29.5%), road traffic crashes (6.8%), the polio virus (5.7%), and other factors (29.5%).

Regarding the onset of disability, 35.7% of the respondents were disabled from birth, while 23.2% were disabled between 11 and 15 years old. In terms of mobility dependence, 59.6% of the respondents relied on assistance for travel to and from school, while 40.4% were independent in their mobility. Among those who were travel-dependent, 42.7% primarily relied on their mother for transportation, and 25.6% depended on their father.

3.4.3 Mobility barriers of school children with disabilities

Modes of public transport used to and from school, as shown in Figure 2, showed that 98.2% of school children with disabilities do not have access to school buses. As a result, a substantial proportion of the students relied on minibuses (33.7%), taxis (23.9%), comrade buses (18%), NMT (12.8%), and tricycles (10.3%) as a mode of travel to and from school. These various travel modes to and from school were buttressed by these statements from two of the participants at the FGD session:

> *"I use public transport because the distance will not be easy for me to trek" FGD – Visually impaired student, (2023).*
> *"I do not use public transport because I live around the school and usually walk to school" (FGD – Speech impairment student, 2023).*

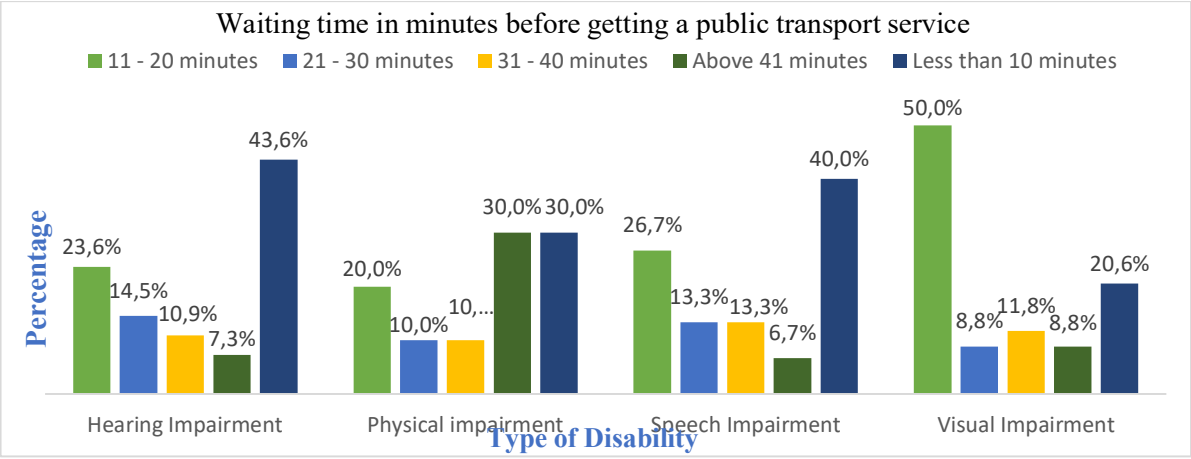

Figure 3: Waiting time in minutes before getting a public transport service
Source: Authors' Analysis (2023)

The waiting time in minutes before getting a public transport service, as shown in Figure 3, indicated that 79.4% of all schoolchildren with disabilities spend 11 minutes or more waiting before getting a public transport service to and from school. Interestingly, the study revealed that among all categories of students, visually impaired students (50%) spent the most time (11–20 minutes) waiting for public transport.

This was buttressed by the statement from one of the participants at the FGD session:

> *"Most times when I wait for public transport between 15 – 20 minutes and it does not come on time, and when it comes, it is quickly occupied with other passengers, leaving me behind" FGD – Speech impaired student, (2023).*

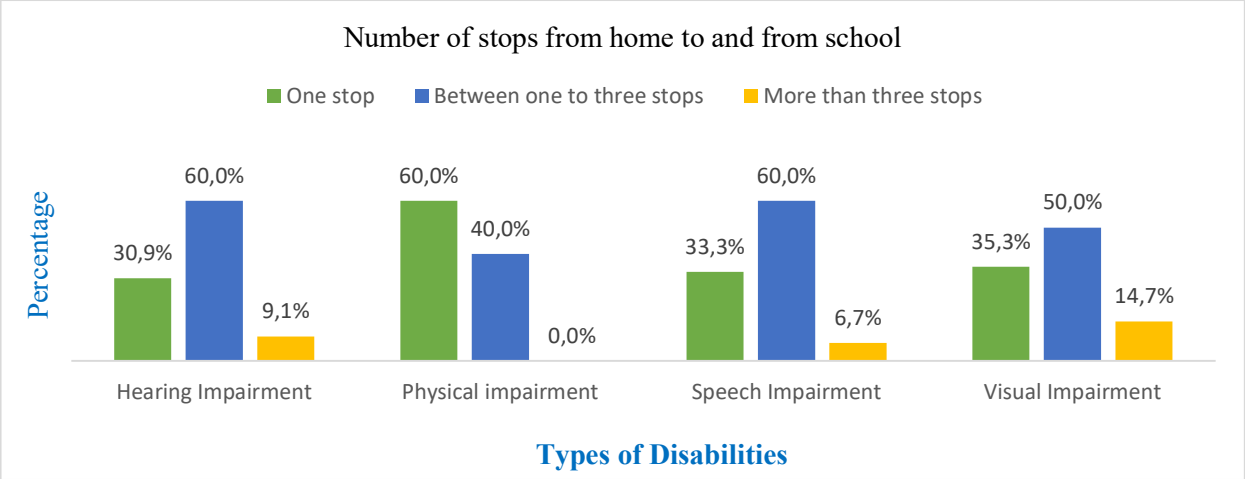

Figure 4: Number of stops from home to and from school
Source: Authors' Analysis (2023)

Table 3: Respondents perception of quality of public transport services

	Row label	Very high	High	Moderate	Low	Very low	Grand Total
Perception of availability of public transport service	Hearing Impairment	21.8%	30.9%	10.9%	10.9%	25.5%	100.0%
	Physical impairment	10.0%	20.0%	30.0%	20.0%	20.0%	100.0%
	Speech Impairment	13.3%	26.7%	20.0%	26.7%	13.3%	100.0%
	Visual Impairment	5.9%	23.5%	23.5%	17.6%	29.4%	100.0%
	Grand Total	14.9%	27.2%	17.5%	15.8%	24.6%	100.0%
Perception of the timeliness of public transport service	Hearing Impairment	27.3%	9.1%	12.7%	21.8%	29.1%	100.0%
	Physical impairment	20.0%	20.0%	20.0%	30.0%	10.0%	100.0%
	Speech Impairment	6.7%	20.0%	33.3%	20.0%	20.0%	100.0%

Visual Impairment	20.6%	0.0%	23.5%	41.2%	14.7%	100.0%
Grand Total	21.9%	8.8%	19.3%	28.1%	21.9%	100.0%

Source: Authors' Analysis (2023)

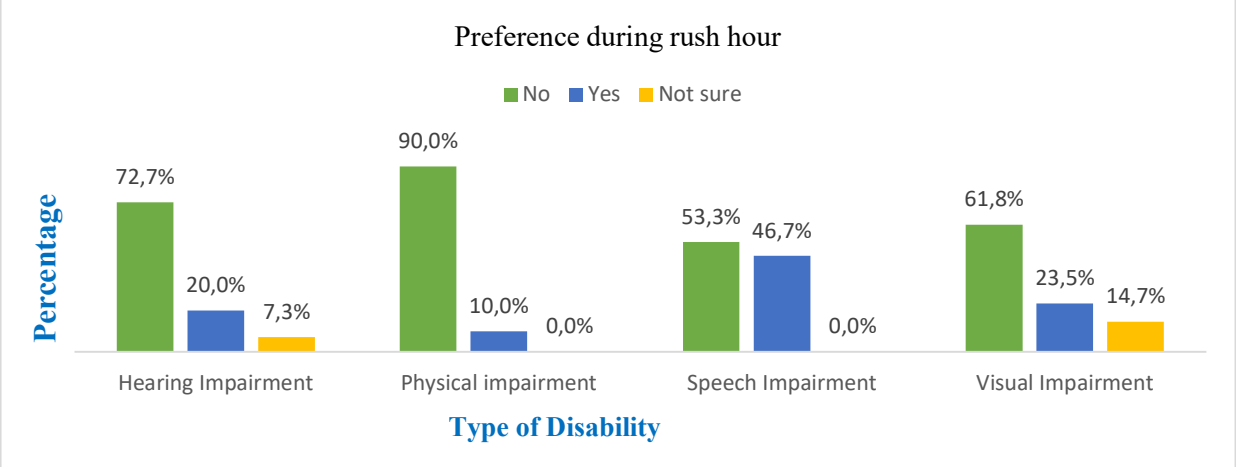

Figure 5: Preference during rush hour
Source: Authors' Analysis (2023).

The number of stops made from home to and from school, as shown in Figure 4, indicates that on average, 60.1% of all school children with disabilities made two stops on their way to and from school. This is indicative of a lack of proximity between the homes of this group of students and the special schools that they attend.

The perception of the quality of public transport service, as shown in Table 3, indicated that public transport was not available to 40.4% of school children with disabilities to and from school, while 50% of school students with disabilities considered the timeliness of public transport service low.

Preference during rush hour by public transport drivers, as shown in Figure 5, indicated that 68.4% of all respondents were not considered to enter and sit in public transport vehicles by drivers during rush hours. It was also revealed that 90% of physically impaired students, 72.7 percent of hearing impaired students, 61.8 percent of visually impaired students, and 53.3% of speech impaired students were given the least preference by bus drivers during rush hour. This was buttressed by the statement from one of the participants at the FGD session:

> *"If I don't have someone with me, there won't be anyone to tell me to sit either in front or back of the bus. I will have to trace it myself. In the process of tracing it myself, my hand may mistakenly meet another passenger which will be embarrassing." FGD – visually impaired students (2023).*

The duration in minutes from home to school, as shown in Figure 6, indicates that (64.3%) of all respondents spent on average 15 minutes to 1 hour travelling before getting to and from school. It was also revealed that the school they were enrolled in was not within walking distance of their home.

This was buttressed by the statement from one of the participants at the FGD session:

> *"The distance between where I live and my school is quite far, and it takes a lot of time before I reach my school." FGD – visually impaired students (2023).*

The cost of public transport service to and from school, as shown in Figure 7, indicated that 66.4% of all the respondents reported spending less than 500 Naira, while the others 33.6% spent above 500 Naira (1.30 USD) on transport to and from school daily.

This was buttressed by the statement from one of the participants at the FGD session:

> *"My home is very far from my school. My mother brings me to school daily. She spends about 1,000 Naira on transport to and from school." FGD – Speech impaired student, (2023).*

Sufficiency of time to board and alight from public transport modes, as shown in Figure 11, revealed that 60.2% of respondents had sufficient time to board and alight from public transport modes, whereas 39.8% of respondents did not get sufficient time to board and alight from public transport to and from school. More so, it also revealed that 64.7% of the visually impaired respondents had the least sufficient time given to them to board and alight from public transport mode, compared with 33.3% of the speech impaired, 30.9% of the hearing impaired, and 30% of the physically impaired respondents.

This was buttressed by the statement from one of the participants at the FGD session:

> *"Whenever I am using public transport, the drivers are always in a hurry. When they stop, other passengers will want to enter, causing a rush. Inside the vehicle, the driver may not get to the exact bus stop you want to stop at. If you get to tell them once, they will not respond, or sometimes they will respond with just a nod. I won't be able to see them because I am blind. But when you remind them again the second time, they will shout at you." FGD: visually impaired student (2023).*

"Also, while alighting from the vehicle, they won't wait for you to come down properly. They will definitely make you fall off the vehicle, or someone will push you. You may still be coming down without your leg landing on the floor, and the bus will move." FGD: physically impaired student (2023).

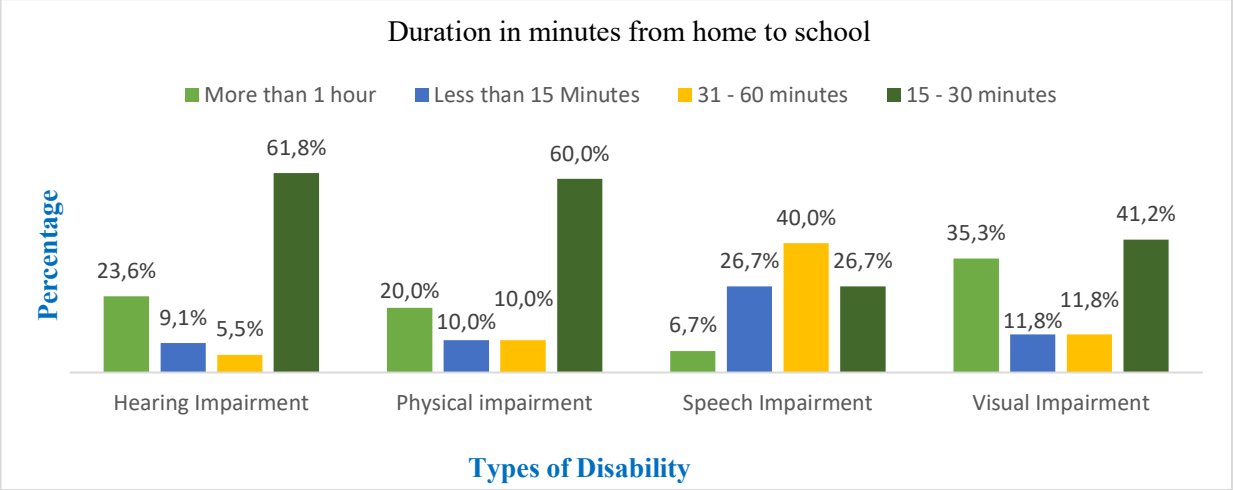

Figure 6: Duration in minutes from home to school
Source: Authors' Analysis (2023)

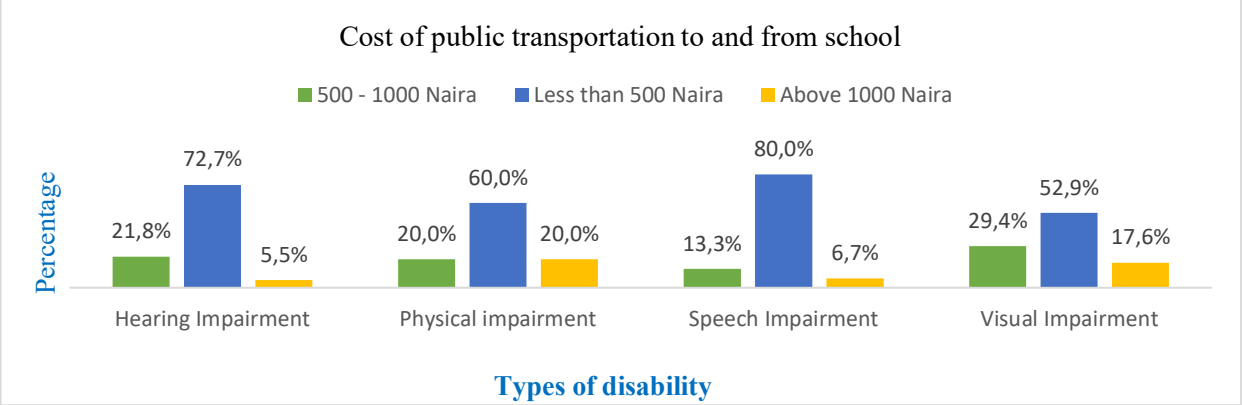

Figure 7: Cost of transportation to and from school
Source: Authors' Analysis (2023)

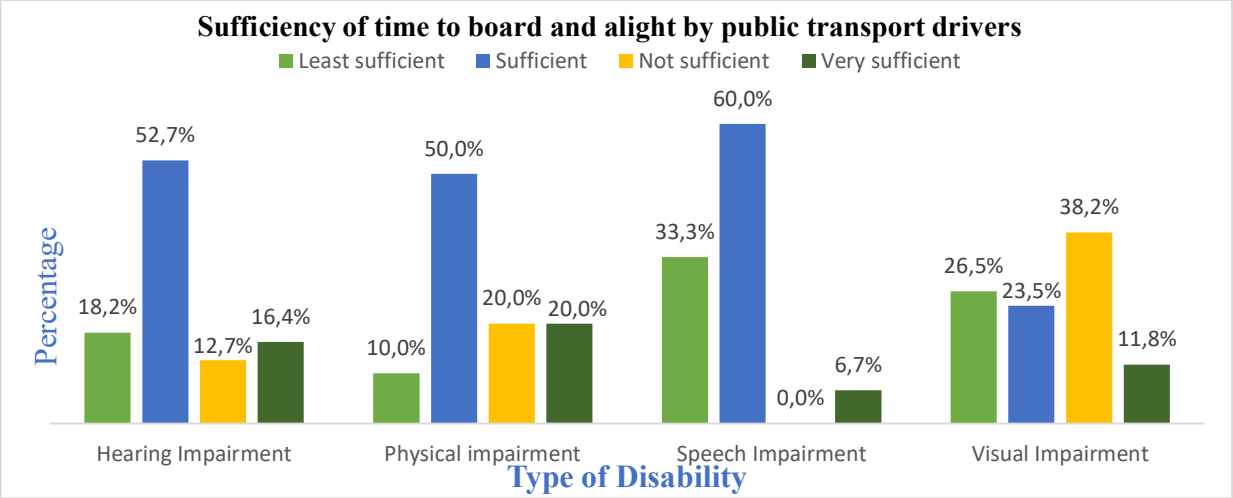

Figure 8: Sufficiency of time to board and alight from public transport mode
Source: Authors' Analysis (2023)

3.4.4 Mobility Needs of School Children with Disabilities

Table 4 shows the highest mobility needs of children living with disabilities in Benin City, Nigeria, based on percentages. The physically impaired students had the following highest needs: affordability (70%), safety (70%), and comfortability (60%). Similarly, the hearing-impaired students had the following highest needs: availability (62.3%), safety (48.1%), and comfortability (45.1%). The visually impaired students had the following highest needs: accessible travel information (54.9%), affordability (54.8%), and availability (51.6%). The speech-impaired students had the following highest needs: availability (60%), safety (60%), and comfortability (53.3%).

Table 4: Ranking of mobility needs based on categories of disabilities

Mobility needs		Categories of disabilities		
		Physical impairment		
		High	**Moderate**	**Low**
1	Affordability of public transport	70.0%	10.0%	20.0%
2	Safe public transport	70.0%	10.0%	20.0%
3	Safe crossing facilities	60.0%	0.0%	40.0%
4	Comfort in public transport	60.0%	20.0%	20.0%
		Hearing impairment		
5	Availability of public transport	62.3%	7.5%	29.9%
6	Safe public transport	48.1%	11.5%	23%
7	Comfortability in public transport	45.1%	21.6%	27.5%
8	Affordability of public transport	37.8%	30.2%	39.6%
		Visual impairment		
9	Access to travel information	54.9%	6.5%	38.7%
10	Affordability of public transport	54.8%	6.5%	38.8%
10	Availability of public transport	51.6%	16.1%	32.3%
11	Barrier-free pedestrian sidewalk	46.7%	20.0%	33.3%
12	Safe pedestrian crossing	46.6%	16.7%	38.7%
		Speech impairment		
13	Availability of public transport	60%	13.3%	26.7%
14	Safe public transport	60%	13.3%	26.7%
15	Comfortability in public transport	53.3%	26.7%	20%
16	Affordability of public transport	50%	1.7%	42.2%

Source: Authors' Analysis (2023)

3.4.5 Difference in mobility barriers experienced among school children with disabilities

One-way analysis of variance (ANOVA) was used to test the stated hypothesis;

There is a significant difference in mobility barriers experienced among school children with disabilities. Dependent variables include physical barriers, social barriers and personal/emotional barriers as dependent variables, while categories of disabilities are independent variables.

Table 5: ANOVA table for mobility barriers experienced by schoolchildren with disabilities

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Physical barriers	Between Groups	5.476	3	1.825	5.542	.001
	Within Groups	35.567	108	.329		
	Total	41.042	111			
Social barriers	Between Groups	1.590	3	.530	1.353	.261
	Within Groups	42.301	108	.392		
	Total	43.891	111			
Psychological/emotional barriers	Between Groups	2.662	3	.887	3.057	.032
	Within Groups	30.181	104	.290		
	Total	32.842	107			

Source: Authors' Analysis (2023)

Table 5, the ANOVA table above shows that there exists a statistically significant difference between our group means as shown in the $F(3,108) = 5.542$, with $p = 0.001$ for physical barriers. It is also seen that there is a significant difference between group means of personal and emotional barriers as shown in the F-value of 3.057 with $p = 0.032$ which are both less than $p = 0.05$. This is an indication that across the various types of disabilities, there is a significant difference in physical barriers and personal/emotional barriers experienced among school children with disabilities. The table also shows non-significance between group means in social barriers with F-value = 1.353 and $p = 0.261 > 0.05$. Hence, there is no significant difference in the social barriers experienced among school children with disabilities.

After establishing the significance of the ANOVA, we can then proceed with the post hoc test.

Table 6: Post hoc test

Dependent variable	Type of disabilities	Mean
Physical barriers	Physical Impairment	1.9800
	Visual Impairment	1.8737
	Hearing Impairment	2.3704
	Speech Impairment	2.0944
	Total	2.1522
Social barriers	Physical Impairment	2.1944
	Visual Impairment	2.2399
	Hearing Impairment	2.3654
	Speech Impairment	2.3167
	Total	2.3066
Psychological/emotional barriers	Physical Impairment	2.2130
	Visual Impairment	2.1515
	Hearing Impairment	2.4936
	Speech Impairment	2.4464

Source: Authors' Analysis (2023)

Table 6: Multiple comparisons Table (Tukey HSD)

Dependent Variable	Type of disabilities	P- value (sig.)	Significance
Physical Barriers	Physical vs visual impairment	.956	No
	Physical vs hearing impairment	.203	No
	Physical vs speech impairment	.962	No
	Visual vs hearing impairment	.001	Yes (hearing > visual)
	Visual vs speech impairment	.606	No
	Hearing vs speech impairment	.357	No
Social barriers	Physical vs visual impairment	.998	No
	Physical vs hearing impairment	.880	No
	Physical vs speech impairment	.969	No
	Visual vs hearing impairment	.813	No
	Visual vs speech impairment	.980	No
	Hearing vs speech	.994	No
Psychological/emotional barriers	Physical vs visual impairment	.990	No
	Physical vs Hearing impairment	.476	No

	Physical vs speech impairment	.741	No
	Visual vs hearing impairment	.026	Yes (hearing > visual)
	Visual vs speech impairment	.320	No
	Hearing vs speech impairment	.991	No

Source: Authors' Analysis (2023)

The multiple comparisons table above shows which groups differed from each other. The Tukey post hoc test is generally the preferred test for conducting post hoc tests on a one-way ANOVA. We can see from the table that there is a statistically significant difference in physical barriers experienced by the visual impairment and the hearing impairment (0.001) and also there is a difference in the personal and emotional barriers experienced by the visual and hearing impairment (0.026) with the mean of the hearing impaired (2.3704, 2.4936) being greater than that of the visual impaired (1.8737, 2.1515) for both respectively. However, there are no differences in the other mobility barriers experienced in other groups under the physical, social and personal/emotional barriers among school children with disabilities.

4.0 Discussion of Findings, Conclusion and Recommendations

4.1 Discussion

A gender breakdown of the respondents revealed an equal distribution, with 50% identifying as male and 50% identifying as female. Regarding age, 26.3% of the respondents were between 6 and 12 years old, while 73.7% were between 13 and 18 years old. The distribution of respondents across school types indicated that 41.4% attended primary school and 58.6% attended secondary school. An analysis of respondents' local government areas (LGAs) of residence showed that 31.9% lived in Oredo, 37.1% in Ikpoha-Okha, 23% in Egor, and 8% in other LGAs. The study found that 48.2% of the respondents were hearing impaired, while 29.8% were visually impaired. The respondents also self-reported the causes of their disabilities, with 56.8% attributing their impairments to birth defects and 29.5% to eye disease. Regarding the duration of their disabilities, 35.7% of the respondents had been disabled since birth, while 23.2% had acquired their disabilities between the ages of 11 and 15. Importantly, the study also revealed that 59.6% of the respondents relied on assistance for mobility to and from school, while 40.4% were independent in their mobility. Among those who were travel-dependent, 42.7% primarily relied on their mother for transportation, and 25.6% depended on their father.

In terms of mobility barriers faced by schoolchildren with disabilities in Benin City, Nigeria, the average travel time from home to school was found to be 15 minutes to 1 hour, with 64.3% of respondents spending this duration. This extended travel time can be attributed to the widespread exclusion of schoolchildren with disabilities from mainstream public transportation options in the city. This finding aligns with previous research. For instance, Hawani et al. (2021) reported an average commuting time of 12 to 25 minutes for students with special needs in Johor Bahru, Malaysia. Similarly, Buliung et al. (2021) found that students with

disabilities in Ontario, Canada, experienced substantial excess travel time, particularly those labelled as deaf, physically disabled, or having behavioural exceptionalities. This excess travel time can exacerbate missed classroom time and limit opportunities for peer interaction. Regarding the mode of public transport used by schoolchildren with disabilities, only 1.8% had access to school buses, with the remaining 98.2% relying on minibuses, commune buses, taxis, tricycles, and NMT for their daily commute. This finding is consistent with a study by Ojekere et al. (2021), who reported that minibuses and taxis were the most common modes of transport for the PWD population in Benin City. Additionally, 60.1% of respondents made two stops on average during their commute, indicating a lack of proximity between homes and school locations. Perceptions of the availability and timeliness of public transport services also revealed significant challenges. A substantial proportion of respondents (40.4%) lacked inclusive access to existing public transport services, with 40% of the physically impaired and 47% of those with visual impairments reporting particular difficulties. Moreover, 55.9% of respondents rated the timeliness of public transport services as low or moderate with respect to meeting their travel needs.

In terms of driver consideration and seating arrangements, 68.4% of respondents faced difficulties entering and sitting in public transport vehicles during rush hours. Additionally, the majority of respondents lacked priority or dedicated seats reserved for them in government-owned and managed public transport vehicles. The waiting time for public transport services was also a significant barrier, with 79.4% of respondents spending an average of 11 minutes waiting before getting a public transport service to and from school. Furthermore, 66.4% of respondents spent a minimum of 100 Naira (1.25 USD) on a single trip to school on daily transportation, while 33.6% spent more than ₦500.

A comprehensive analysis of the mobility needs of schoolchildren with disabilities revealed distinct priorities for each group. The physically impaired students identified affordability, safety, comfort, public transport, and safe crossing facilities as their top five mobility needs, with each need receiving a 70% endorsement rate. Similarly, the hearing-impaired students prioritized available, safe, and comfortable public transport, with respective endorsement rates of 62.3%, 48.1%, and 45.1%. For visually impaired students, accessible travel information, affordability, and availability of public transport emerged as the most critical needs, each receiving endorsement from over 50% of respondents. Finally, speech-impaired students identified availability, safety, and comfortability in public transport as their top three mobility needs, with each need endorsed by at least 60% of respondents. This finding is consistent with Buliung et al. (2021), who also found that the availability of mobility services for students with disabilities will confer significant access to education for students with disabilities.

The results of the ANOVA indicated that schoolchildren with disabilities across all disability types faced similar physical barriers, as determined by $F(3,108) = 5.542$, $p = 0.001$. However, a significant interaction effect was observed for emotional or psychological barriers, $F(3,104) = 3.057$, $p = 0.032$. This suggests that while schoolchildren with disabilities generally encounter similar physical barriers, their experiences of emotional or psychological barriers may vary depending on the specific type of disability.

4.2 Strategies to boost inclusive mobility among school children with disabilities

This study has uncovered several gaps in understanding the mobility challenges and needs of schoolchildren with disabilities in LMIC cities. Based on the research findings, the POST strategy has been offered, which indicates, prioritizes, offer, sustain, and train for inclusive mobility of schoolchildren with disabilities:

- **Prioritize school bus services for school children with disabilities**

School bus services are essential to break the cycle of mobility exclusion faced by thousands of schoolchildren with disabilities in LMIC cities. Therefore, state governments, in collaboration with education ministries, should provide free, disability-inclusive school buses for each special-needs school across the city. This will undoubtedly contribute to increased school attendance rates among children with disabilities.

- **Offer free public transport services for children with disabilities**

Affordable public transport service to and from school remains a crucial need for children with disabilities. In view of this, public transportation services should be made free for schoolchildren with disabilities who are identified with a uniform and a designated school identity card. This will help to ease the burden of travel costs on their parents and encourage school attendance among this group of students.

- **Sustain seat reservations on government public mass transit for children with disabilities**

As a policy matter, dedicated seat reservations should be prioritized for students with disabilities on government-owned public mass transit services. Students can be identified using a school ID issued by the state Ministry of Education. Furthermore, bus drivers and assistants should strictly enforce the use of these dedicated seats, and a system for reporting non-compliance should be established.

- **Sensitize public transport operators on the mobility needs of children with disabilities**

Equipping public transport operators, including drivers and conductors, with the necessary knowledge of CWDs' mobility needs is paramount for delivering truly inclusive public transport services. Therefore, comprehensive training programs should be implemented across the city's public transport system, focusing on sensitizing operators to the travel requirements of CWDs and equipping them with the skills to effectively address those needs.

4.3 Conclusion

The analysis, discussions, and findings of this study reveal that schoolchildren with disabilities face varying degrees of mobility exclusion in their daily commute to and from school in LMIC cities. There is an urgent need to move beyond the current narrative of disabling public transport systems, which continue to hinder the potential and abilities of schoolchildren with disabilities, and towards an inclusive and equitable approach to urban mobility. To achieve this transformation, the mobility needs of schoolchildren with disabilities must be recognized and prioritized within the urban public mobility system.

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