

Assessment of Modal Choice of Physically Challenged People in Oyo State, Nigeria.

AWOREMI J. R.¹, AZEEZ BOLANLE RIDWAN², ADEBANJO A. A.³

^{1, 2, 3}*Department of Transport Management, Ladoke Akintola University of Technology, Ogbomosho, Oyo State, Nigeria.*

Abstract- Mobility is a crucial aspect of human life, facilitating access to social, economic, and cultural activities. Despite growing awareness of the challenges faced by physically challenged individuals in accessing reliable transportation, there remains a significant gap in understanding their mobility patterns, which hinders the development of effective strategies to improve their transportation systems in Oyo State, Nigeria. This study aimed to assess the modal choice of physically challenged individuals in Oyo State, Nigeria. The study adopted a descriptive research design with the use of a well-structured questionnaire. The population consisted of 2,449 students in special basic schools using multistage sampling technique, including purposive sampling, proportional stratified random sampling, and systematic random sampling with a sample size of 344 respondents. Data analysis was conducted using descriptive statistics and inferential statistics. Descriptive statistics was used to analyze socio economic characteristics and inferential statistics of multiple regression analysis were used to examine the modal choice of physically challenged people. Findings from the result of multiple regression analysis aimed to examine the modal choice of physically challenged people showed that all the four (4) explanatory variables were significant in explanatory the variation of mobility of physically challenged people. These variables were public transportation ($p = 0.000$), private vehicles ($p = 0.000$), specialized transport service ($p = 0.000$), and walking/wheelchair ($p = 0.000$). This study concluded that Modal choice has significant effect on the mobility of physically challenged individuals in Oyo state. However, it is recommended that public transport providers and private vehicle owners invest in accessible vehicles equipped with ramps, lifts, and designated spaces for wheelchairs to ensure that physically challenged individuals can easily access transportation services.

Indexed Terms- Modal choice, physically challenged, Assessment, Oyo state.

I. INTRODUCTION

Mobility is a crucial aspect of human life, facilitating access to social, economic, and cultural activities. For physically challenged individuals, however, mobility often presents significant challenges that impact their ability to participate fully in society. According to the World Health Organization (2018), over one billion people, approximately 15% of the world's population, live with some form of disability. Among these, a significant number have mobility impairments due to conditions such as spinal cord injuries, cerebral palsy, muscular dystrophy, and amputations. These impairments not only affect an individual's physical capabilities but also their psychological and social well-being. Ensuring that physically challenged individuals have access to appropriate mobility solutions is essential for their independence and quality of life.

Understanding the mobility patterns of physically challenged people involves examining both the physical and social environments they navigate. This includes evaluating the availability and effectiveness of mobility aids, the accessibility of public infrastructure, and societal attitudes towards disability. Mobility aids, such as wheelchairs, prosthetic limbs, and assistive devices, play a crucial role in enhancing the mobility of physically challenged individuals. However, the effectiveness of these aids depends on their suitability to the individual's needs and the accessibility of the environments in which they are used (Smith and Ebrahim, 2020).

In Nigeria, the National Population Commission (2018) estimates that approximately 3.2 million people, or about 2% of the population, live with a

disability. However, other estimates suggest the number may be higher due to underreporting and the stigma associated with disability. The challenges faced by physically challenged individuals in Nigeria are compounded by inadequate infrastructure, limited access to healthcare and assistive devices, and societal attitudes that often marginalize disabled individuals (Abang, 2019). Comparatively, in other developing countries, similar barriers to mobility are observed. The lack of inclusive design in public infrastructure and transportation systems poses significant obstacles for physically challenged individuals. For example, in India, the Census 2011 reported that 2.21% of the population has a disability, with physical disabilities being the most common. The accessibility of public spaces and transportation remains a significant issue, limiting the mobility and participation of physically challenged individuals in societal activities (Mitra and Sambamoorthi, 2020).

Ajayi and Aworemi (2020) carried out a research on Intermediate Public Transport Services and the Travel Characteristics of Physically-Challenged Individuals in Oyo State. The research works on travel characteristics of physically challenge individual focusing on travel pattern and the factors affecting their choice of demand for Intermediate Public Transport Services. Findings reveal that access to education is the most important need for the physically challenged in Oyo State. More so, the study also revealed that physical challenged individual prefers to travel by motorcycle due to its preponderance and maneuverability between vehicles in intra-urban movement. Also, Omirin et al (2017) carried out a research on ‘The role of public transport in meeting the transport needs of the physically challenged persons in Benin City’. It examined the trip patterns and accessibility barriers encountered by these specialized group of people in the use of existing public road transport infrastructure and services.

II. LITERATURE REVIEW

2.1 Trip Pattern

Trip patterns directly deal with the behavioral aspect of human nature thus it needs to closely monitor and understand the factors that affect this decision making procedure. A number of factors come into play and can be broadly classified as characteristics of trip maker,

characteristics of trip, characteristics of mode as well as many latent factors like comfort and convenience (Goel *et al.*, 2018). According to Burgmanis (2022) most of the transportation modes can make a reasonable claim to be able to satisfy all trip purposes within community. There are, however, modes that respond best to selected situations with identifiable needs. With respect to users group, the options are more complicated because people tend to have differing expectations. These range from placing comfort features first to a single-minded emphasis on affordability. Students are concerned with the trip patterns according to their trips purpose that is required to be fulfilled. The extent to which socio-economic activities of students affect trip pattern in a non-residential university environment has remained a subject of concern among students in a non-residential university environment (Martín et al., 2019).

2.2 Mode-choice Determinants

Most studies have found that travel time, travel cost, and convenience are the key determinants of students’ mode choice. These were ranked as the first three factors affecting mode choice by the students of Ateneo De Manila University and Miriam College in Philippines (De Guzman and Diaz, 2015). Choueiri *et al.* (2023), who also studied the travel behavior of students at Ohio State University, concluded that the determinants of students’ mode choice can be subsumed under four factors labeled as “safety and weather”, “cost and environment”, “travel time and departure flexibility”, and “travel time and making stops”.

Other research studies assessed how socio-economic, demographic, and psychological characteristics can impact the mode choice of university campus travelers. Zhan et al. (2016) utilized a web-based travel survey to collect student’s mode choices over eight different universities in China. Findings showed that females use more public transit, where males depend on biking more frequently. Other factors discussed were bike ownership and travel distance, where walking potential decreased significantly with the increase in travel distance.

The effect of car ownership on students’ mode choice was studied by Limanond *et al.* (2021), who conducted a descriptive study of the travel behavior of students

living on campus at the Suranaree University of Technology in Thailand using trip diaries filled out by students. The results indicated that students who owned a car were most likely to use it while others would resort to ride sharing or using the bus, which is the only public transport mode available there. However, car ownership did not affect the number of trips performed by students or the total distance traveled.

Liu (2016) evaluated university students' mode choice in Danang, Vietnam. The mode choice was modeled using a conditional logit regression model, which was used to assess the factors influencing student's mode choice for their trips. Findings showed that student characteristics such as age, gender, and income significantly impact their mode choice decision. Travel time was found to have a strong negative effect on walking. Students using motorcycles were willing to switch to public transport if an efficient and reliable public transport system is available.

III. METHODOLOGY

The study adopted a descriptive research design with the use of a well-structured questionnaire. The population consisted of 2,449 students in special basic schools using multistage sampling technique, including purposive sampling, proportional stratified random sampling, and systematic random sampling with a sample size of 344 respondents. Data analysis was conducted using descriptive statistics and inferential statistics. Descriptive statistics was used to analyze socio economic characteristics and inferential statistics of multiple regression analysis were used to examine the modal choice of physically challenged people.

IV. RESULT AND DISCUSSION

4.1 Questionnaire Response Rate

The table 1 below showed the response rate for the administered questionnaires. A total of 344 questionnaires were distributed, out of which 325 were returned. This results in a high response rate of 94.5%, indicating that the majority of the participants completed and submitted the questionnaires. This suggests a strong level of engagement and cooperation

from the respondents, ensuring that the data collected is both reliable and representative of the sample.

Table 1 Questionnaire Response Rate

Total Questionnaires Administered	Questionnaires Returned	Response Rate (%)
344	325	94.5%

Source: Author's Computation (2024)

4.3 Modal choice Analysis

The table 2 presented the modal choices of physically challenged individuals in Oyo State, highlighting the different transportation options they utilize, and their corresponding perceptions. Public transportation has a mean score of 3.09, suggesting that while it is somewhat favorable, it may not be considered the most optimal option for the physically challenged, as reflected by the higher proportion of "Undecided" (9.2%) and "Disagree" (8.6%) responses. The relatively high standard deviation (1.23) indicates variability in opinions about the accessibility or quality of public transport for this group.

Private vehicles, with a mean score of 3.21, are the most favored mode of transportation, reflecting a more favorable view compared to public transport, as shown by a higher percentage of "Strongly Agree" (44.9%) and "Agree" (42.2%) responses. The lower standard deviation (1.12) suggests more uniformity in the respondents' satisfaction with private vehicles, indicating that it is a more reliable choice for many physically challenged individuals.

Specialized transport services also received a moderate mean score of 3.12, showing that this option is valued but not overwhelmingly preferred, with a relatively higher percentage of "Undecided" (19.4%) responses. The higher standard deviation (1.19) implies varied opinions about the accessibility and availability of specialized transport services, indicating that some individuals find them useful, while others may not have access or may not be fully satisfied with these services.

Walking or using a wheelchair, with a mean score of 3.13, is another widely accepted choice, though the spread of responses shows mixed opinions. The moderate standard deviation (1.16) again suggests

some variability in satisfaction, indicating that while it works for some individuals, others may face challenges depending on the infrastructure or their mobility needs.

The findings imply that private vehicles and walking/wheelchairs tend to be the most favorable options for the physically challenged, while public transportation and specialized transport services need further improvements in accessibility and satisfaction to better serve this demographic. The variability in responses across all modes suggests that a one-size-fits-all approach is inadequate and more tailored solutions are needed to enhance the mobility of physically challenged individuals in Oyo State.

Table 2: Modal Choice on the Mobility of Physically Challenged People in Oyo state

Modal Choice	SA (%)	A (%)	UD (%)	D (%)	SD (%)	Mean
Public Transportation	37.8	37.8	9.2	8.6	6.5	3.09
Private Vehicles	44.9	42.2	4.3	4.3	4.3	3.21
Specialized Transport Service	28.0	29.8	19.4	14.5	8.3	3.12
Walking / Wheelchair	30.2	36.6	14.2	13.5	5.5	3.13

Source: Author’s Computation (2024)

The hypothesis that modal choice has no significant relationship with the mobility of physically challenged individuals was tested using multiple regression

analysis. The model summary from Table 3 shows that the multiple regression analysis revealed that the predictors (walking/wheelchair, public transportation, private vehicles, and specialized transport service) significantly influenced the mobility of physically challenged individuals, with the model explaining 52.2% of the variance in mobility ($R^2 = 0.522$) as indicated by the Model Summary. The standard error of the estimate was 0.462, suggesting that the model’s predictions were fairly accurate. The ANOVA results confirmed the statistical significance of the model, with an F-statistic of 87.322 ($p < 0.001$), indicating that the independent variables collectively explained a significant portion of the variance in the dependent variable, mobility.

In Table 4, the coefficients showed that all four predictors had significant positive effects on mobility. Public transportation ($\beta = 0.361, p = 0.000$), private vehicles ($\beta = 0.308, p = 0.000$), specialized transport services ($\beta = 0.432, p = 0.000$), and walking/wheelchair ($\beta = 0.339, p = 0.000$) all positively influenced the mobility of physically challenged individuals. The unstandardized coefficients indicated that, holding other factors constant, specialized transport services contributed the most to mobility, followed closely by public transportation, private vehicles, and walking/wheelchair.

The implications of these findings are that improving and expanding access to private vehicles, public transportation, specialized transport services, and walking or wheelchair accessibility could significantly enhance the mobility of physically challenged individuals. Policy and infrastructural improvements in these areas would likely lead to greater independence and accessibility for this population. The findings also underscore the importance of integrated transportation solutions that address the diverse needs of physically challenged people.

Table 3: Model Summary and ANOVA^a

Multiple R	.722 ^a
R Square (R^2)	.522
Adjusted R Square (R^2)	.516
Standard Error	.462

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	74.567	4	18.642	87.322	.000 ^b
1 Residual	68.315	320	.213		
Total	142.882	324			

Source: Author's Computation (2024)

Table 4: Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error			
	(Constant)	.210	.106	1.989	.048
	Public transportation	.203	.023	8.789	.000
1	Private vehicles	.203	.027	7.611	.000
	Specialized transport service	.227	.025	9.176	.000
	Walking/wheelchair	.190	.027	6.918	.000

a. Dependent Variable: Mobility of physically challenged people

Source: Author's Computation (2024)

V. CONCLUSIONS AND RECOMMENDATIONS

Base on the findings, the study therefore concluded that modal choice has significant effect on the mobility of physically challenged individuals in Oyo state. However, it is recommended that public transport providers and private vehicle owners invest in accessible vehicles equipped with ramps, lifts, and designated spaces for wheelchairs to ensure that physically challenged individuals can easily access transportation services.

REFERENCES

- [1] Abang, T. B. (2019). The disabled in Nigeria: The need for a new approach. *Disability and Society*, 4(3), 287-298.
- [2] Ajayi, I. A., Ekundayo, H. T., and Arogundade, B. B. (2010). Parents' involvement in school administration as a correlate of effectiveness of secondary schools in Nigeria. *Journal of Education Administration and Policy Studies*, 2(3), 41-46.
- [3] Ajayi, J.O and Aworemi J.R (2020) Intermediate Public Transport Services and the Travel Characteristics of Physically-Challenged Individuals in Oyo State *LASU JOURNAL OF TRANSPORT* Vol. 2, Issue 1, ISSN: 2504–8783.
- [4] Burgmanis, G. (2012). Travel patterns of children living in rural areas of Riga agglomeration: an exploration of school trips to Riga. *ECONOMIC SCIENCE FOR RURAL DEVELOPMENT*.
- [5] Choueiri, E. M., Choueiri, G. M., Choueiri, B. M. (2013). Road safety in the MENA region in general and in Lebanon in particular, *International Conference on Road Safety and Simulation, Rome, Italy*.
- [6] Davis, B., Dutzik, T. (2012) Transportation and the New Generation: Why Young People are Driving Less and what it Means for Transportation Policy, Frontier Group and U.S. PIRG Education Fund.
- [7] De Guzman, M. P., and Diaz, C. E. (2005) Analysis of mode choice behavior of students in exclusive schools in Metro Manila: the case of Atenio De Manila University and Miriam College, *Eastern Asia Society for Transportation Studies* 5 1116-1131.
- [8] Goel, R., Garcia, L. M., Goodman, A., Johnson, R., Aldred, R., Murugesan, M., ... and Woodcock, J. (2018). Estimating city-level travel patterns using street imagery: A case study of using Google Street View in Britain. *PLoS one*, 13(5), e0196521
- [9] Limanond, T., Butsingkorn, T., Chermkhunthod, C. (2011) Travel behavior of university students who live on campus: a case study of a rural university in Asia, *Transport Policy* 18, 1 163-171.
- [10] Liu, G. (2016) A Behavioral Model of Work-trip Mode Choice in Shanghai. Discussion Papers No.444, Statistics Norway, Research Department,.
- [11] Martín, J. C., Martín-Domingo, L., Lohmann, G., and Spasojevic, B. (2019). The role of travel patterns in airport duty-free shopping satisfaction: A case study from an Australian regional airport. *Journal of Air Transport Management*, 80, 101691
- [12] .Mishra, S., Sharma, I., and Pani, A. (2023). Analyzing autonomous delivery acceptance in food deserts based on shopping travel

patterns. *Transportation Research Part A: Policy and Practice*, 169, 103589

- [13] Mitra, S. (2018). Disability, health and human development. Palgrave Macmillan.
- [14] Omirin, O.J and Ojekere, S. (2017) Transporting the physically challenged in Benin-city, Nigeria African Journal for the Psychological Study of Social issues vol.20 No.3 2017
- [15] World Health Organization (WHO). 2018. Disability and Health. URL: <https://www.who.int/news-room/fact-sheets/detail/disability-and-health> accessed on 31-12-2018.
- [16] Zhang, P., Qian, K., Zhou, C., Stewart, B. G., and Hepburn, D. M. (2022). A methodology for optimization of power systems demand due to electric vehicle charging load. *IEEE Transactions on Power Systems*, 27(3), 1628-1636
- [17] Zhao, P. (2023). The impact of the built environment on individual workers' commuting behavior in Beijing. *International Journal of Sustainable Transportation*, 7(5), 389-415