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Impact of Transportation Infrastructure on Access to Technical Education and Academic Performance in Rural Areas of Nigeria: A Case Study of Rimi Local Government Area, Katsina State

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Abstract

This study investigates the impact of transportation infrastructure on access to technical education and academic performance in rural areas of Nigeria, with a particular focus on Rimi Local Government Area (LGA) in Katsina State. The research design used was a mixed-methods approach was used to gather both quantitative and qualitative data. A total of 60 teachers and 200 students from various schools within Rimi LGA participated in the study. Data collected from teachers and students reveal that inadequate transportation infrastructure negatively affects students' attendance, punctuality, and academic performance. Interventions such as government provision of transportation facilities, community involvement, and flexible school schedules are recommended to improve educational outcomes. The study highlights the critical need for infrastructure development to support academic success in rural areas.

Keywords: Infrastructure, Transportation, LGA, Technical Education, Academic Performance

Introduction

Education plays a pivotal role in the development of human capital and socio-economic progress. In rural areas of Nigeria, access to education, especially technical education, is significantly influenced by the availability and quality of transportation infrastructure (Muhammad & Sawaba, 2020).

Transportation challenges, including limited public transport, long travel distances, and high costs, often create barriers for students, particularly in remote areas. This study explores how these transportation issues

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affect students' attendance and academic performance, with a specific focus on Rimi Local Government Area (LGA) in Katsina State, Nigeria.

Rural areas in Nigeria face unique challenges in terms of access to education, primarily due to poor transportation infrastructure. In many parts of the country, particularly in northern Nigeria, students often have to travel long distances to access secondary and tertiary institutions (Kaiser, 2022). The lack of adequate roads, unreliable transportation services, and the high costs of commuting create significant barriers to regular school attendance, especially for students in impoverished areas. This situation is compounded by the fact that many rural students rely on public transport or personal means such as motorcycles and bicycles to reach schools, which may not be readily available or affordable (Kaiser, 2022).

Technical education, in particular, requires more structured learning environments and consistent attendance, both of which are hindered by transportation-related challenges (Muhammad, et al., 2019). The study aims to understand the relationship between transportation infrastructure and the ability of students to access educational opportunities, particularly in terms of their academic performance and overall school engagement. Despite the importance of education in rural development, students in areas like Rimi LGA face significant transportation-related challenges that hinder their ability to attend school regularly and perform academically. Long commute times, unreliable transportation options, and high costs of travel are key barriers to accessing education (Hamza et al., 2023). These factors are particularly problematic for students pursuing technical education, where consistent attendance and participation are crucial for mastering practical skills (Ahmed, 2023). The lack of a reliable transportation system may lead to lower academic performance, increased absenteeism, and disengagement from school activities, ultimately reducing educational outcomes in rural areas.

This study is significant as it provides insights into the critical relationship between transportation infrastructure and educational outcomes in rural Nigeria. It contributes to the body of knowledge on the challenges faced by students in accessing education in remote areas. The findings will be valuable for policymakers, educators, and local

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governments in developing strategies to improve transportation infrastructure and enhance access to education. Furthermore, the study offers practical recommendations for improving student attendance, academic engagement, and overall educational performance in rural settings.

Research Objectives

1. To assess the current state of transportation infrastructure in Rimi Local Government Area (LGA).
2. To identify interventions that can improve transportation access and educational outcomes.
3. To examine how transportation infrastructure impacts student attendance and academic performance in technical education.
4. To provide recommendations for improving transportation systems and educational access in rural Nigeria.

Research Questions

1. What is the current state of transportation infrastructure in Rimi LGA?
2. What interventions can improve transportation access and educational outcomes in the area?
3. How does transportation affect students' attendance and academic performance?

Theoretical Framework

This study is grounded in two main theoretical frameworks:

The Social Exclusion Theory (Sen, 2000). This theory argues that lack of access to key services, including education, due to transportation barriers can lead to social exclusion, particularly in rural and marginalized communities. The exclusion from education due to transportation challenges can perpetuate cycles of poverty and limit future opportunities.

The Human Capital Theory (Becker, 1964). This theory highlights the importance of education as an investment in human capital. It suggests that access to education is essential for personal and societal development, and barriers such as poor transportation infrastructure undermine this process, ultimately affecting economic growth and individual development.

These theories support the idea that improving access to education, through better transportation infrastructure, can lead to improved academic outcomes and greater social and economic opportunities for rural students.

Research Methodology

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The research design used was a mixed-methods approach was used to gather both quantitative and qualitative data (Creswell, 2014). The study involved surveys of teachers and students, along with semi-structured interviews for deeper insights into the challenges of transportation in rural education.

A total of 60 teachers and 200 students from various schools within Rimi LGA participated in the study. Teachers were selected from both public and private institutions, while students were randomly selected from secondary schools offering technical education.

A structured questionnaire was used to collect data from teachers and students. Teachers provided their insights on transportation infrastructure, while students shared their experiences regarding commuting to school, attendance, and academic performance.

In-depth interviews were conducted with selected teachers and local community leaders to explore possible interventions and suggestions for improvement (Creswell & Poth, 2018).

Data were analysed using descriptive statistics, including mean scores and standard deviations, to assess the perceptions of teachers and students. The qualitative data from interviews were transcribed and analysed thematically to identify common themes related to transportation challenges and potential solutions.

Results

Research Question 1: What is the current state of transportation infrastructure in Rimi LGA?

Table 1: Teachers' Responses on the current state of transportation infrastructure

S/N	Items	SA	A	D	SD	$\bar{X}$	**SD**	Remarks
1	Ration of public transport coverage.	4	24	2	0	3.7	1.92	Accepted
2	The commercial vehicles should frequently be in a good service.	28	6	0	1	3.5	1.85	Accepted

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3	Good teacher students' interaction has influence to the student's Punctuality.	16	15	2	0	3.2	1.79	Accepted
4	Motorcycles and bicycles ownership facilitate the transport condition.	12	18	0	1	3.1	1.76	Accepted
5	The location of the school can reduce the time travel.	12	12	4	1	2.9	1.70	Accepted
6	Subsidy of in transport cost reduces the rate of students' absenteeism.	20	3	0	4	2.7	1.64	Accepted

Table 1 shows a mean value of between 2.7 and 3.7 and the standard deviations between 1.64 and 1.92. This is an indication that the all the conditions of transport that facilitate students learning process were are accepted by the respondents.

Research Question 2: What interventions can improve transportation and educational outcomes?

Table 2: Teachers' Responses to Improvements in Transport Infrastructure

S/N	Items	SA	A	D	SD	**X**	**SD**	Remarks
1	Government should intervene to provide the transportation facilities	24	16	0	0	3.6	1.90	Accepted
2	The school base management committee (SBMC) and (PTA should make a provision in an easy way for student's transportations.	28	9	0	0	3.7	1.93	Accepted
3	The school management within it's administration power should make some adjustment of morning lessons.	8	3	212	1	2.2	1.48	Not Accepted
4	The community should provide simple transportation ways for student's transport by providing free or low cost vehicles.	8	18	0	1	3.1	1.76	Accepted
5	Local government should make provision of public transport for students.	20	15	0	0	3.5	1.87	Accepted

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Table 2 shows a mean value of between 2.2 and 3.6 and the standard deviations between 1.48 and 1.87. Item 3 received the lowest mean score of 2.2, suggesting that teachers do not support the idea of adjusting morning lessons to improve transportation conditions. This might indicate that they believe this approach is not effective or feasible. This suggest that the only item 3 has the lowest mean score of 2.2 which states that the school management within its administration power should make some adjustment of morning lessons, was not accepted by the respondents.

Research Question: 3: How does transportation affect students' attendance and academic performance?

Table 3: Students' Responses on how transportation affect students' attendance and academic performance

S/N	Items	A	B	C	D	$\bar{X}$	SD	Remarks
1	How do you go to school?	164	9	8	12	3.21	1.79	Accepted
2	What time do you wake up in the morning usually?	20	114	21	6	2.70	1.64	Accepted
3	What time do you start morning trip to school?	84	96	0	4	3.22	1.70	Accepted
4	How much time does trip take to reach school every morning?	48	96	20	6	2.83	1.68	Accepted
5	How do you go back home from school every afternoon?	24	114	14	9	2.53	1.59	Accepted
6	What time do you leave the school in the afternoon to reach your home?	124	63	4	6	3.28	1.81	Accepted
7	How much time does the trip takes to reach home every afternoon?	44	69	34	9	2.60	1.61	Accepted
8	Do you sleep/nap in the afternoon when go back home after school?	48	105	46	16	2.65	1.63	Accepted

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9	What time do you sleep at night usually?	116	60	12	5	3.19	1.76	Accepted
10	How per is your home from your school?	148	27	10	9	3.23	1.80	Accepted
11	On a scale of 0 to 100, how do you evaluate your average grade in school?	44	117	12	4	2.95	1.72	Accepted
12	How do you spend your time during the trip to or from school?	112	51	14	8	3.08	1.75	Accepted
13	How do you describe the trip to or from school?	92	45	22	11	2.83	1.68	Accepted
14	How do you feel during the day after the bus trip?	16	120	16	8	2.70	1.64	Accepted
15	At home, how much time do you spend studying every day?	92	81	6	7	3.10	1.76	Accepted
16	How well are you treated during the trip to or from school?	124	45	14	7	3.16	1.78	Accepted
17	How safe do you treated during the trip to or from school?	140	33	12	8	3.22	1.79	Accepted

Table 3 shows a mean value of between 2.53 and 3.28 and the standard deviations between 1.59 and 1.81. This propose that all items under the RQ 3 were accepted by the respondents.

Finding of the Study

The findings of the study Impact of Transportation Infrastructure on Access to Technical Education and Academic Performance in Rural Areas of Nigeria: A Case Study of Rimi Local Government Area, Katsina State revealed that:

Current State of Transportation Infrastructure according to Research **Research Question 1:** The results indicate that transportation infrastructure in Rimi LGA is inadequate, with low coverage of public transport options. Most students rely on personal means of transport, such as bicycles and motorcycles, which are not always reliable or

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safe. Teachers noted that the poor transportation system significantly affects student punctuality and attendance.

Interventions for Improvement in line with **Research Question 2:**

Teachers suggested that the government should provide more transportation facilities, and the local community should contribute by offering low-cost transport options. School-Based Management Committees (SBMC) and Parent-Teacher Associations (PTA) could also play a role in organizing transportation for students. Impact of Transportation on Attendance and Performance in accordance with Research **Research Question 3:**

The results from the students' responses revealed that long commuting times negatively impacted their academic performance. Students who spent more time commuting reported lower grades and higher rates of absenteeism. Conversely, those with shorter, more reliable travel times showed better attendance and academic engagement.

Discussion The findings of this study align with existing literature that emphasizes the link between transportation access and academic performance are essential this finding was concurred with (Vickery, 2011). Long travel times and unreliable transport systems contribute to absenteeism, tardiness, and fatigue, all of which hinder academic performance. This findings are in line with the assertion of (Ahmed 2023). The findings were also in agreement with the position of Edward (2020) on the impact of school transportation on students outcome, in which his finding show that the school transportation might positively affect school attendance, an increasingly important outcome, by providing a reliable, consistent, and safe mode of transportation.

The study also highlights the importance of community involvement and government intervention in addressing these barriers. Flexible school schedules, subsidies for transport, and local initiatives to improve transport could significantly improve student outcomes. These findings are in conformity with a study conducted by Rogers et al. (2018) who ascertained that effective transport conditions and their influence on students' learning processes. Therefore, the responses highlight that public transport coverage and vehicle maintenance are viewed as the most significant factors in improving students' access to education.

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Impact of Transportation on Attendance and Performance; overall well-being; safety and treatment are vital in enhancing students' academic performance. This finding is concurred with the work of Sattin (2022). Nevertheless, factors such as sleep patterns, study time, and feelings about the transport experience contribute to students' overall well-being and potentially influence their academic performance. Accordingly, perceptions of safety and treatment during transport are relatively positive, which is beneficial for students' comfort and potentially their academic focus. To support these findings unveiled by the study, Wang (2019) suggested that transportation distance and time is correlated with pupils' school performance and has no correlation with their stress levels.

Recommendations

1. Government Action: The government should prioritize the development of transportation infrastructure in rural areas, particularly for students. This includes improving road networks, subsidizing transport costs, and providing regular, safe public transport options for students.

2. Community Engagement: Local communities, schools, and PTAs should work together to organize transport solutions for students, including subsidizing travel costs and exploring low-cost transport alternatives.

3. Flexible School Schedules: Schools should consider adjusting their schedules to accommodate students' travel times, allowing for later start times or staggered lessons to reduce the impact of long commutes.

4. Awareness and Advocacy: There is a need for increased awareness and advocacy regarding the role of transportation in education, particularly in rural areas, to influence policy changes.

Conclusion

Transportation infrastructure plays a critical role in determining access to education in rural areas. In Rimi LGA, inadequate transportation systems create barriers to student attendance, punctuality, and academic performance, particularly for those pursuing technical education. By addressing these transportation challenges through government intervention, community-based solutions, and school schedule adjustments, it is possible to improve educational outcomes and support the academic success of rural students.

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