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ROAD INFRASTRUCTURE AND URBAN MOBILITY IN PORT HARCOURT, RIVERS STATE

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ABSTRACT

This article examined the effect of road infrastructure on urban mobility in Port Harcourt, Rivers State, based on Objective One of Joan's M.Sc. study on public transportation and mobility challenges. The study used quantitative survey data collected from 400 respondents comprising commuters, commercial drivers, transport operators, residents, traffic-management officials and transport-regulatory personnel. Data were analysed with descriptive statistics and Pearson Product Moment Correlation at the 5% significance level. The descriptive analysis showed that respondents agreed that potholes and damaged roads reduce transportation efficiency ($M = 3.0$), flooded roads negatively affect commuter movement ($M = 3.2$), inadequate road maintenance contributes to traffic congestion ($M = 3.4$), and good road infrastructure improves urban mobility and accessibility ($M = 3.3$). The only item below the 3.00 criterion mean was the statement that poor road conditions contribute to transportation delays ($M = 2.4$). The inferential result produced a positive correlation of $r = 0.189$ with $p = 0.000$ and $N = 400$, leading to rejection of H_{01} . The result indicates a statistically significant positive association between the road-infrastructure measure used in the study and urban mobility/accessibility. The finding reinforces the importance of road condition, drainage, maintenance and infrastructure quality in the mobility system of Port Harcourt.

KEYWORDS: Road Infrastructure; Urban Mobility; Accessibility; Port Harcourt; Transportation Efficiency; Traffic Congestion; Road Maintenance.

1. INTRODUCTION

1.1 Background to the Study

Transportation is a fundamental component of urban development because it enables people, goods and services to move among residential, commercial, industrial and institutional locations. Public transportation and the supporting road network are particularly important in cities where a large proportion of residents depend on shared mobility. Rodrigue (2020) explains the central role of transportation in connecting economic and social activities, while the World Bank (2021) emphasizes the relationship between urban mobility, accessibility and economic productivity.

Rapid urbanization increases demand for movement. The dissertation notes that more than half of the world's population lives in urban areas and that urban populations are projected to continue increasing. In developing countries, this growth can place considerable pressure on transportation infrastructure. African Development Bank (2022) identifies inadequate infrastructure, weak public transport systems, poor planning and ineffective traffic management as recurring urban transportation problems.

In Nigeria, road transportation is the dominant mode for passenger and freight movement. The dissertation cites the Federal Ministry of Transportation (2023) and National Bureau of Statistics (2023) in describing the central role of roads in national mobility and the challenges associated with maintenance, congestion, flooding and transport demand. Port Harcourt, as a major industrial and commercial centre in the Niger Delta, experiences substantial daily movement associated with residential, commercial, educational, governmental and oil-and-gas activities.

Within Port Harcourt, roads such as Aba Road, Ikwerre Road, East-West Road, Rumuokoro and the Artillery axis carry substantial traffic volumes. The dissertation describes recurring problems including potholes, flooding, inadequate drainage, poor maintenance, congestion and limited integration between road infrastructure and public transportation services. These conditions can affect travel reliability, accessibility and the movement of commuters.

1.2 Statement of the Problem

The problem addressed by Objective One is the potential mismatch between the mobility needs of Port Harcourt's growing population and the condition and capacity of its road infrastructure. Poorly maintained roads, damaged pavement, flooding and inadequate drainage may reduce travel reliability and increase congestion. At the same time, the mere presence of roads does not guarantee effective mobility because road quality, maintenance,

traffic management and integration with public transport influence how efficiently the network functions.

The dissertation notes that previous Nigerian studies have often examined road infrastructure, congestion or transportation economics separately, while fewer studies have integrated these issues within the broader public transportation and urban-mobility context of Port Harcourt. Objective One therefore provides empirical evidence on the relationship between road infrastructure and mobility in the study area.

1.3 Objective, Research Question and Hypothesis

- Objective One: Examine the effect of road infrastructure on urban mobility in Port Harcourt, Rivers State.
- Research Question One: What is the effect of road infrastructure on urban mobility in Port Harcourt?
- H01: Road infrastructure has no significant effect on urban mobility in Port Harcourt, Rivers State.

2. Literature Review

2.1 Road Infrastructure and Urban Mobility

Road infrastructure includes the physical network and associated facilities required to support movement, including carriageways, bridges, drainage systems, intersections, pedestrian facilities and traffic-control infrastructure. Its quality affects travel speed, safety, accessibility, vehicle operating costs and reliability. Ede (2021) examined road infrastructure and urban mobility challenges in Port Harcourt, while Adegboye (2020) linked road-network conditions to transportation efficiency in Rivers State.

Road deterioration can manifest through potholes, erosion, flooding and pavement failure. These conditions may increase vehicle maintenance costs, reduce effective road capacity and produce delays. The dissertation's review cites Afolabi (2020), Afolabi (2022), Eze (2022), Ogunleye (2022) and other studies as evidence that infrastructure conditions influence transportation performance.

2.2 Road Maintenance, Drainage and Flooding

Maintenance is essential because infrastructure quality changes over time under traffic loads and environmental conditions. In Port Harcourt, heavy rainfall and drainage constraints can intensify flooding. Flooded roads can interrupt routes, reduce speeds and force commuters and operators to change travel paths. The dissertation connects these issues with commuter accessibility and congestion.

2.3 Road Infrastructure and Economic/Social Activity

Urban mobility has economic and social dimensions. Efficient roads facilitate access to workplaces, schools, markets and health services. Iheanacho (2021) and Iheanacho (2023) link transportation infrastructure and delays with business productivity in Port Harcourt. A road network that supports predictable movement can therefore contribute to labour mobility and commercial activity.

2.4 Empirical Evidence

Empirical studies reviewed in the dissertation generally report that road conditions are associated with transportation efficiency and accessibility. Adebayo (2025) found that poor road infrastructure affected transportation efficiency and commuter accessibility across selected Nigerian urban centres. Ogunleye (2022) reported effects of potholes, erosion and flooding on road efficiency and accessibility in Rivers State. Eze (2022) linked poor road conditions, inadequate parking and weak traffic control with transportation delays and congestion in Port Harcourt.

Other studies broaden the issue to sustainability and urban planning. Nwosu (2021) examined urban transportation planning and mobility management, while Okon and Chukwu (2020) examined transportation planning and urban mobility management. Afolabi and Moses (2023) considered sustainable urban mobility, and Adebisi and Lawrence (2021) examined transportation systems and environmental sustainability. Collectively, these studies suggest that infrastructure, management and mobility outcomes should be examined as an interconnected system.

2.5 Literature Gap

The literature gap identified in the dissertation concerns the limited integrated examination of public transportation and mobility challenges in Port Harcourt. Objective One narrows this gap by empirically testing the road-infrastructure dimension with primary data from 400 respondents. The study therefore contributes local evidence on how road infrastructure relates to urban mobility within a specific Nigerian metropolitan context.

3. Theoretical Framework

3.1 Urban Mobility Theory

Urban Mobility Theory provides the principal framework for understanding movement within cities. The theory emphasizes the capacity of transportation systems and infrastructure to meet the movement needs of an urban population. Accessibility is a central concept because

mobility is not simply the movement of vehicles; it includes the ability of people to reach desired destinations such as workplaces, schools, hospitals and markets.

The theory explains that rapid urbanization increases transportation demand and can expose deficiencies where infrastructure expansion does not match population growth. Congestion, poor accessibility, inadequate facilities and long travel times can emerge when the transport system cannot accommodate demand. This is directly relevant to Port Harcourt, where population growth, industrial activity and commuting pressure create substantial mobility requirements.

3.2 Sustainable Development Theory

Sustainable Development Theory provides a second perspective. The dissertation draws on the Brundtland framework (WCED, 1987) and subsequent sustainability literature to emphasize the need to balance economic productivity, social wellbeing and environmental protection. Banister (2008) argues for transportation systems that reduce excessive dependence on private vehicles, improve accessibility and reduce congestion and emissions.

For Port Harcourt, sustainable mobility requires road infrastructure that is durable and accessible, integrated public transportation, effective traffic management, pedestrian facilities and measures that reduce environmental impacts. The theory therefore supports infrastructure investment as part of a broader mobility strategy rather than as an isolated construction activity.

4. METHODOLOGY

The study adopted a quantitative research design. Primary data were collected through structured questionnaires administered to commuters, commercial drivers, transport operators, residents, traffic-management officials and transport-regulatory personnel. A sample of 400 respondents was selected through multistage sampling from major transportation corridors and densely populated areas in Port Harcourt.

The questionnaire used a four-point response structure in the reported univariate tables, while the research hypotheses were tested using Pearson Product Moment Correlation through SPSS 27 at a 0.05 level of significance. The decision rule was to reject the null hypothesis where $p < .05$ and not reject it where $p > .05$.

Table 1: Questionnaire Administration.

Category	Frequency	Percentage
Questionnaires administered	400	100.0%
Questionnaires retrieved	400	100.0%
Not retrieved	0	0.0%
Invalid	0	0.0%
Valid	400	100.0%

Source: *Field Survey (2026), Joan dissertation, Table 4.1.*

All 400 questionnaires were reported as retrieved and valid. This provided the basis for the descriptive and inferential analysis reported in Chapter Four.

5. RESULTS AND ANALYSIS

The descriptive findings for Objective One are presented below. A criterion mean of 3.00 was used in the source dissertation for acceptance of the questionnaire items.

Table 2: Univariate Analysis of Road Infrastructure and Urban Mobility.

Item	Mean	Decision
Poor road conditions contribute to transportation delays	2.4	Disagreed
Potholes and damaged roads reduce transportation efficiency	3.0	Agreed
Flooded roads negatively affect commuter movement	3.2	Agreed
Inadequate road maintenance contributes to traffic congestion	3.4	Agreed
Good road infrastructure improves urban mobility and accessibility	3.3	Agreed

Source: *Field Survey (2026), Joan dissertation, Table 4.7.*

The descriptive results show that four of the five items were accepted. The strongest mean was 3.4 for inadequate road maintenance contributing to traffic congestion, followed by 3.3 for good road infrastructure improving mobility and accessibility and 3.2 for flooded roads negatively affecting commuter movement. The statement concerning poor road conditions contributing to transportation delays recorded a mean of 2.4 and was not accepted.

Table 3: Pearson Correlation Test for Objective One.

Relationship	r	p-value	N	Decision
Road infrastructure ↔ urban mobility/accessibility	0.189	0.000	400	Reject H01

Source: *Research Survey (2026), Joan dissertation, Table 4.11; decision rule $p < .05$.*

The correlation coefficient was positive ($r = 0.189$) and the significance value was 0.000. Because the reported p-value is below 0.05, the null hypothesis was rejected. The coefficient indicates a statistically significant but relatively weak positive association between the paired road-infrastructure and mobility measures used in the study.

6. Discussion of Findings

The first objective produced a statistically significant positive relationship between road infrastructure and urban mobility. This finding is consistent with the descriptive pattern in which respondents agreed that potholes and damaged roads reduce transportation efficiency, flooding affects commuter movement, inadequate maintenance contributes to congestion, and good infrastructure improves mobility.

The result agrees with Adebayo (2025), whose study identified poor road infrastructure as a constraint on transportation efficiency and accessibility in Nigerian urban centres. It is also consistent with Ogunleye (2022), who identified potholes, erosion and flooding as factors reducing road efficiency in Rivers State. Eze (2022) similarly associated road conditions and weak traffic control with transportation delays in Port Harcourt.

The result can be interpreted through Urban Mobility Theory. Where infrastructure is able to support demand, movement becomes more predictable and destinations become more accessible. Where road quality deteriorates, the effective capacity of the transport network may decline. However, the relatively small coefficient indicates that road infrastructure is only one component of urban mobility; traffic management, public transport availability, travel demand, land-use patterns, household income and other factors also matter.

The finding also supports Sustainable Development Theory because road investment has social, economic and environmental consequences. Better-maintained roads can reduce delays and vehicle operating inefficiencies, but sustainable mobility requires integration with public transport, walking facilities, traffic management and environmental measures.

7. Practical Implications and Recommendations

- Road maintenance should be systematic rather than primarily reactive, with priority given to high-use corridors and locations with recurring pavement failure.
- Drainage rehabilitation should be integrated with road maintenance to reduce the mobility effects of flooding during rainy periods.
- Traffic-management measures should complement physical road improvements, especially at major intersections and recurrent congestion points.
- Urban road projects should consider pedestrian access, public transport stops and the connection between residential and employment areas.
- Road-condition monitoring should be supported by reliable asset inventories and periodic assessment so that maintenance needs can be identified early.

- Transportation planning should integrate road infrastructure with public transportation, land-use planning and environmental management.
- Future infrastructure projects should include measurable mobility indicators such as travel reliability, accessibility and congestion performance.

8. CONCLUSION

The evidence from Objective One shows a statistically significant relationship between the road-infrastructure measure and urban mobility in Port Harcourt. The descriptive results identify maintenance, flooding, road damage and infrastructure quality as important aspects of the mobility experience. The inferential test produced $r = 0.189$ and $p = 0.000$ for $N = 400$, leading to rejection of H_{01} . The study therefore provides empirical support for sustained road maintenance and infrastructure improvement as components of urban-mobility planning.

9. Contribution to Knowledge and Limitations

The article contributes localized empirical evidence on the road-infrastructure dimension of public transportation and urban mobility in Port Harcourt. It combines respondent-level descriptive evidence with inferential correlation analysis and places the finding within Urban Mobility Theory and Sustainable Development Theory.

The study is based on cross-sectional questionnaire evidence, so the reported correlation should not be interpreted as proof of a causal mechanism. The analysis also uses the specific questionnaire indicators selected by the researcher. Future studies can combine survey data with objective road-condition measures, travel-time data, traffic counts, geographic information systems and longitudinal infrastructure-performance records.

10. Publication Source Note

The article preserves the objective wording, reported statistical values, source citations and complete reference list of the uploaded dissertation. No new field dataset has been introduced.

Extended Literature Synthesis

Road infrastructure should be understood as a network rather than as isolated road segments. Its contribution to mobility depends on continuity between corridors, intersections, drainage, pedestrian facilities, public transport stops and traffic-management arrangements. A road may have adequate pavement but still provide poor mobility if an adjacent junction is severely constrained or if flooding repeatedly interrupts the corridor. This systems perspective is

consistent with Urban Mobility Theory and helps explain why the study treats infrastructure as one dimension of a wider transportation system.

The Port Harcourt context also demonstrates the interaction between physical infrastructure and urban form. Employment, residential development, markets, educational institutions and industrial activities generate trip patterns that place different demands on the road network. Where land-use development occurs faster than transport infrastructure, congestion and accessibility problems can intensify. Nwosu (2021) and Okon and Chukwu (2020) support the importance of coordinated transportation planning and mobility management.

Maintenance is particularly important because infrastructure performance declines over time. Preventive maintenance can address pavement deterioration, drainage obstruction and other defects before they become major mobility constraints. The descriptive finding that inadequate road maintenance recorded a mean of 3.4 therefore provides an important management signal within the study.

The environmental dimension is also relevant. Poor traffic flow and repeated congestion can increase fuel consumption and emissions. The literature reviewed by Afolabi (2020), Adebisi (2020), Nwachukwu (2021) and the World Health Organization (2023) connects transportation activity with environmental and road-safety concerns. Sustainable road planning should therefore consider mobility, safety and environmental performance together.

Methodological Reflection and Interpretation

The use of Pearson Product Moment Correlation provides evidence about association between the selected questionnaire measures. The reported $r = 0.189$ indicates a positive association, while $p = 0.000$ indicates statistical significance under the study's 0.05 decision rule. The result should not be interpreted as proof that road infrastructure alone causes changes in urban mobility. Instead, it provides evidence that the two measured constructs varied together in the surveyed population.

The descriptive and inferential findings should also be considered together. Respondents generally accepted four of the five road-infrastructure statements, while one statement was below the criterion mean. This pattern suggests that respondents recognized specific infrastructure problems rather than uniformly rating every aspect of road performance in the same way. The strongest descriptive item concerned inadequate maintenance contributing to congestion.

The sample included different categories of transportation stakeholders. This broad coverage is useful because road infrastructure affects road users and operators differently. Commuters

experience accessibility and travel reliability, operators experience vehicle operating conditions and route performance, while traffic officials and regulators observe management and enforcement issues.

Future empirical work can strengthen the evidence by combining questionnaire responses with measured road-condition scores, traffic counts, travel-time observations, GIS-based accessibility indicators and seasonal flood records. Such mixed evidence would make it possible to compare perceived mobility effects with observed network performance.

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