

NIGERIAN
ENVIRONMENTAL
STUDY ACTION
TEAM2025 Conference
Proceedings

Environmental Consequences of New Road Infrastructure within Kano Metropolis

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ABSTRACT

The construction of road pavements requires a significant quantity of natural resources and energy there by causing various indirect and direct environmental impacts. The various human activities and development works have adverse impacts on environment causing climate change, which is recognized as one of the most critical environmental concerns confronting the world. This study aims to evaluate the environmental implications of road infrastructure in Kano Metropolis, providing insight into how road development affects ecological sustainability and urban quality of life. The study employed a descriptive type of survey design using a sample size of 384 drawn from Krejcie and Morgan sampling table. A well-structured questionnaire alongside focus group discussion and key in-depth interviews were used for data collection. The results revealed that 88.2% of respondents confirmed that the road infrastructure is in good condition. However, 65.7% strongly agreed that the areas surrounding the roads have been turned into dumpsites, and 61.3% strongly agreed that poor waste management has made road infrastructure a significant issue. The study concludes that while road infrastructure in Kano metropolis has significantly increased over the past decade, it faces serious threats from improper waste disposal and flood management, which, if not addressed, could lead to road damage in the near future. The need for user education and incorporating safety measures is emphasized to reduce accidents. The study recommends more frequent monitoring and evaluation of the roads, intensified environmental sanitation, public education, and regular impact assessments.

KEYWORDS: Road Infrastructure, waste and flood management, Environmental monitoring.

INTRODUCTION

The presence of an adequate, reliable and efficient transport system is a critical factor in local economic development. A well-developed transportation infrastructure provides adequate access to local communities, which in turn is a necessary condition for the efficient operation of manufacturing, retail, labour and housing market (Olubemehin, 2012). Kano as one of the fastest growing city in Sub-Saharan Africa is undergoing massive transformation in past 20 years. This leads to growing establishment of more roads, bridges, underpass and overhead all with sole aim of easy flow of goods, services and human. This new development may have its own side of problems especially the issue of perennial flooding as well as solid waste disposal (Usman et al, 2016).

Air pollution caused by road construction harms the environment, degrading the region's air quality (Guita 2020). The degraded air resulting from road construction mainly contains silica, among other compounds (Guo et, al., 2023, Harrison et, al., 2016). When inhaled into the

human body, silica can lead to lung cancer and other respiratory tract infections such as silicosis, cough, cold, etc. (Guo et al., 2023, Gharpure et al., 2021). These diseases impact human health greatly and can have even worsening effects on people with underlying health conditions such as asthma, which may lead to the loss of life (Tan et al., 2021). Road construction is linked to environmental pollution and risks, which impact people's health and well-being in urban and rural areas (Gharpure et al., 2021)

The loss of carbon sink services offered by tree cover due to deforestation during road construction is an important factor and needs to be accounted in any Life Cycle Assessment (LCA) studies of road pavements. Road construction sector can play a significant part in achieving the Nationally Determined Contribution (NDC) as pavement life cycle have significant impacts on the environment. All over the world, the impacts of product, process and system on ecosystem are being performed using the life cycle approach. Life cycle assessment (LCA) is a tool to assess the environmental impacts of any activity, product or system by translating the environmental burdens to environmental impacts based on quantification of inputs and outputs (Butt et al., 2014).

STUDY AREA

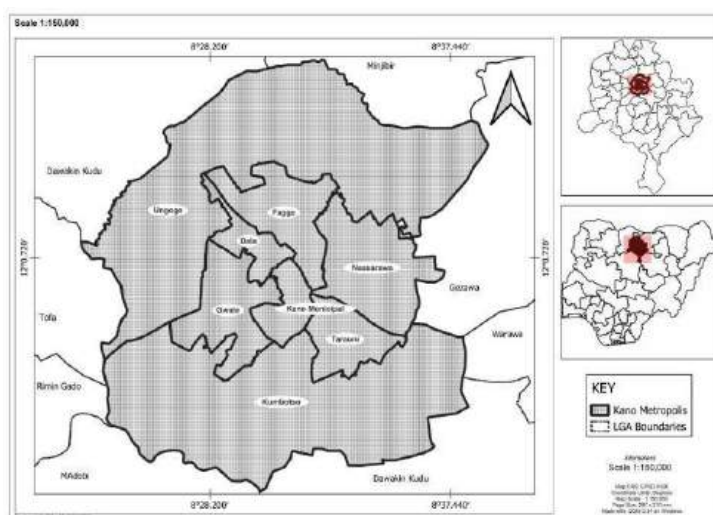


Figure1.1 Map of Kano showing Study Area

Source: GIS Lab Department of Geography Bayero University Kano (2024)

STUDY DESIGN

Location and Extent

This study adopted descriptive type of survey research design. Assessing the conditions and environmental impact of road infrastructures such as bridges, flyovers and underpasses was more appropriate with surveyed research design. Opinions from inhabitants of the study location were sought through interaction in order to provide insight into the subject under study.

The study employed proportionate sampling method for allocation of questionnaires based on the distribution of the infrastructure then availability sampling method was used to select the respondents while stratified sampling method was used to select the infrastructure, road

infrastructure such as bridges, flyovers and underpasses were stratified into class A, B, C and D. However, systematic sampling was used to distribute the research instrument at a periodic of five intervals to the respondents at the time of data collection until the requirement of responses are achieved.

RESULTS AND DISCUSSIONS

1.1 Environmental Effects of Road Infrastructural Development in Kano Metropolis

The development of infrastructure especially road has a way of affecting the environment either positive or negative, from an interview conducted at Kano State Ministry of Works, Housing and Infrastructural Development it was confirmed that environmental impact assessment has been carried out before the commencement of construction of the bridges. The officer confirmed that all environmental factors have been given due consideration even though he made it clear that it is not the responsibility of the ministry to take care of the roads upon completion because all roads ones completed are handed over to agencies vested with the responsibility of maintaining them. He said agencies like KNUPDA, REMASAB, FERMA and other sister agencies are responsible for taking care of roads upon completion.

1.2 Environmental Consequences of Waste Disposal management on the Road infrastructures within Kano metropolis

The distribution of responses where 33.5% strongly agreed that the surrounding of the flyovers has been turned into dumpsite, 32.2% agreed with the statement above on the other hand 25.2% disagreed while 7.3% strongly disagreed too. This result means that since 65.7% of the respondents agreed and strongly agreed that the surrounding of the road infrastructures has been turned into dumpsite, the need to take serious actions is essential as seen in figure 2 and plate 1A, B.

Bridges around Hotoro, Sabon Gari and Gadan Lado have the highest percentage of these occurrences, indicating that there is high number of dumping activities taking place in such locations.

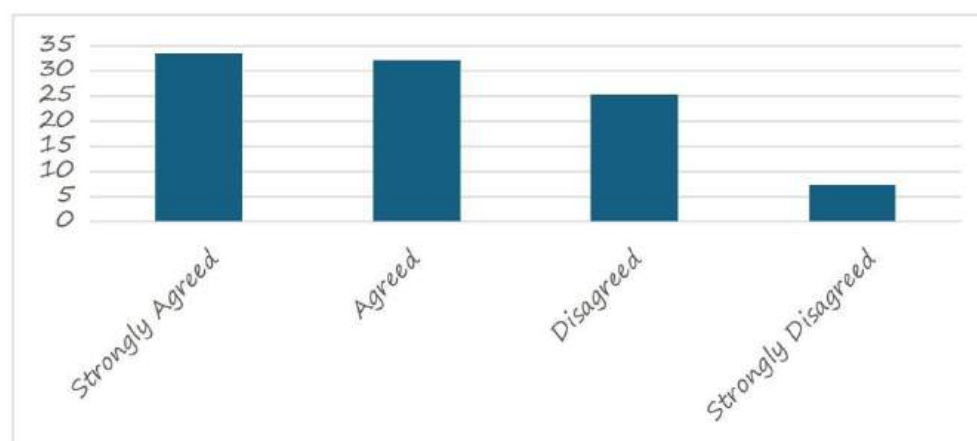


Figure 2: People's Behaviour in Handling Waste around the Roads

Source: Fieldwork 2024



Plate 1: Sabon Gari Dumpsite
Dumpsite



Plate 2: Sabon titi Dumpsite



Plate3: Kofar Ruwa

Source: Fieldwork 2024

1.3 : Problems of Waste Management along Flyovers

The surrounding of flyovers has been in serious problem due to poor waste management. This result as seen in table 4.8 above, 32.8% of respondents strongly agreed that the surrounding of the road infrastructures has become a serious problem due to waste management, 28.5% of the respondents agreed, 29.4% disagreed to the above statement and 7.3% strongly disagreed to it. This result shows that the surrounding of the road infrastructure has serious problem of waste management as agreed and strongly agreed makes 61.4% of the total responses.

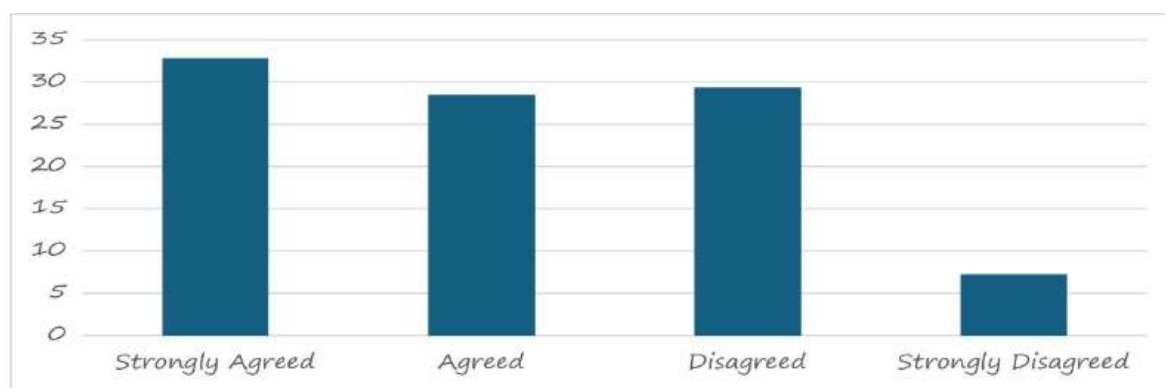


Figure 3: Road infrastructures and waste management Problems

Source: Fieldwork 2024

1.4 Environmental Consequences due to Flooding along Road infrastructures within Kano Metropolis

Flooding in itself can be natural or manmade but for the sake of this research work, manmade factors especially construction of road infrastructures are considered.

Findings as recorded in table 4.10 above shows that 35.9% of the respondents agreed that there are adequate drainage facilities, 28.3% said its very adequate, 21.0% complained it is inadequate because the road infrastructure causes flooding during raining season and 12.9% says it poor. This result shows that 64.2% confirm adequacy and very adequate of the drainage systems along road infrastructure in Kano Metropolis.

Nevertheless, from the distribution it is clear that bridges located in Naibawa, has a serious drainage problem, one (1) respondent said the drainage is adequate, one (1) respondent said the drainage is very adequate, one (1) respondent said the drainage is inadequate while

seventeen (17) said the drainages are poor that makes eighteen respondents out of twenty. Likewise, a similar problem is observed along Sabon Titi were out thirty-five respondents, eighteen said its inadequate, two said its poor making a total of nineteen (19) respondents affirming the need to recheck the drainages along the said bridges.

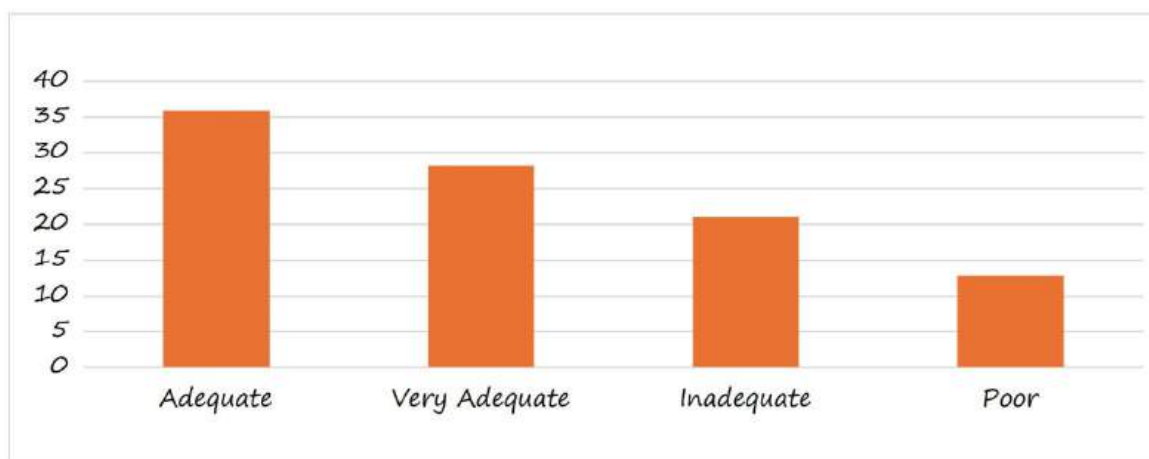


Figure 4: Adequacy of Drainage Systems

Source: Fieldwork 2024

1.5 Presence of Structural Defaults along Road Infrastructure.

Figure 5 below shows that 52.9% of the respondent affirms to the presence of structural defaults on the road infrastructure within kano metropolis especially those constructed in the last one (1) decade while 45.1% said there are no structural defaults on the road infrastructure. When carefully studying the result, its shows that there is serious level of structural default on bridges along Sabon Titi and Naibawa as seen in plate.

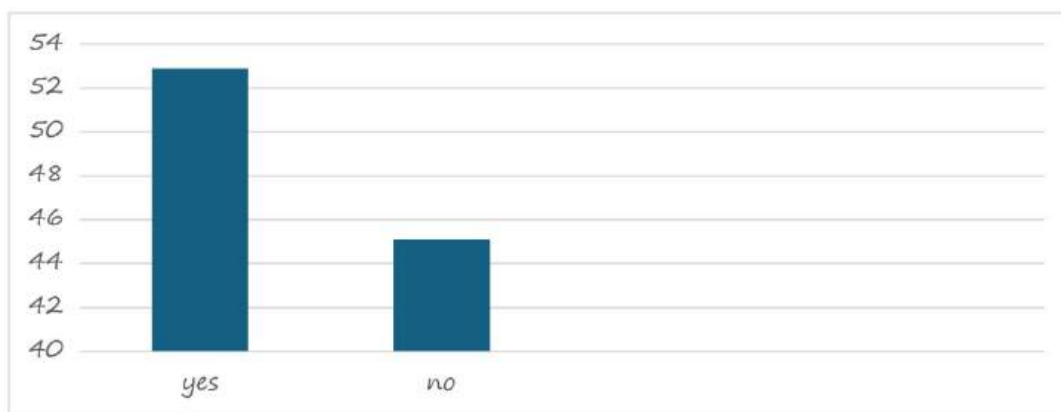


Figure 5: Structural Defaults on Road Infrastructure Source: Fieldwork 2024



Plate 4: Structural Default along Kofar Ruwa
Source: Fieldwork 2024



Plate 5: Structural Default along Kofar Ruwa
Source: Fieldwork (2024)

Conclusions and Recommendations

The new roads infrastructures constructed in the last decade are under serious threat from improper waste disposal and inadequate flood management, which, if not addressed by the authorities, could lead to substantial damage through flooding, structural default, pollution from waste and social bias in the near future. Additionally, educating road users is essential, along with incorporating safety measures, as these steps will greatly help reduce accidents along the road networks.

5.4 Recommendations

Findings from this study has outline the critical need for safety and waste management. The study from the conclusions made has the following recommendations;

- Regular monitoring and evaluation of all available road infrastructure should be intensified by the Government agencies responsible for managing the roads after their completion.
- Environmental sanitation by commercial owners along the road infrastructure should be encourage to clear waterways.
- Public enlightenments should be encouraged so that people should know the value of clean environment and avoid indiscriminate refuse dumping especially along drainage systems.
- Policies should be promulgated by government all level on waste disposal management and flood control.
- Structural default on roads infrastructures should be given serious consideration as living it linger can lead to loss of lives of users.

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