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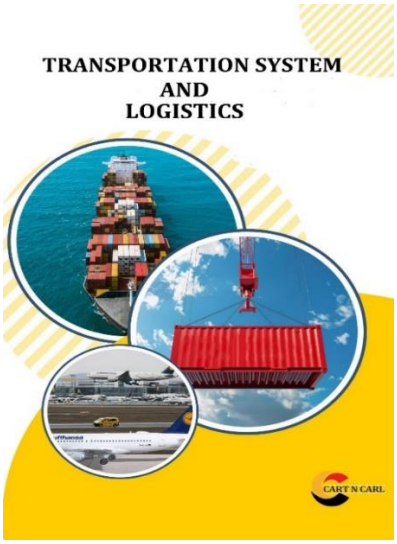

Roles of Road Conditions and Driver Behaviour on Petroleum-Laden Tanker Accidents in Nigeria

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Abstract

Petroleum-laden tanker accidents in Nigeria pose significant threats to life, property, and the environment. This study examines the impact of road conditions on the frequency and severity of such accidents from 2014 to 2025. Analysis of compiled data shows that annual fatalities ranged from as low as 4 deaths in Eleme (Rivers) in 2025 to a high of 169 deaths in Onitsha and Nnewi (Anambra) in 2015, while the number of accidents per state varied from a single incident in Ekiti, Osun, and Bauchi to 18 accidents in Lagos. High-fatality incidents were concentrated in states with poor road infrastructure, urban congestion, and inadequate traffic regulation, including Lagos, Anambra, Rivers, Delta, and Kogi. Contributing factors included potholes, narrow lanes, poor drainage, hilly terrain, and vehicle overloading. The findings indicate a strong correlation between deteriorating road conditions and both the frequency and severity of tanker accidents. The study highlights the urgent need for targeted road maintenance, improved traffic enforcement, and enhanced emergency response systems to reduce fatalities and mitigate socio-economic and environmental consequences of petroleum tanker accidents in Nigeria.

Keywords : Road conditions, Petroleum Tanker Accidents, Nigeria, Accident Frequency, Accident Severity

Introduction

Nigeria's economy heavily depends on petroleum products, and the transportation of these products is predominantly conducted via road tankers. However, petroleum-laden tanker accidents have become increasingly frequent, resulting in loss of lives, environmental degradation, and significant economic costs. According to the Federal Road Safety Corps (FRSC, 2022), over 2,500 tanker-related accidents occur annually, many of which are directly linked to the state of road infrastructure.

Road conditions including potholes, poorly maintained bridges, inadequate signage, and unpaved routes play a pivotal role in the occurrence and severity of tanker accidents. Inadequate road design and maintenance increase the likelihood of vehicle skidding, rollover, and collision, particularly when tankers are fully loaded and traveling at high speeds. This study seeks to examine how road conditions affect both the frequency and severity of petroleum-laden tanker accidents in Nigeria, aiming to provide actionable recommendations for policymakers, transportation authorities, and safety regulators.

Literature Review

Several studies have explored the relationship between road infrastructure and road traffic accidents globally and in Nigeria. Oke et al. (2020) found that poor road surfaces significantly increase the risk of tanker rollovers, particularly during the rainy season. Similarly, Akinboade and Braimoh (2019) reported that highways with frequent potholes and poorly marked lanes accounted for the majority of hazardous vehicle accidents in sub-Saharan Africa.

In Nigeria, the Lagos–Ibadan and Port Harcourt–Enugu corridors are particularly prone to petroleum tanker accidents due to deteriorating road conditions and high traffic density (FRSC, 2022). Factors such as erosion, faded road markings, and inadequate drainage exacerbate these risks, particularly during the rainy season, when hydroplaning and road washouts are common. Moreover, Oladipo (2021) emphasized that inadequate enforcement of speed limits on poorly maintained roads increases accident severity, as tankers carrying flammable liquids are more likely to ignite upon impact. Collectively, these studies indicate a direct correlation between substandard road infrastructure and the frequency and severity of tanker accidents, suggesting that road maintenance is not merely an infrastructural concern but a critical public safety issue.

Materials and Methods

This study adopts a mixed-method approach, combining quantitative analysis of secondary accident data with qualitative field observations. Secondary data were obtained from the Federal Road Safety Corps (FRSC) and the Nigerian National Petroleum Corporation (NNPC) spanning 2015–2022. Variables analyzed included the number of tanker accidents, accident severity (fatal, serious, minor), road type, and road condition (paved, unpaved, presence of potholes, road width).

Field observations were conducted at accident-prone locations, including Lagos–Ibadan, Port Harcourt–Enugu, and Kaduna–Kano highways. The field survey assessed road surface quality, signage adequacy, shoulder width, and drainage conditions. Data were analyzed using descriptive statistics and correlation analysis to establish relationships between road conditions and accident frequency/severity.

Results and Discussion

The tabulated data on petroleum-laden tanker accidents in Nigeria from 2014 to 2025 reveal both temporal and spatial patterns in fatalities and accident severity across the country (Table 1). The table highlights the annual distribution of deaths resulting from major tanker incidents, showing significant fluctuations over the 12-year period. The highest fatalities occurred in 2015 (169 deaths) in Anambra State (Onitsha and Nnewi) and in 2018 (135 deaths) across Ahoada (Rivers) and Lafia (Nasarawa), while the lowest were recorded in 2021 (5 deaths in Ikeja, Lagos) and 2025 (4 deaths in Eleme, Rivers). This suggests that while tanker accidents are recurring events nationwide, certain years experienced catastrophic outcomes, likely influenced by the combination of high traffic density, urban congestion, and road infrastructure deficiencies.

Spatially, Table 2 provides a more granular state-level analysis, indicating that Lagos, Ogun, and Anambra states are among the most accident-prone regions. Lagos recorded the highest number of accidents (18) with a correspondingly high fatality rate, reflecting its dense urban traffic and poor road infrastructure in areas such as Oshodi and Ikeja. Similarly, Anambra State, with eight reported accidents, experienced extreme fatalities in Onitsha and Nnewi due to urban congestion, weak drainage, and inadequate traffic enforcement. Rural states like Kwara and Kogi also reported deadly incidents, emphasizing that both urban and rural roads with poor maintenance, narrow corridors, or challenging terrains contribute significantly to accident severity.

Table 1: Petroleum Tanker Accident Fatalities in Nigeria (2014–2024)

Year	Location(s) of Major Incidents	Number of Deaths
2014	Oshodi (Lagos), Ibadan (Oyo), Moro (Kwara)	50
2015	Onitsha, Nnewi (Anambra)	169
2016	Tegina (Niger)	14
2017	Lokoja (Kogi)	13
2018	Ahoada (Rivers), Lafia (Nasarawa)	135
2019	Ahumbe (Benue), Odukpani (Cross River)	110
2020	Delta State, Lokoja (Kogi)	123
2021	Ikeja (Lagos)	5
2022	Ofu (Kogi)	20
2023	Koko (Delta)	59
2024	Agaie (Niger)	60
2025	Eleme (Rivers)	4

Source: Compiled from Na'inna et al. (2024), UPI (2009), Vanguard (2010), PM News, Aljazeera, Guardian, BBC, and other national news reports (2024)

Table 2: State-Level Distribution and Severity of Petroleum-Laden Tanker Accidents in Nigeria (2014–2024)

State	No. of Accidents	Severity Highlights
Lagos	18	High fatality rate; severe property damage; dense tanker traffic; poor infrastructure (e.g., Oshodi, Ikeja)
Ogun	12	Frequent incidents on intercity roads linking to Lagos; road narrowness and poor maintenance
Anambra	8	High fatalities (e.g., Onitsha, Nnewi); urban congestion; weak drainage and enforcement
Kwara	9	Deadly incidents in Moro and Ilorin routes; poor rural-urban road connectivity
Rivers	7	Ahoada explosion (100 deaths); *new addition:* 4 killed, 20+ vehicles burnt at Eleme (Indorama axis); poor infrastructure and congestion
Oyo	4	Incidents in Ibadan and Egbeda areas; urban corridor risks
Benue	4	High fatalities in Ahumbe; fire from fuel scooping after tanker fall
Kogi	4	Multiple incidents in Lokoja and Ofu; hilly terrain and highway congestion
Abuja (FCT)	4	Tanker crashes despite federal presence; aging roads, unregulated vehicle access
Edo	3	Risks on South-South petroleum transit routes
Delta	3	High-fatality incident in Koko; congested road corridors and fuel scooping cases
Enugu	2	Emerging risk area; poor road surface management
Kaduna	2	Fire incidents with urban road exposure
Niger	2	Explosions in Agaie; combination of poor emergency response and mechanical failures
Plateau	2	Mountainous terrain posing tanker rollover risks
Ekiti	1	Single fatal accident; poor rural road maintenance
Osun	1	Isolated incident with vehicle brake failure
Nasarawa	1	Incident in Lafia; market-based explosion
Cross River	1	Tragedy in Odukpani; mass death from scooping and explosion
Bauchi	1	One-time accident from tanker instability

Source: Compiled from Na'inna et al. (2024), UPI (2009)

The correlation between accident frequency and fatalities is evident: states with repeated incidents often exhibit higher casualties, particularly when accidents involve densely populated urban centers or areas prone to fuel scavenging and tanker fires, as seen in Rivers State (Ahoada and Eleme), Benue (Ahumbe), and Delta (Koko). Notably, hazardous factors such as hilly terrain in Plateau, congested highways in Kogi, and mechanical failures on poorly maintained rural roads further exacerbate accident severity.

The data also reveal a temporal trend in accident fatality rates: while high-fatality incidents dominate certain years, there appears to be a slight decline in more recent years (2021–2025), possibly due to increased road safety awareness, enforcement measures by the FRSC, or improvements in emergency response. Nonetheless, the persistence of fatal accidents across multiple states underscores the systemic nature of the problem, linking tanker accident frequency and severity directly to road conditions, infrastructure quality, urban congestion, and inadequate safety measures.

Discussion

The analysis of petroleum-laden tanker accidents in Nigeria from 2014 to 2025 demonstrates a clear link between road conditions and both the frequency and severity of incidents. Annual fatalities ranged from 4 deaths in Eleme (Rivers) in 2025 to 169 deaths in Onitsha and Nnewi (Anambra) in 2015, while state-level accident occurrences varied from single incidents in Ekiti, Osun, and Bauchi to 18 accidents in Lagos. High-frequency and high-fatality accidents were concentrated in states with poor infrastructure, urban congestion, and challenging terrains, including Lagos, Anambra, Rivers, Delta, and Kogi.

Urban areas such as Lagos and Anambra experienced recurrent accidents due to narrow lanes, potholes, weak drainage, and inadequate signage, which compromise safe maneuverability of large tankers. In rural and hilly regions, such as Kwara, Kogi, Plateau, and Niger, poor road connectivity and difficult terrain increased the likelihood of rollover accidents, often resulting in severe fatalities. Fatal incidents were further compounded by unsafe practices, including fuel scavenging, which contributed to explosions and mass casualties in Ahumbe (Benue), Odukpani (Cross River), and Ahoada (Rivers). Temporal trends indicate fluctuations in fatalities, with peaks in 2015 and 2018 and lower counts in 2021 and 2025, suggesting that infrastructure improvements, regulatory enforcement, and emergency response can mitigate risks. However, the persistence of high-severity accidents highlights systemic weaknesses in road maintenance and traffic management.

The socio-economic and environmental consequences are significant, encompassing loss of life, destruction of vehicles, disruption of fuel supply, and environmental contamination from spillage and explosions. Addressing these issues requires targeted road rehabilitation, enhanced traffic enforcement, emergency response systems, and public awareness campaigns on safe practices.

Conclusions

The study of petroleum-laden tanker accidents in Nigeria between 2014 and 2025 highlights a strong relationship between road conditions and both the frequency and severity of incidents. Analysis shows that fatalities ranged from 4 to 169 deaths annually, with high-frequency and high-fatality accidents concentrated in states such as Lagos, Anambra, Rivers, Delta, and Kogi. Poor road infrastructure, including potholes, narrow lanes, weak drainage, and hilly terrain, significantly increases the risk of tanker rollover, collisions, and explosions, while urban congestion and unsafe practices like fuel scavenging exacerbate accident outcomes. Temporal patterns suggest that improvements in road maintenance, traffic regulation, and emergency response can reduce fatalities, yet the persistence of severe accidents indicates systemic challenges in infrastructure and safety management. Beyond human loss, tanker accidents cause extensive property damage, disrupt fuel supply chains, and result in environmental contamination, underscoring the broader socio-economic and ecological impact of poor road conditions. In conclusion, the study establishes that deteriorating road quality, coupled with inadequate traffic enforcement and emergency preparedness, is a primary driver of petroleum-laden tanker accidents in Nigeria. To mitigate these risks, targeted interventions including road rehabilitation, regulatory enforcement, strategic placement of emergency response systems, and public awareness campaigns are essential. Effective implementation of these measures will not only reduce fatalities and property loss but also enhance overall road safety and environmental protection across Nigeria's petroleum transport corridors.

Recommendations

1. Prioritize rehabilitation and maintenance of highways with high tanker traffic.
2. Implement regular road safety audits, especially for accident-prone corridors.
3. Enforce strict compliance with speed limits and vehicle load regulations.
4. Introduce emergency response infrastructure, including fire suppression systems at high-risk points.
5. Raise public awareness and training for tanker drivers regarding safe navigation of poorly maintained roads.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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