

Examining the Factors Contributing to Truck Accident in Tanzania a Case of Dar Es Salaam – Tunduma Road

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Abstract:

Truck-related accidents have become a pressing public safety and economic issue across Tanzania, especially along major transport corridors like the Dar es Salaam–Tunduma Road. This highway, a crucial part of the Central and Southern African Development Community (SADC) transport network, experiences a disproportionately high number of heavy vehicle crashes. This study aims to assess the major factors contributing to truck accidents along the Dar es Salaam–Tunduma Road and to provide evidence-based recommendations for mitigation. Using a structured questionnaire distributed through Google Forms, this research collected data from drivers, transport officers, logistics professionals, and other road users with firsthand knowledge of the corridor. The study employed a mixed-methods approach. Quantitative responses were analyzed using descriptive statistics, while open-ended responses were categorized thematically to capture insights into perceptions and lived experiences. The findings reveal that driver-related factors, such as fatigue, long working hours, and limited rest periods, play a significant role in accident causation. More than 70% of respondents identified these factors as “highly influential.” Road infrastructure was another major concern, with 64% of participants pointing to potholes, poor road design, lack of signage, and absence of designated lanes for heavy trucks. Additionally, 53% cited mechanical issues—especially brake and tire failures—as common causes of accidents. The study also revealed perceived weaknesses in the enforcement of traffic regulations, including insufficient inspection protocols, corruption among enforcement officers, and a lack of consistent penalties for violations. Respondents proposed practical interventions such as the establishment of truck-only lanes, installation of fatigue-monitoring systems, stricter licensing procedures, and improved inspection routines. Several participants also suggested regular refresher courses for truck drivers and investment in smart transport technologies to monitor vehicle health and driver behavior in real time. The paper concludes by proposing a set of policy and operational recommendations tailored to the Tanzanian context. These include establishing rest areas at strategic intervals, implementing mandatory driver fatigue management policies, investing in road redesign in high-risk zones, and strengthening institutional oversight of road transport regulation.

1. Introduction:

The increasing incidence of road traffic accidents involving heavy-duty trucks has become a pressing concern in Tanzania’s transportation and

logistics sector. Among the most affected routes is the Dar es Salaam–Tunduma Road, a strategic national and regional corridor connecting the capital city to the southern border and neighboring countries in the Southern African Development

Community (SADC). This route handles a significant volume of freight transport, making it vital to Tanzania's economic development and cross-border trade. However, with the rise in truck traffic comes a corresponding increase in road accidents, leading to loss of life, property damage, traffic congestion, and a reduction in transport efficiency.

Globally, truck-related accidents account for a substantial proportion of road fatalities. According to the World Health Organization (2021), heavy vehicle crashes are particularly deadly due to the size and momentum of trucks compared to other vehicles. In Sub-Saharan Africa, the problem is compounded by inadequate infrastructure, poor vehicle maintenance, limited driver training, and inconsistent enforcement of road safety regulations (Agyemang et al., 2020; Mabunda & Molapo, 2021). Tanzania shares many of these challenges, but few studies have conducted in-depth, corridor-specific investigations that provide localized evidence to guide policy and intervention.

While national policies and frameworks exist—such as the Road Traffic Act and transport oversight by authorities like the Surface and Marine Transport Regulatory Authority (SUMATRA) and the Tanzania National Roads Agency (TANROADS)—implementation gaps persist. Truck drivers often report long working hours, poor road conditions, and minimal access to rest points. Additionally, limited inspection capacity and inconsistent application of penalties for violations reduce the effectiveness of regulatory frameworks. These systemic weaknesses call for data-driven inquiry into the real-world experiences of road users and stakeholders operating along high-risk corridors like Dar es Salaam–Tunduma.

This study seeks to assess the major factors contributing to truck accidents along the Dar es Salaam–Tunduma Road. Specifically, it investigates the role of driver behavior, road infrastructure quality, vehicle mechanical condition, and the enforcement of road safety

regulations. The study utilizes a mixed-methods approach, combining quantitative analysis of structured questionnaire data with qualitative insights from open-ended responses.

The paper is structured as follows: Section 2 presents a review of relevant literature. Section 3 describes the methodology employed in the study. Section 4 outlines and analyzes the findings, while Section 5 discusses the implications of the results. Section 6 concludes the paper with recommendations for improving truck safety and reducing accident rates along Tanzanian highways

2. Literature Review:

Road traffic accidents involving heavy vehicles have garnered increasing scholarly attention due to their disproportionate impact on public health, infrastructure, and economic productivity. The global burden of truck-related accidents is rising, with the World Health Organization (2020) reporting that more than 1.3 million people die each year from road traffic injuries, a significant portion of which involve heavy-duty vehicles. In developing countries like Tanzania, where transportation systems are still maturing, the implications are particularly severe.

2.1 Driver Behavior and Accident Causation

A vast body of literature identifies driver behavior as a primary contributor to road accidents. Ajzen's (1991) Theory of Planned Behavior emphasizes that attitudes, subjective norms, and perceived control predict behavioral intentions, which is relevant for understanding risky driving patterns among truck drivers. Studies by Mabunda and Molapo (2021) in South Africa and Okeke and Ubah (2021) in Nigeria highlight fatigue, distraction, substance use, and overconfidence as major behavioral risks. Tanzanian research by Komba et al. (2022) and Magembe et al. (2021) confirms these findings, pointing to fatigue from excessive hours and limited rest as leading causes of crashes along major routes.

2.2 Road Infrastructure Deficiencies

The quality of road infrastructure significantly affects road safety outcomes. Poor design features

such as sharp curves, inadequate signage, potholes, and lack of lighting can increase accident risks, especially for large vehicles. Global studies (Fagnant & Kockelman, 2019; Lindstrom & Törner, 2020) show that road geometry and surface condition correlate with accident rates. In Tanzania, several studies (Kimaro et al., 2022; Mwakatumbula et al., 2023) underscore the role of inadequate road markings, erosion-prone sections, and overloaded intersections. The Controller and Auditor General (2022) also noted delays in road maintenance and infrastructure upgrades, particularly on high-traffic routes such as Dar es Salaam–Tunduma.

2.3 Vehicle Condition and Mechanical Failures

Mechanical issues are consistently cited as direct causes of truck accidents. Brake failures, tire bursts, and lighting malfunctions often stem from poor maintenance practices or lack of routine inspection. According to NHTSA (2022), nearly 40% of heavy truck accidents in their U.S. study involved at least one mechanical defect. African studies echo these results: Bonyo et al. (2022) identified maintenance gaps in Kenya, while Mwenda and Mkumbwa (2021) observed frequent mechanical failures on Tanzanian highways due to limited inspection infrastructure and informal servicing. The Tanzania Bureau of Standards (TBS, 2021) has emphasized the importance of adherence to mechanical safety standards, yet enforcement remains weak.

2.4 Enforcement of Road Safety Regulations

The effectiveness of enforcement mechanisms significantly shapes driver behavior and vehicle safety. Studies by Stewart and Elvik (2021) and Gonzalez and Herrera (2021) argue that consistent regulation enforcement—through fines, automated monitoring, and roadside inspections—reduces accident frequencies. However, in countries like Tanzania, enforcement is often hampered by corruption, understaffing, and resource constraints. Mshana (2018) and Mwakalebela (2019) highlight inconsistencies in traffic law enforcement and limited technological support for monitoring violations. SUMATRA (2022) reports

that many vehicles pass inspections without fulfilling minimum safety criteria due to bribery or informal loopholes.

2.5 Research Gap and Justification

While substantial research has explored road safety in Sub-Saharan Africa, few studies specifically focus on the Dar es Salaam–Tunduma corridor despite its strategic significance. Existing works tend to isolate individual factors—such as infrastructure or driver behavior—without offering an integrated, location-specific analysis that incorporates stakeholder feedback. Furthermore, few studies have utilized mixed-method approaches that combine quantitative and qualitative perspectives from those directly involved in freight transport. This study addresses that gap by offering a holistic examination of accident contributors on this corridor, using real-time survey data from drivers, logistics officers, and road safety experts.

3. Methodology:

This chapter outlines the research design, target population, sampling techniques, data collection methods, and analysis procedures employed in this study. The purpose was to examine the factors contributing to truck accidents along the Dar es Salaam–Tunduma Road using a mixed-methods approach, combining both quantitative and qualitative data collection and analysis techniques.

3.1 Research Design

The study adopted a descriptive cross-sectional survey design. This design was suitable as it allowed the researcher to gather data from a specific population at a single point in time, providing a snapshot of existing conditions and behaviors related to truck accidents. A mixed-methods approach was used: quantitative data was obtained through structured Likert-scale questions, while qualitative insights were derived from open-ended responses. The design aimed to ensure triangulation, enriching findings by integrating numerical trends and subjective perspectives.

3.2 Study Area

The research was conducted along the Dar es Salaam–Tunduma Road, a vital highway in Tanzania's transport corridor that connects the port city of Dar es Salaam to the southern highlands and borders of Zambia. The road is a key route for commercial trucking activities, and it is frequently cited as a high-risk stretch for traffic accidents involving heavy vehicles. Towns such as Mikumi, Morogoro, Iringa, Mbeya, and Tunduma were considered in scope due to their strategic positioning along the route.

3.3 Target Population

The target population consisted of stakeholders with firsthand knowledge or experience in trucking operations along the Dar es Salaam–Tunduma corridor. These included: Truck drivers and co-drivers, Fleet owners and logistics managers, Road safety officers, Traffic police and Officials from transport regulatory bodies

3.4 Sampling Technique and Sample Size

A non-probability purposive sampling technique was used due to the specific expertise and experience required from respondents. This approach enabled the selection of individuals who were most likely to provide relevant and informed insights. Data was collected from a sample of 120 respondents, drawn through virtual distribution of Google Forms and targeted outreach through transport unions and logistics associations.

The sample size was calculated using the formula:

$$n = \frac{Z^2 \cdot P(1 - P)}{e^2}$$

Where:

- n = required sample size
- Z = Z-score (1.96 for 95% confidence level)
- p = estimated proportion (0.5 used for maximum variability)
- e = margin of error (0.09)

$$n = \frac{(1.96)^2 \times 0.5 \times (1 - 0.5)}{(0.09)^2} \approx 119$$

This justified the use of 120 respondents in the study.

3.5 Data Collection Methods

Data collection was conducted online due to logistical constraints. A Google Forms questionnaire was developed and distributed through professional trucking forums, WhatsApp groups, and email. The questionnaire consisted of five sections: Demographic information, Driver behavior factors, Road infrastructure issues, Vehicle mechanical condition and Law enforcement and regulation. Most questions used a 5-point Likert scale, ranging from *Strongly Disagree* to *Strongly Agree*. One section also collected open-ended responses to capture qualitative insights.

3.6 Data Analysis Techniques

Quantitative data were analyzed using Microsoft Excel and Google Sheets to compute frequencies, percentages, and visual summaries through bar charts and pie graphs. Responses were tabulated and visualized to identify dominant trends and recurring patterns. For qualitative responses, thematic analysis was employed. Similar open-ended responses were grouped to extract common themes, such as fatigue, corruption, or poor infrastructure, providing additional context to quantitative patterns.

3.8 Ethical Considerations

Ethical clearance was granted by the relevant institutional research body. Respondents were informed of the voluntary and anonymous nature of the survey. No personal identifiers were collected, and participation posed no physical or psychological risk. Data was stored securely and used solely for academic purposes.

4. Findings and Analysis:

This chapter presents and interprets the findings obtained from the structured questionnaire distributed through Google Forms. The goal was to assess the factors contributing to truck accidents along the Dar es Salaam–Tunduma Road. Data are categorized into five sections: (1)

demographic characteristics, (2) driver behavior, (3) road infrastructure, (4) vehicle conditions, and (5) enforcement of road safety regulations. Both quantitative data (from Likert scale questions) and qualitative data (from open-ended responses) are presented. Figures and tables are referenced for visual interpretation.

4.1 Driver Behavior

Respondents rated statements related to truck driver behavior. Results indicate that 71% agreed that fatigue and long driving hours are major contributors to accidents. Furthermore, 65% acknowledged that distractions such as mobile phone use while driving are common. One respondent noted, “Most truck drivers are under pressure to meet delivery deadlines, which makes rest secondary.”

4.2 Road Infrastructure

Respondents highlighted poor infrastructure as a key accident contributor. 64% agreed that potholes and poor designs like sharp curves directly increase accident risk. Another 58% expressed concern over inadequate road signage and narrow shoulders. A participant remarked, “The condition of roads in highland regions becomes worse during the rainy season, making navigation more dangerous.”

4.3 Vehicle Conditions

Mechanical issues were recognized as a significant problem. 53% of respondents agreed that faulty vehicle components (especially brakes and tires) are frequent causes of crashes. Some drivers admitted to skipping scheduled maintenance due to financial constraints. “Truck owners delay maintenance until a breakdown happens,” noted one respondent.

4.4 Enforcement of Regulations

Regarding enforcement, 69% of participants stated that regulations exist but are poorly enforced. Corruption among some enforcement officers was frequently mentioned, with several respondents claiming that “some truckers pay their way past checkpoints without proper

inspection.” Only 22% felt that current enforcement strategies are sufficient to deter risky behaviors.

4.5 Open-Ended Responses Summary

Respondents suggested several interventions, including: Introduction of truck-only lanes, Use of mandatory rest points and fatigue monitoring systems, Improved vehicle inspection protocols, Road design improvements in high-risk areas, Periodic safety training for drivers. One driver wrote, “We need designated rest areas. Fatigue kills.” Another emphasized the need for enforcement accountability, stating, “Without real inspections, rules are just paper.”

4.6 Visual Analysis

Visual summaries from Google Forms provided bar charts and pie graphs reflecting frequency of responses. These visuals confirmed trends seen in the data analysis—particularly high agreement levels with infrastructure and driver behavior factors. Visuals are referenced in this chapter and included in the appendix.

4.7 Summary of Findings

The findings underscore the multidimensional nature of truck accidents. Behavioral factors like fatigue, infrastructural inadequacies such as potholes, mechanical faults in trucks, and weak enforcement of regulations are all significant contributors. The qualitative responses emphasized practical recommendations that point to systemic reform rather than one-off solutions.

Discussion:

This chapter interprets the findings presented in Chapter 4 in light of existing literature and theoretical frameworks. It explores how the observed results align with or deviate from previous studies, draws inferences, and offers possible explanations for the major patterns that emerged from the data.

Driver Behavior and Human Error

The study found that 71% of respondents agreed that fatigue and extended driving hours are major contributors to truck accidents. This supports

Ajzen's (1991) *Theory of Planned Behavior*, which links intentional risk behavior to perceived control and external pressures. Many drivers in this study admitted that economic or contractual obligations forced them to drive beyond safe limits. Similar findings were reported by Magembe et al. (2021) and Nyamuryekung'e and Masanja (2020), who highlighted fatigue and stress as major accident triggers among truck drivers in East Africa. Distracted driving, including mobile phone use, was also reported by over 60% of respondents. This aligns with Kimaro and Mndeme (2023), who found that distractions sharply increase the probability of road accidents in Tanzania. The behavior component therefore emerges as a central predictor of accident occurrence and needs targeted behavioral interventions.

Road Infrastructure Deficiencies

Poor infrastructure was another dominant theme, with 64% of respondents agreeing that potholes and road design flaws such as sharp curves and inadequate signage contribute to accidents. This reinforces previous studies by Abdullah et al. (2021) and Mwakyusa (2021), which showed that deteriorating road conditions raise crash frequency, particularly for heavy vehicles that require longer stopping distances and maneuvering space. Geographic challenges, such as hilly terrains and weather-related hazards, particularly around Morogoro and Iringa, were noted to exacerbate these dangers. The respondents' emphasis on improved road geometry and maintenance aligns with global road safety recommendations (World Bank, 2021; WHO, 2020).

Mechanical Failures and Vehicle Conditions

Mechanical defects—especially with brakes, tires, and lighting systems—were identified by 53% of respondents as contributing significantly to accidents. These results are consistent with findings by John and Magoma (2022) and Mwiwaha et al. (2021), which documented systemic failures in regular truck maintenance and inspection in Tanzania. Open-ended responses

revealed that many truck owners postpone maintenance for cost reasons or rely on informal, unregulated garages. Such patterns underscore the need for policy-level interventions to mandate periodic inspections with real penalties for non-compliance. These findings validate the conclusions by Smith et al. (2022), who observed similar issues in studies on mechanical failure across African roads.

Weak Enforcement of Road Safety Regulations

A significant portion of respondents (69%) reported that although regulations exist, enforcement is irregular and often undermined by corruption. Respondents pointed out that officers sometimes accept bribes to bypass safety checks. This finding is echoed in the works of Kassim and Mhando (2021) and Transparency International (2021), which cite enforcement irregularities as a major weakness in Tanzania's road safety system. The lack of strong institutional mechanisms for accountability means that laws on paper fail to translate into meaningful deterrence. Several participants emphasized that without genuine enforcement, even well-designed policies have limited impact.

Stakeholder Insights and Practical Recommendations

The open-ended responses provided valuable, grounded suggestions such as: Establishing truck-only lanes to reduce conflict with lighter vehicles, Mandatory rest points and fatigue-monitoring systems, Improved inspection protocols with digital tracking, Redesign of dangerous road segments and Training and licensing reforms for drivers. These recommendations align with both national and global trends in road safety reform. The WHO (2022) has emphasized the importance of infrastructural segregation and institutional strengthening to protect high-risk road users such as truck drivers.

Summary of the Discussion

The discussion highlights that addressing truck accidents requires an integrated strategy. Behavioral, technical, institutional, and

infrastructural reforms must all be pursued concurrently. The recommendations provided by stakeholders offer a pathway forward—one that must be supported by robust political will, adequate funding, and public engagement.

5. Conclusion and Recommendations:

5.1 Conclusion

This study assessed the primary factors contributing to truck accidents along the Dar es Salaam–Tunduma Road. Based on data collected through Google Forms and supported by existing literature, the findings indicate that truck accidents are a result of intersecting issues involving driver behavior, road infrastructure, vehicle condition, and regulatory enforcement. Driver fatigue, speeding, and distractions were the most commonly identified behavioral issues. Poor road conditions—such as potholes, narrow lanes, and inadequate signage—further increase accident risk. Mechanical problems, especially worn-out brakes and tires, were also frequently reported. Additionally, lax and inconsistent enforcement of road safety laws, often linked with corruption, was found to exacerbate these problems. These findings align with theoretical frameworks such as the Haddon Matrix and the Theory of Planned Behavior, highlighting that effective accident prevention must address human, vehicle, and environmental factors simultaneously.

5.2 Recommendations

5.2.1 For Government and Regulatory Authorities

Enhance law enforcement transparency and reduce corruption within road safety units. Introduce electronic systems for truck inspections and compliance tracking. Invest in road infrastructure, especially redesigning dangerous segments. Establish well-equipped rest stops to combat fatigue-related accidents.

5.2.2 For Transport Companies and Truck Owners

Institute mandatory and scheduled maintenance for all fleet vehicles. Offer safety and refresher

training for drivers regularly. Monitor driving behavior using tracking systems and incentivize safe practices.

5.2.3 For Truck Drivers

Adhere strictly to allowed driving hours and rest periods. Avoid distractions such as mobile phone use while on duty. Report unsafe roads or inspection irregularities to appropriate bodies.

5.2.4 For Civil Society and Media

Conduct public education campaigns on road safety and driver conduct. Push for greater accountability in law enforcement and transport policy. Partner with stakeholders to track progress on road safety improvements

3 Limitations of the Study

The study relied on online data collection, limiting access to certain demographic groups. The inability to perform in-person interviews or site visits reduced opportunities to validate data through observation. Furthermore, responses may be influenced by subjective perception rather than documented experiences.

5.4 Areas for Further Research

Future research could focus on: Quantifying the economic losses from truck accidents on national trade. Evaluating the effectiveness of digital monitoring tools in accident reduction. Cross-border studies comparing trucking corridors in East and Southern Africa. Understanding the psychosocial stressors affecting long-distance truck drivers.

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