

**ASSESSMENT OF OVERLOADING AND SAFETY
PROBLEMS OF INTERCITY PUBLIC PASSENGER
TRANSPORT ALONG MINNA-SULEJA ROAD, NIGER
STATE, NIGERIA**

**Adelanke Samuel Owoeye^{1*}, Kolawole Tajudeen Gbadamosi² & Felix Kayode
Omole³ & Ameer Kolade Akanbi⁴**

^{1,4}Department of Logistics and Transport Technology, Federal University of Technology,
Minna, Nigeria

²Department of Logistics and Transport Technology, Federal University of Technology,
Akure, Nigeria

³Department of Urban and Regional Planning, Federal University of Technology, Akure,
Nigeria

*ade.owoeye@futminna.edu.ng

ABSTRACT: This research focuses on the overloading and safety problems of intercity public passenger transport along Minna-Suleja Road. The primary data were obtained through structured questionnaires administered to motorists and field surveys, whereas the secondary data were sourced from passenger manifests and FRSC accident records. The study adopted a mixed-method approach in which data were gathered by administering questionnaires to 150 motorists via a simple random sampling technique. The sample population was obtained from the passenger manifests of NURTW, RTEAN and NARTO at 3 major terminal facilities in Minna (i.e. Mobil, Abdul-Salaam Park and Kure New Market Motor Park). The findings revealed that the most active travellers in road transport are youths between the age brackets of 21-30 years and 31-40 years, having a combined frequency and percentage of 84% and 56%, respectively. Gender composition shows that 58.7% were male and 41.3% were female. The marital status shows that 26% were single, while 64% were married. Additionally, the result revealed that 31.3% of the travellers were into trading/business, with 24% being civil servants. Business and work trips had the highest number of trip purposes, with 44.7% and 23.3% respectively. 33.3% of passengers find fare barely affordable, and 34% find overloading of vehicles terrible. The nonchalant attitude of drivers ranked highest, with a mean score of 1.65, as a factor causing overloading, with vehicle integrity ranking highest as a significant effect of overloading on travel, with a mean score of 2.37. Finally, notable surges occurred in 2016 and 2017, where the number of RTC cases reached 907 and 943, respectively. The study recommends that FRSC and DRT need to intensify the enforcement of vehicle load limits and severe penalties for violators.

Keywords: Overloading, Safety, Intercity, Public, Transport

INTRODUCTION

Transport involves the movement of people, goods, ideas and services in a spatiotemporal dimension. It influences people's daily activities, invariably playing a significant role in the lives of individuals and society (Gbadamosi, 2002). Moreover, the transportation network is

designed to convey passengers and goods efficiently from one end to another. Transport ensures the ease, spread, cost, and quality of trips between places and land use in urban centres, inextricably ensuring a functional system (Osoba, 2012). The size, structure and vertical and horizontal spread of any city depends on the nature and function of the transport system (Akinyemi et al., 2019).

As Nigeria's economy expanded, passenger and commodity transport have increased. This improvement in the existing road networks nationwide. The increase in economic activities and social interaction among urban centres has created a spike in the volume of passengers and freight movement. Moreover, the recent increase in the pump price of premium-motor-spirit (PMS) due to the deregulation of the downstream sector of the petroleum industry in Nigeria has led to most car owners jettisoning their vehicles for public transport services (Akinyemi, 2013). Invariably, the surge in the amount of traffic along major traffic corridors in Niger State has resulted in the way and manner public transport operators, especially drivers, overload their vehicles to reduce operational costs and increase profit margins to compensate for the cost of fueling.

Oyekanmi, et al. (2020) reported that vehicle overloading illegally exceeds vehicles' maximum permissible legal weight. Furthermore, an overloaded vehicle has been observed to cause severe strain on vehicle integrity, resulting in dire consequences such as road mishaps compared with legally loaded vehicles (Adebola et al., 2014). An accident is likely to occur whenever a vehicle is overloaded with more severe consequences than a legally loaded vehicle (Jacob & La Beaumelle (2010). One of the most severe reasons for road accidents is vehicle overloading, necessitating enormous government expenses (Adebola et al., 2014).

The persistent incidence of overloading and safety problems among public transport vehicles for highway passengers and excessive axle loads are key issues impeding proper traffic management and increasing traffic crashes (FRSC Annual Report, 2014). This has led to poor road damage, reduced road life spans, increased fuel consumption, and a greater risk of road mishaps and fatalities. Given the vital role of public passenger transport in densely populated urban centres, addressing the overloading issue and its related safety concerns is crucial. There is an urgent need to understand the root causes of this menace and provide solutions to enhance the Safety of passengers on Nigerian highways.

This study investigated the impacts of overloading on intercity public transport safety along the Minna-Suleja road. Specifically, the research explored the effects of overloading on vehicle integrity, road conditions, and accident rates and examined the regulatory gaps that may exacerbate these issues. Furthermore, the study proposed solutions to mitigate the risks associated with overloading and improve passenger safety in Niger State's intercity public transport system.

LITERATURE REVIEW

Olagunju (2015) and Akintayo (2017) highlight how insufficient regulation enforcement and the financial motivations of drivers significantly increase the risk of accidents. In their study, Musa and Adebayo (2019) reported that overloading worsens vehicle instability and driver fatigue, compromising intercity Safety. Ponnaluri (2012) reported that prolonged driving hours and inadequate rest periods lead to safety concerns even in the highly regulated environment of the United States. Inegbedion and Aghedo (2018) examined the impact of

overloading on vehicle deterioration, total costs, and the replacement of vehicle fleets in Nigeria. The findings showed that overloading has caused significant deterioration and cost accumulation. The findings show that overloading serves as a major precipitate to vehicle deterioration, increases operating and total costs and thus affects the replacement time of the vehicle fleet. Adebola et al. (2014) studied public transport security and Safety in Lagos, Nigeria's Bus Rapid Transit (BRT) context. The study involves an exposition of the risks and challenges of public transport.

Conceptual Framework

Overloading Model

The study of existing control measures suggests that the risk of catching an overloaded vehicle is relatively low, at least when the route is outside the areas where weigh-in-motion systems are employed or where the presence of enforcement personnel is expected. National Heavy Vehicles Safety Strategy NHVSS (2001). The study of existing control measures combined with traffic data collection and enforcement regimes is possible via the framework shown below:

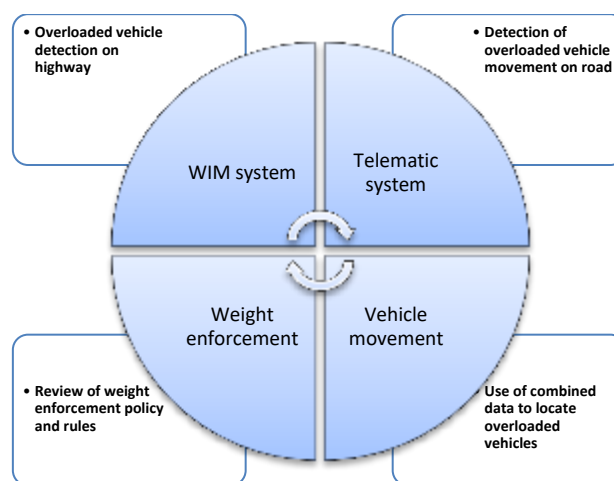


Figure 1: Overload Vehicle Management Framework Enforcement Effectiveness

Source: National Heavy Vehicles Safety Strategy Australia (2001)

Consequently, the mixture of the information collected by the traffic data collection system will lead to a continuous review of road traffic policies and rules on weight enforcement and significantly contribute to road transport safety. However, enforcing weight regulations and traffic data collection activities may not diminish; instead, their overall coverage and effectiveness could significantly improve

Safe System Approach

The transportation sector has adopted the safe system approach to address and reduce the risks associated with our vast and intricate transportation networks. It operates by establishing multiple layers of protection to prevent crashes and reduce the impact on individuals when accidents occur. This holistic and comprehensive approach offers a

framework to create safer environments for people. Unlike traditional safety methods, it accounts for human errors and vulnerability, designing systems with built-in redundancies to safeguard everyone.



Source: U.S. Department of Transportation (2022)

The safe system approach focuses on preventing crashes that cause death and serious injuries and incorporates the following basic principles:

a. Death and Serious Injuries are Unacceptable

A safe system approach prioritizes the elimination of crashes that result in death and serious injuries.

b. Humans make mistakes

People will inevitably make errors and decisions that may lead to crashes; still, the transportation system can be designed to accommodate certain types and levels of mistakes, helping to avoid fatalities and serious injuries when accidents occur.

c. Humans are vulnerable

Human bodies have physical limits for tolerating crash forces, so creating and operating a transportation system that considers human vulnerabilities and prioritizes is essential.

d. Shared responsibility

Preventing fatalities and severe injuries on roadways requires the collaboration of all stakeholders, including all levels of government, industry, nonprofit organizations, researchers, and the general public.

e. Safety is proactive

Safety issues in the transportation system should be addressed proactively by utilizing tools to identify risks before crashes happen, rather than waiting to respond after incidents occur.

f. Redundancy is essential

Mitigating risks means reinforcing every part of the transportation system, ensuring that the other components continue to protect people if one part fails.

Objectives of a Safe System Approach

The implementation focuses on five key objectives aligned with the elements of the safe system approach:

- **Safer People:** Promote responsible driving and road use by encouraging safe behaviours and creating conditions that ensure people can reach their destinations safely.
- **Safer Roads:** Design road environments that reduce the risk of human error and account for injury tolerances, encouraging safer behaviour and protecting vulnerable road users.
- **Safer Vehicles:** Increasing the availability of vehicle technologies and systems that prevent crashes and minimize harm to occupants and other road users in the event of a crash.
- **Safer Speeds:** Encourage safer speeds on all road types through context-appropriate road design, proper speed limit setting, public education, targeted outreach, and enforcement.
- **PostCrash Care:** Improving crash survivability by ensuring swift access to emergency medical services, protecting first responders, and preventing secondary crashes with effective traffic incident management.

Empirical Review

Overloading and Its Impacts on Safety

Several studies have drawn attention to the strong link between vehicle overloading and the heightened risk of accidents in Nigeria's intercity transport system. Olagunju (2015) and Akintayo (2017) emphasized that weak regulatory enforcement and financial incentives for drivers substantially increase the chances of accidents. Musa and Adebayo (2019) also highlighted that overloading undermines vehicle stability and leads to driver fatigue, resulting in dangerous conditions on intercity roads. This aligns with Ponnaluri's (2012) findings, which showed that extended driving hours and insufficient rest intensify safety concerns even in a well-regulated setting like the United States. These studies collectively point to the need

for stronger regulation enforcement and improved driver working conditions to reduce the safety risks associated with overloading.

Economic Drivers of Overloading

Financial pressures play a significant role in encouraging overloading within Nigeria's public transport system. Adewunmi (2017) explains that drivers and passengers partake in overloading to reduce costs—drivers exceed vehicle capacity to boost profits, while passengers opt for overloaded vehicles due to cheaper fares. Gana and Emmanuel (2014) and Gaira (2020) similarly observed that economic motives often overshadow safety concerns, sustaining the hazardous practice of overloading. High fuel prices and limited disposable income are key factors behind the ongoing prevalence of overloading in Nigeria's public transport sector.

Regulatory Failures and Infrastructure Gaps

Beyond economic pressures, weak regulatory enforcement and inadequate infrastructure worsen the overloading issue. Adewole and Salami (2020) observed that overloading is widespread due to the lack of enforcement of vehicle capacity regulations. Anyanwu et al. (2016) and Mohsen et al. (2018) highlight poor road conditions and limited regulatory oversight as key factors that increase the risk of accidents involving overloaded vehicles. Inegbedion and Aghedo (2018) also found that overloading accelerates vehicle deterioration, leading to increased maintenance costs and more frequent mechanical breakdowns, further jeopardizing road safety.

Public Transport Safety Perceptions

Despite the evident risks of overloading, passengers frequently opt for overloaded vehicles without better alternatives. Afolabi et al. (2017) and Adewunmi (2017) noted that while many passengers feel unsafe in overloaded vehicles, they often choose to use them due to lower fares and limited transport options. This highlights a lack of passenger awareness and underscores the need for interventions that enforce regulations and offer safer, more affordable transportation choices. While the existing literature offers a strong foundation for examining the challenges of overloading, there is a noticeable lack of recent studies. Gaira (2020), Oyekanmi et al. (2020), and Adewole, (2020) were among the more recent contributions. Still, there is limited consideration of post-2020 research that could address the ongoing economic pressures heightened by inflation and recent regulatory changes in Nigeria's transport and petroleum sectors. A more current review would benefit from incorporating studies investigating how these recent socioeconomic and regulatory shifts have influenced overloading practices and related safety issues. Therefore, filling these research gaps is essential for creating effective strategies to reduce the risks linked to overloading in intercity public transport.

Study Area

Minna is the capital of Niger State, located in north-central Nigeria; consists of two major ethnic groups: the Nupe and the Gwari. It lies between latitudes 9°33 and 9°40 North of the Equator and longitudes 6°29 and 6°35 East of the Greenwich Meridian. Minna is an agricultural spot famous for agrarian produce such as ginger, shea nuts, yams and cotton.

Suleja is a city in Niger State with a population of 216,578 as of 2006 (N.P.C., 2006). Due to its proximity, the city is sometimes confused with the nearby city of Abuja. Suleja, situated in Niger State, Nigeria, is a vibrant town recognized for its important role as a major transit point linking the Federal Capital Territory with northern Nigeria. As the town experiences population growth and increasing economic activity, it faces infrastructure and urban planning challenges, highlighting its pivotal role in regional development.



Figure 3: Map of Nigeria showing Niger State

Source: Niger State Ministry of Lands and Housing Minna, (2022)

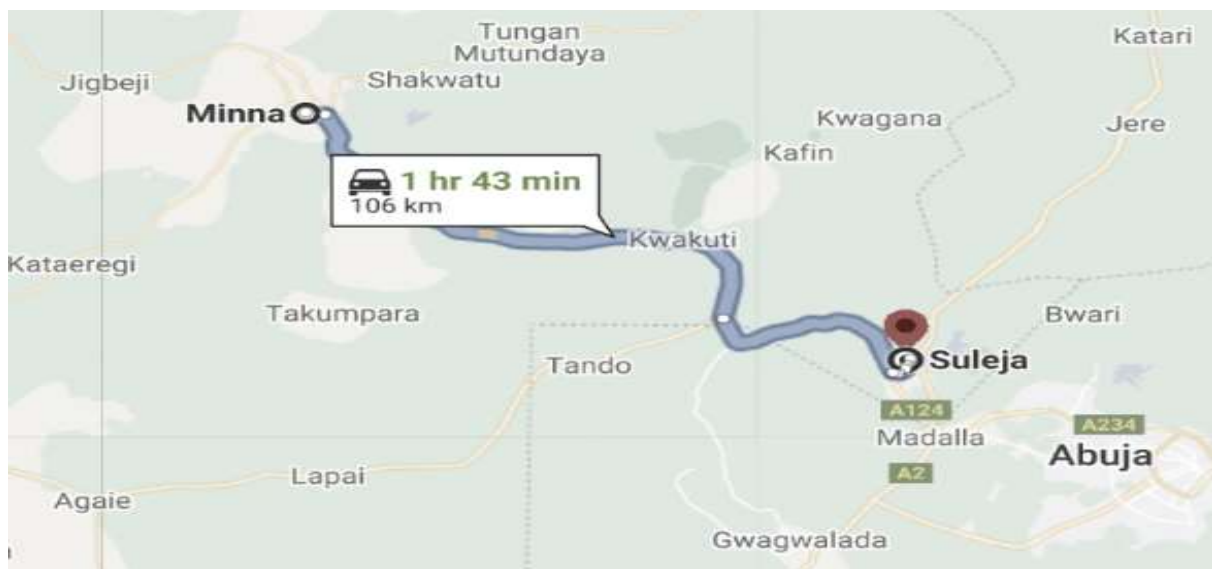


Figure 4: Route distance and time between Minna and Suleja (2024)

Source: Google Maps (2024)

METHODOLOGY

The study adopted a mixed-methods approach combining quantitative and qualitative research. Data were gathered to obtain information on perceptions of Safety and experiences with overloading by administering questionnaires to 150 intercity bus operators and passengers via a simple random sampling technique. The sample population of this research was obtained from the passenger manifests of NURTW (National Union of Road Transport Workers), RTEAN (Road Transport Employers Association of Nigeria) and NARTO (National Association of Road Transport Owners) at 3 major terminal facilities in Minna, (i.e. Mobil Park, Abdul-salaam Park and Kure New Market Motor Park). Over a 7 days period, a total of approximately 1,673 passengers were recorded at these terminals. The primary data were obtained by administering questionnaires to passengers who travel along Minna-Suleja Road. The secondary data were obtained from passengers' records, the directorates of road traffic services (DRTs) records in Minna, journals, official publications, and the Federal Road Safety Corps database.

Using the Taro Yamane formula to select a sample size of 150 from a population of 1,673 is appropriate because it efficiently balances statistical accuracy with practicality given the scope and resources available for the study. This formula, ideal when the total population is known, helps calculate a suitable sample size based on a specific margin of error and confidence level. In this study, with an 8% margin of error, 150 respondents provide a statistically representative sample, capturing a wide range of experiences related to Safety and overloading among intercity transport users. This sample size also aligns with the research objectives by ensuring diverse perspectives while remaining manageable in data collection and analysis, avoiding the challenges of an overly large sample.

The researchers adhered to ethical standards by fully informing respondents about the nature of the study, their right to confidentiality, and their ability to withdraw at any point during the study. FRSC and DRT.'s granted permission to use road crash data, and the researchers maintained a good balance between primary and secondary data collection. This combination provides a robust dataset for analyzing the issues related to overloading and Safety in intercity transport.

Taro Yamane formula was used to obtain an appropriate sample size for the study.

$$n = \frac{N}{1 + N(e^2)}$$

where n = the required sample size

N = Population size (1,673)

e = Margin of error (0.078)

$$n = \frac{1,673}{1 + 1,673(0.006084)}$$

$$n = \frac{1,673}{1 + 10.175}$$

n= 149.73

n= 150

RESULTS AND DISCUSSION

Table 1: Socioeconomic characteristics of the travellers

| Age | Frequency | Percentage |
|---------------------------|------------|------------|
| <21yrs | 15 | 10 |
| 21-30yrs | 44 | 29.3 |
| 31-40yrs | 40 | 26.7 |
| 41-50yrs | 31 | 20.7 |
| >51yrs | 20 | 13.3 |
| | 150 | 100 |
| Gender | | |
| Male | 88 | 58.7 |
| Female | 62 | 41.3 |
| | 150 | 100 |
| Marital Status | | |
| Single | 39 | 26 |
| Married | 96 | 64 |
| Widowed/Widower | 9 | 6 |
| Separated | 6 | 4 |
| Total | 150 | 100 |
| Educational Status | | |
| No Formal Education | 21 | 14 |
| Primary | 39 | 26 |
| Secondary | 42 | 28 |
| Tertiary | 36 | 24 |
| Others | 12 | 8 |
| Total | 150 | 100 |
| Occupation | | |
| Student | 35 | 23.3 |
| Farming | 31 | 20.7 |
| Civil Servant | 36 | 24 |
| Trade/Business | 47 | 31.3 |
| Unemployed | 1 | 0.7 |
| Total | 150 | 100 |

Source: Author's Computation (2024)

The socioeconomic characteristics of the travellers outlined in Table 1 present a varied demographic landscape. Findings show a predominance of young to middle-aged adults between age 21-40 years (56%). The gender distribution is male-dominated, with 58.7% being men, suggesting that men may be more inclined to travel in this context. Marital status data reveal that most travellers are married (64%), which may indicate that marriage and its related responsibilities influence travel behaviour. Concerning educational background, most travellers have attained formal education, particularly at the secondary (28%) and primary

(26%) levels. With regard to occupation, many travellers are involved in trade/business (31.3%) and civil services (24%), indicating that many are economically active and likely to travel for work. Additionally, farmers (20.7%) and students (23.3%) represent substantial groups, suggesting that educational and agricultural needs also drive travel patterns.

These findings of this study largely confirm and build on previous research on intercity transport in Nigeria. The high percentage of younger respondents (56% aged 21-40) supports Adewumi's (2017) view that younger people are frequent intercity travellers due to work demands, while the 13.3% of respondents over 51 challenges Gaira's (2020) claim that older individuals travel less. The male-dominated gender distribution (58.7%) aligns with Musa and Adebayo's (2019) findings that men, especially in trade and civil service, travel more. However, the significant 41.3% of female respondents suggests increasing female participation, as noted by Gaira (2020).

Marital status data, with 64% of respondents married, reflects Gana and Emmanuel's (2014) conclusions that family responsibilities drive intercity travel. Education levels, where secondary and tertiary education were most common, align with Gaira's (2020) observations linking higher education to greater mobility, while the 14% with no formal education mirrors Anyanwu et al.'s (2016) findings about lower-income groups' reliance on public transport. Occupational data, dominated by traders (31.3%), supports Adewole and Salami's (2020) emphasis on intercity transport's role in economic activities. The presence of civil servants (24%) and students (23.3%) reinforces Inegbedion and Aghedo's (2018) call for improved safety regulations to cater to diverse users.

Table 2: Purpose of Travel

| Purpose of Trip | Frequency | Percent |
|-----------------|-----------|---------|
| Shopping | 3 | 2 |
| School | 29 | 19.3 |
| Work | 35 | 23.3 |
| Business | 67 | 44.7 |
| Personal | 16 | 10.7 |
| Total | 150 | 100 |

Source: Author's Computation (2024)

The data on travel purposes in Table 2 reveal that the most significant proportion of travellers, 44.7%, are motivated primarily by business, emphasizing the importance of economic activities as a key driver of travel. Similarly, work-related travel accounts for 23.3%, indicating that employment responsibilities significantly influence movement.

The findings align with and extend prior research on transport usage. The dominance of business-related travel (44.7%) supports Adewole and Salami's (2020) assertion that intercity transport is vital for economic transactions, particularly among traders and entrepreneurs. The significant proportion of respondents travelling for work (23.3%) echoes Musa and Adebayo's (2019) observation that employment drives frequent intercity travel, especially for those in trade and civil service.

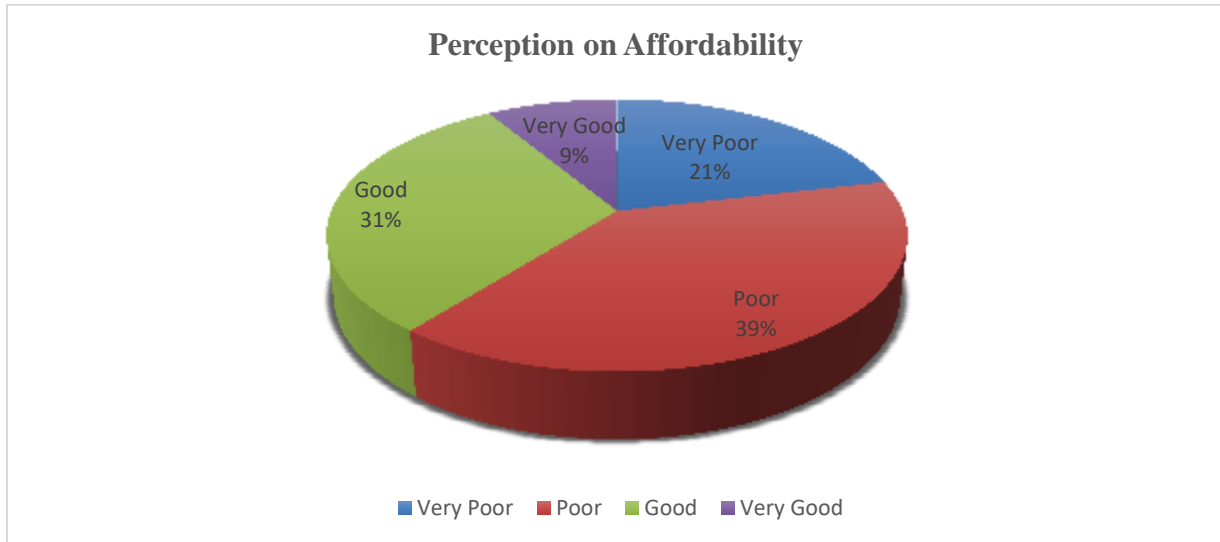


Figure 5: Condition of Overloading

Source: Author's Computation (2024)

Figure 5 shows the evaluation of travellers' perceptions of affordability of travel fares, which reveals a broad spectrum of perceptions of affordability. A substantial 33.3% of travellers find the fares barely affordable, implying that although they can cover the costs, it is a struggle. Similarly, 26.7% view the fares as less affordable, indicating that while the expenses are somewhat tricky, they are still manageable. On the other hand, 21.3% of travellers consider fares unaffordable, highlighting the financial pressure and challenges in covering travel costs. Only 18.7% of travellers regard the fares as affordable, suggesting that a small portion of the population finds the costs reasonable. Overall, the data indicate that the cost of travel is a significant issue for most travellers, with many facing difficulties affording it.

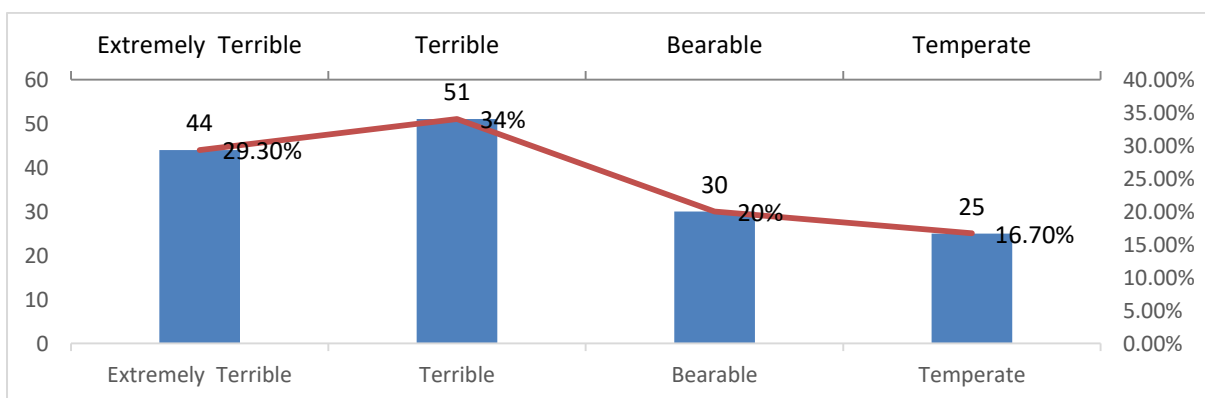


Figure 6: Overloading assessment by travellers

Source: Authors' computation, (2024)

Figure 6 assesses travellers' perceptions of overloading along the Minna to Suleja road. It presents data in two series: the number of respondents and the percentage of respondents who rated the conditions as "Extremely Terrible," "Terrible," "Bearable," or "Temperate." The

majority of respondents (51; 34%) rated the conditions as "Terrible," followed closely by "Extremely Terrible" (44 respondents; 29.3%), indicating a predominantly negative perception of the road conditions. A smaller portion of respondents found the situation "Bearable" (30 respondents) or "Temperate" (25 respondents), reflecting that fewer travellers view the conditions as less severe. The trend in the data shows a peak in negative ratings, with the most common perception being that the road conditions due to overloading are "Terrible," followed by a gradual decrease in more positive assessments.

The findings highlight significant safety concerns related to overloading on the Minna to Suleja road, with most travellers rating the situation as "Terrible" or "Extremely Terrible." This suggests a heightened risk of accidents and other hazards, emphasizing the urgent need for stricter enforcement of load limits and traffic regulations. Additionally, the poor travel experience reflected in these perceptions could discourage the use of the route, potentially reducing economic activity and affecting the livelihoods of those reliant on intercity travel.

Table 3: Factors causing overloading

| S/NO | CAUSES | SA | A | N | D | SD | WS | MEAN | RANK |
|------|---|----|----|----|----|----|-----|------|-----------------|
| 1 | Nonchalant attitude by drivers | 75 | 59 | 11 | 3 | 2 | 248 | 1.65 | 1 st |
| 2 | Profit motive | 73 | 61 | 8 | 5 | 3 | 254 | 1.69 | 2 nd |
| 3 | Bribery/Corruption | 69 | 46 | 27 | 4 | 4 | 278 | 1.85 | 3 rd |
| 4 | Drivers greed | 51 | 78 | 9 | 6 | 6 | 288 | 1.92 | 4 th |
| 5 | Weak enforcement of law and order | 59 | 45 | 38 | 6 | 2 | 297 | 1.98 | 5 th |
| 6 | Cost of fuelling/maintenance | 49 | 32 | 35 | 15 | 19 | 373 | 2.49 | 6 th |
| 7 | Inadequate available vehicles | 9 | 6 | 43 | 52 | 40 | 558 | 3.72 | 7 th |
| 8 | Low or no awareness of the Dangers of overloading | 9 | 8 | 32 | 40 | 61 | 586 | 3.91 | 8 th |

Source: Author's Computation (2024)

**Note: SA=Strongly agree; A=Agree; N=Neutral; D=Disagree; SD=Strongly disagree*

Table 3 outlines several key factors contributing to overloading among public transport operators, ranked by their perceived significance. The table outlines the primary factors driving overloading among public transport operators, ranked according to their perceived importance on the basis of respondents' mean scores. The most critical factor is the carefree attitude of drivers, with a mean score of 1.65, indicating that most respondents strongly agree or agree that this behaviour significantly contributes to overloading. The profit motive follows closely, with a mean score of 1.69, indicating that many operators prioritize financial gain over Safety, thus promoting overloading. Bribery and corruption, with a mean score of 1.85, ranks third, suggesting that these unethical practices enable drivers to bypass penalties, further encouraging overloading.

The carefree attitude of drivers ranks as the leading cause (Mean = 1.65), which aligns with Oyekanmi et al. (2020), who identified driver behaviour as a significant contributor to road safety problems, indicating a cultural acceptance of risky practices. Following closely, the profit motive (Mean = 1.69) echoes Musa and Adebayo's (2019) assertion that economic pressures compel drivers to prioritize profits over Safety, reinforcing the need for regulatory

frameworks that balance economic viability with safety standards. The third-ranked cause, bribery/corruption (Mean = 1.85), reflects systemic issues highlighted by Adewole and Salami (2020), emphasizing how corruption undermines enforcement. Interestingly, the cost of fueling/maintenance (Mean = 2.49) is less emphasized in existing literature but suggests a more substantial impact on driver decisions than previously reported, indicating a gap in understanding the economic pressures faced by transport operators. This comprehensive analysis illustrates how these findings confirm and expand upon existing research while highlighting areas for further exploration in the intercity public passenger transport safety field.

Table 4: Effects of Overloading on Travel and Safety along the Minna-Suleja Road

| S/N | Impact factors | Minimal | High | Extreme | W.S. | Mean | Rank |
|-----|--------------------|------------|------------|------------|------|------|------------------|
| 1 | Vehicle integrity | 15 (10.0%) | 64(42.7%) | 71(47.3%) | 356 | 2.37 | 1 st |
| 2 | Maintenance cost | 27 (18.0%) | 58 (38.7%) | 65 (43.3%) | 338 | 2.25 | 2 nd |
| 3 | Freight damage | 36 (24.0%) | 45 (30.0%) | 69 (46.0%) | 333 | 2.22 | 3 rd |
| 4 | Fuelling cost | 26 (17.3%) | 71 (47.3%) | 53 (35.3%) | 327 | 2.18 | 4 th |
| 5 | Vehicle Breakdown | 25 (16.7%) | 79 (52.7%) | 46 (30.7%) | 321 | 2.14 | 5 th |
| 6 | Travel time | 37 (24.7%) | 58 (38.7%) | 55(36.7%) | 318 | 2.12 | 6 th |
| 7 | Passengers comfort | 29 (19.3%) | 77 (51.3%) | 44 (29.3%) | 315 | 2.1 | 7 th |
| 8 | Passengers safety | 52 (34.7%) | 61 (40.7%) | 37 (24.7%) | 285 | 1.9 | 14 th |
| 9 | Travel cost | 42 (28.0%) | 61 (40.7%) | 47 (31.3%) | 305 | 2.04 | 9 th |
| 10 | Road Surface | 41 (27.3%) | 64 (42.7%) | 45 (30.0%) | 304 | 2.03 | 10 th |
| 11 | Accident rates | 39 (26.0%) | 72 (48.0%) | 39 (26.0%) | 300 | 2.00 | 11 th |
| 12 | Road durability | 43 (28.7%) | 67 (44.7%) | 40 (26.7%) | 297 | 1.98 | 12 th |
| 13 | Insecurity | 58 (38.7%) | 46 (30.7%) | 46 (30.7%) | 288 | 1.92 | 13 th |
| 14 | Passengers safety | 52 (34.7%) | 61 (40.7%) | 37 (24.7%) | 285 | 1.9 | 14 th |
| 15 | Traffic Congestion | 68 (45.3%) | 39 (26.0%) | 43 (28.7%) | 275 | 1.83 | 15 th |

Source: Author's Computation (2024)

Table 4 details the effects of overloading on travel and Safety along the Minna-Suleja road, ranked by their perceived impact based on mean scores. The most prominent effect identified is on vehicle integrity, with a mean score of 2.37, indicating that most respondents believe that overloading has a significant to extreme impact on the structural condition of vehicles, making it the greatest concern. Maintenance costs (mean score of 2.25) and freight damage (mean score of 2.22) are also significant, indicating that overloading increases vehicle maintenance expenses and the risk of damage to goods during transport. At the lower end, respondents view factors such as traffic congestion (mean score of 1.83) and passenger safety (mean score of 1.90) as less affected by overloading, although they remain important. Overall, the results highlight the wide-ranging negative impacts of overloading, particularly its harmful effects on vehicle conditions and finances. Therefore, addressing these issues is crucial for ensuring the Safety and well-being of all road users.

The survey findings on factors impacting intercity public passenger transport provide valuable insights that align with previous research. Vehicle integrity is identified as the most

critical factor (Mean = 2.37), supporting Kluschke et al. (2019), who noted that vehicle condition significantly affects safety and maintenance costs. Following this, maintenance cost (Mean = 2.25) corresponds with Adekitan et al. (2018), emphasizing the financial strain maintenance places on transport operators and its influence on vehicle reliability and Safety. The third factor, freight damage (Mean = 2.22), aligns with Andrzejczak et al. (2018), who indicated that poor maintenance could lead to increased freight damage, affecting operational efficiency. Passenger safety ranks lower (Mean = 1.90), indicating a possible gap between perceived and actual safety practices, a concern supported by studies advocating for enhanced public road safety education (Atombo & Wemegah, 2021). Overall, these results reinforce and extend the existing literature, illustrating the complex factors that affect Safety and operational efficiency in intercity public passenger transport systems.

Table 5 Road Traffic Crashes (RTCs) Statistics from 2013-2022

| AR | Total RTC 2022 Cases | Fatal | Serious | Minor | Total Number Vehicles Involved | Total Number Injured | Total Number Killed | Total Number of People Involved |
|------|----------------------|-------|---------|-------|--------------------------------|----------------------|---------------------|---------------------------------|
| 2013 | 670 | 144 | 356 | 170 | 810 | 1145 | 333 | 3823 |
| 2014 | 673 | 144 | 359 | 170 | 751 | 1145 | 333 | 2044 |
| 2015 | 510 | 144 | 340 | 29 | 714 | 1922 | 333 | 3767 |
| 2016 | 907 | 378 | 359 | 170 | 751 | 1145 | 524 | 2044 |
| 2017 | 943 | 419 | 353 | 171 | 751 | 1145 | 524 | 1950 |
| 2018 | 904 | 452 | 321 | 131 | 748 | 1124 | 407 | 1986 |
| 2019 | 773 | 401 | 281 | 91 | 729 | 1146 | 338 | 2080 |
| 2020 | 716 | 315 | 313 | 88 | 836 | 1604 | 413 | 2818 |
| 2021 | 640 | 237 | 356 | 47 | 810 | 1921 | 447 | 3823 |
| 2022 | 517 | 145 | 342 | 30 | 714 | 1922 | 333 | 3767 |

Source: FRSC Annual Reports (2022)

Table 5 provides an overview of road traffic crashes (RTCs) involving intercity public transport operators from 2013 - 2022, detailing fatal, serious, and minor accidents and the total number of vehicles, injuries, fatalities, and people involved. One key observation is the fluctuating trend in total RTC cases, with notable surges in 2016 and 2017, where cases reached 907 and 943, respectively. These years also saw an increase in fatalities, with 524 deaths recorded in both, indicating a clear link between the number of crashes and fatalities. This trend suggests that factors such as overloading, inadequate vehicle maintenance, and other safety challenges may have contributed to increased accidents and deaths. The table also shows a consistent pattern of high vehicle involvement and affected people, with little improvement in safety outcomes. Despite declining RTC cases between 2017 and 2022, the number of injuries remained relatively high, peaking in 1922 in both 2015 and 2022. Despite fewer accidents, this persistence in injury numbers points to overloading as a key issue, as it increases the severity of each crash. The data underscore the importance of enforcing stricter safety measures, such as limiting vehicle capacity and improving maintenance standards, to address overloading and reduce the number of injuries and fatalities in intercity transport.

The data on road traffic collisions (RTC's) from 2013 to 2022 reveals significant trends aligning with existing traffic safety literature. The year 2016 recorded the highest RTCs cases at 907, reflecting a peak in traffic incidents that supports Daud et al. (2017) that increased vehicle density correlates with higher accident rates. Furthermore, the consistent number of injuries and fatalities across the years suggests systemic issues in road safety management,

echoing concerns Atombo and Wemegah (2021) regarding the need for enhanced public education and stricter enforcement of traffic regulations to mitigate such risks. These findings underscore the ongoing challenges faced in improving road safety and reducing RTCs in intercity public transport systems.

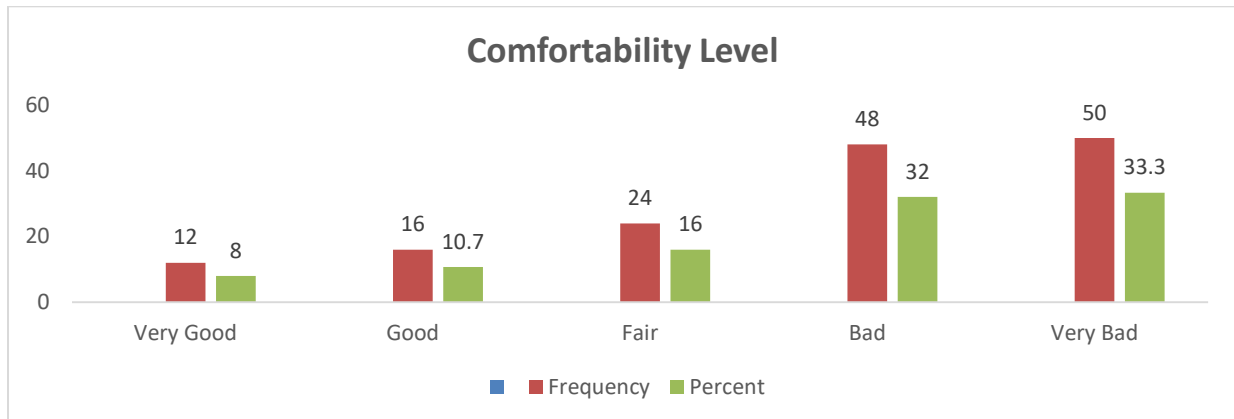


Figure 5: Level of Comfort Experienced by Travellers

Source: Author's Computation (2024)

Figure 5 offers valuable insights into the comfort levels experienced by travellers on the Minna-Suleja road. The data indicate that a considerable majority of respondents (65.3%) rate their comfort as either "Bad" (32%) or "very bad" (33.3%), suggesting that overloading significantly detracts from the overall travel experience. Conversely, only a small fraction of travellers (18.7%) reported feeling "very good" (8%) or "good" (10.7%) in terms of comfort. Additionally, 16% of the respondents classified their comfort level as "fair," indicating that while their experience was not entirely satisfactory, it was better than that of those who rated it as "bad" or "very bad." These results highlight the pressing need to address the overloading issue on Minna-Suleja Road. The high percentage of travellers expressing dissatisfaction with their comfort underscores the considerable effect of overloading on the quality of public transportation services. Implementing strategies to mitigate overloading and optimize vehicle capacity could significantly improve passenger comfort, leading to a more favourable travel experience.

Conclusion and recommendations

In summary, the results of this study highlight the considerable challenges associated with overloading in intercity public passenger transport, particularly along the Minna-Suleja road, where issues such as reduced passenger comfort, higher accident rates, and failures in enforcement are evident. The findings indicate that many travellers suffer discomfort due to overloading, which is consistent with existing research that emphasizes its negative impact on Safety and operational efficiency. These findings carry important policy implications, indicating that authorities should rigorously enforce loading regulations, improve public awareness initiatives regarding the risks of overloading, and invest in infrastructure enhancements to create safer travel environments.

Furthermore, there is an urgent need for policy frameworks that encourage compliance among transport operators while ensuring adequate resources are allocated for maintenance

and safety inspections. Future research should prioritize longitudinal studies to evaluate the long-term effects of overloading on Safety and comfort, conduct comparative analyses across different regions to identify effective practices and investigate the efficacy of technological solutions for monitoring vehicle loads. By focusing on these areas, policymakers can formulate more effective strategies to improve Safety and comfort in intercity public transport systems

Recommendations

Based on the above findings and conclusions, the following recommendations were made:

- i. The Federal Road Safety Corps (FRSC) and the Directorate of Road Traffic Services (DRTS) need to intensify the enforcement of vehicle load limits through regular offender checkpoints and penalties.
- ii. Technology such as weigh-in-motion systems can be utilized to ensure compliance with weight limits.
- iii. Investment in road infrastructure improvement to support safer travel conditions. Improving road surfaces, enhancing signage related to weight limits, and establishing designated loading and unloading areas.
- iv. Developing policy framework that incentivizes compliance among transport operators.
- v. Public awareness campaigns should be conducted through various media platforms, including social media, radio, and community outreach programs, to educate both drivers and passengers about the dangers and consequences of overloading.

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