# THE HIDDEN ECONOMIC DRAIN: A COST EVALUATION OF ROAD TRAFFIC ACCIDENTS ON JIMETA-SONG ROAD, ADAMAWA STATE, NIGERIA

**Ahmad, Z.B.* and Usoh, M.A.**

Department of Civil Engineering, Modibbo Adama University, Yola

*Corresponding email: engrbelel@gmail.com

**ABSTRACT**

*Road Traffic Accidents (RTAs) represent a critical yet often unquantified economic burden in Nigeria, diverting scarce resources from national development. This study analyzes the economic cost of RTAs on the critical 75.6km Jimeta-Song road in Adamawa State, a key artery in Northeast Nigeria. Utilizing the Human Capital Approach, data on accident frequency, severity, vehicle damage, and medical costs were collected from the Federal Road Safety Corps (FRSC) and specialist hospitals for the period between 2016 and 2020. The findings reveal a total of 251 accidents over the five-year period, resulting in an estimated economic cost of ₦1.18 billion. Fatal accidents were the most costly category (₦633 million), followed by serious (₦542 million) and minor accidents (₦5.7 million). The analysis identifies the loss of productivity from death and injury as the cost driver, highlighting a severe drain on human capital. The study concludes that RTAs impose a substantial and preventable economic burden, transforming road safety from a social concern into a critical economic development and construction cost management priority. It underscores the urgent need for targeted investments in road safety measures. Recommendations include utilizing the cost data for rigorous Cost-Benefit Analysis to justify infrastructure improvement, stricter enforcement of traffic regulations and the integration of such economic evaluations into standard road project planning to optimize resource allocation and mitigate future losses.*

**Keywords:** Road Traffic Accidents, Economic Cost, Human Capital Approach, Jimeta-Song Road, Adamawa State, Nigeria.

## 1 INTRODUCTION

A robust transportation network is the fundamental backbone of a nation's economic, industrial, and social progress [1], ensuring the free flow of people, goods, and services. However, this mobility comes at a cost. Globally, road accidents claim approximately 1.19 million lives annually, with an additional 20-50 million people suffering non-fatal injuries [2]. The economic toll is staggering, estimated to consume 3% of Gross Domestic Product (GDP) in many countries, representing a massive drain on resources that could otherwise be allocated to development projects. Serious road trauma now costs the world more than US$2.2 trillion per year, or US$6.1 billion every day [3]. In Nigeria, the situation is particularly dire. The country is consistently ranked among those with the highest rates of traffic injuries and fatalities worldwide [4]. The Jimeta-Song road, a 75.6km trunk A road linking key northern Adamawa State towns like Gombi, Mubi, and Maiduguri, is a vital economic artery. Its high traffic volume, however, makes it a hotspot for accidents, resulting in significant loss of life, injuries, and property damage. A pivotal step in addressing the growing global road safety crisis is the monetization of accident costs [5]. This process

enables the efficient allocation of resources by quantifying safety benefits, thereby cultivating a greater societal value for personal safety. Despite this, no prior study has quantified the economic cost of these accidents on this road. As a major trunk A road connecting several economic hubs in the northeast, understanding the full cost of RTAs on this artery is essential for evidence-based policymaking, optimal resource allocation, and justifying investments in proven road safety interventions. This research seeks to address this gap by providing a detailed economic evaluation of RTAs on the Jimeta-Song road from 2016 to 2020. This study therefore aims to quantify the direct and indirect economic costs of RTAs on the Jimeta-Song road between 2016 and 2020 using the Human Capital Approach.

## 2 LITERATURE REVIEW

The economic appraisal of road traffic crashes has evolved significantly, moving beyond mere fatality counts to encompass a holistic valuation of their multi-faceted impact. Existing literature highlights that the true cost includes direct monetary expenses and indirect losses that ripple through the economy [6, 7]. Direct costs typically include property damage, medical and rehabilitation expenses, costs of emergency services, and legal and administrative fees [8]. Indirect costs, often more substantial but harder to quantify, include lost productivity due to temporary or permanent disability, loss of future earnings from premature death, and the intangible costs of human pain, grief, and suffering [9, 10]. The methodological approach to valuing these costs is a subject of extensive scholarly work. The Willingness-to-Pay (WTP) approach, which estimates the amount individuals are prepared to spend to reduce the risk of death or injury, is considered the gold standard in high-income countries due to its theoretical robustness in capturing both tangible and intangible costs [11]. However, its data-intensive requirements and cultural complexities often make it impractical for developing nations. Consequently, the Human Capital Approach (HCA) remains widely used in contexts like Nigeria. The HCA calculates the present value of an individual's future economic output lost due to an accident, effectively measuring the cost to the economy in terms of lost productivity [12]. While criticized for potentially undervaluing the elderly, children, and non-income earners, its transparency and relative simplicity make it a viable tool for generating crucial preliminary economic data in resource-constrained settings [13]. Within Africa and specifically the Nigerian context, studies have begun to highlight the staggering economic burden of RTAs. National estimates suggest the cost could be as high as ₦80 billion annually [14]. Research on specific roads, such as the Lagos-Portharcourt, Lagos-Aba and Lagos-Abuja expressways, has further localized this problem, revealing high costs associated with cargo delays, medical treatments, and vehicle repairs [15]. Predominant causes identified across these studies include human factors like speeding and drunk driving, mechanical failures due to poor vehicle maintenance, and environmental factors like inadequate road design and a lack of safety features [16, 17]. Despite this growing body of work, a significant research gap persists. No known study has provided a detailed, methodical cost analysis of RTCs in the northeastern region of Nigeria, particularly on a critical road like the Jimeta-Song road. This study seeks to fill this void by applying the Human Capital Approach to quantify the direct and indirect costs of RTCs on this road, thereby providing localized evidence to inform regional and national road safety strategies.

## 3 METHODOLOGY

This study employed the Human Capital Approach (HCA), a method widely used in developed and developing countries [18]. The Human Capital (HC) method has been advocated by scholars [19] as a foundational tool for the analysis of accident costs due its robust theoretical basis and reliability. The HCA conceptualizes the total cost of an accident (TAC) as the sum of Direct Accident Costs (DAC) and Indirect Accident Costs (IAC):

$$TAC = DAC + IAC \tag{1}$$

Secondary data on the number, severity, and types of accidents and vehicles involved from 2016-2020 were obtained from the Federal Road Safety Corps (FRSC) office in Girei. To ascertain medical costs, a structured data collection form was used to obtain itemised cost data from the record department of the Specialist Hospital, Yola. This included cost for accident/emergency cards, daily hospitalisation fees, wound

dressing, injection, medication, and surgical procedures, differenciated by accident severity. Primary data on vehicle repair costs were collected through a questionnaire administered to a purposive sample of 29 auto mechanics with experience in repairing accident damaged vehicles. The questionnaires captured their average repair cost for different vehicle categories (SUV, pickup van, tricycle, motorcycle) across the three severity levels. The data analysis proceeded in stages. First, descriptive statistics summarized the accident trends. For cost calculation, direct costs (DAC) were computed as the sum of: (1) Property Damage Costs, which was based on the mechanics' estimates multiplied by the number of vehicles damaged per severity type; (2) Medical Costs, which was calculated by applying the unit costs from the hospital to the number of recorded casualties per severity type; and (3) Lost Productivity, which was estimated using a proxy monthly wage of ₦30,000. For injured victims, this was calculated as (Number of injured persons x [length of hospital stay/30] x ₦30,000). For fatalities, it was calculated as (Number of fatalities x [60 - average victim age of 42] x ₦360,000 annual income). Indirect Costs (IAC), representing human costs like pain and suffering, were then estimated as a percentage of the DAC, following the guidelines established by [19] for developing countries: 28% for fatal, 50% for serious, and 8% for minor accidents. Finally, the total cost for each severity category and the overall period was summed.

## 4 RESULTS AND DISCUSSIONS

### 4.1 Results

#### *4.1.1 Demograhic of Respondents*

The findings shown on Table 1 reveal a clear dominance of male participants as 55 (93.2%) out of 59 respondents, while only 4 (6.8%) respondents were female. Among the drivers, 26 (86.7%) were male and 4 (13.3%) were female, whereas all 29 auto mechanics were male. This indicate that driving though still largely male dominated, has a small representation of females, while automobile repair appears to be an entirely male occupied field within the study area. The result also reflects the gendered nature of the automobile repair occupation.

Table 1. Gender and Occupation of Respondents

| Gender | Drivers | Auto-Mechanics | Total | % |
|---|---|---|---|---|
| Male | 26 | 29 | 55 | 93.2 |
| Female | 4 | 0 | 4 | 6.8 |
| Total | 30 | 29 | 59 | 100 |

Table 2 illustrates the age distribution of respondents. Majority of them fell within the middle age categories, particularly the 35 – 44 years group, which accounted for 21 (35.6%) respondents. This was followed by the 25 – 34 years group with 20 (33.9%) respondents. Together, these two categories make up 69.4% of the respondents.

Table 2. distribution of Respondents' Age

| Age | Drivers | Auto-Mechanics | Total | % |
|---|---|---|---|---|
| 15 – 24 | 0 | 4 | 4 | 6.8 |
| 25 – 34 | 9 | 11 | 20 | 33.9 |
| 35 – 44 | 11 | 10 | 21 | 35.6 |
| 45 – 54 | 8 | 2 | 10 | 16.9 |
| 55 and Above | 2 | 2 | 4 | 6.8 |
| Total | 30 | 29 | 59 | 100 |

The results in Table 3 show that a significant proportion of respondents had attained higher levels of education. Specifically, 30 (50.8%) respondents had tertiary education, making this the dominant category. This was followed by 24 (40.7%) respondents with secondary education, while only 5 (8.5%) had primary education.

Table 3. Educational Background of Respondents

| Educational Level | Drivers | Auto-Mechanics | Total | % |
|---|---|---|---|---|
| Primary Education | 4 | 1 | 5 | 8.5 |
| Secondary Education | 4 | 20 | 24 | 40.7 |
| Tertiary Education | 22 | 8 | 30 | 50.8 |
| Total | 30 | 29 | 59 | 100 |

### *4.1.2 Trend of Road Traffic Accident (2016-2020)*

Figure 1 revealed that between 2016 and 2020, a total of 251 road traffic accidents (RTAs) were recorded along the Jimeta–Song Road, involving 427 vehicles. The trend shows fluctuation across the years. The year 2020 recorded the highest number (103) of accidents, more than double the number in the previous year (2019 with 29 RTAs) despite COVID-19 lockdowns. The sudden spike could be attributed to factors such as increased road usage, deterioration of road conditions, reduced enforcement of traffic regulations, or post-lockdown road use dynamics.

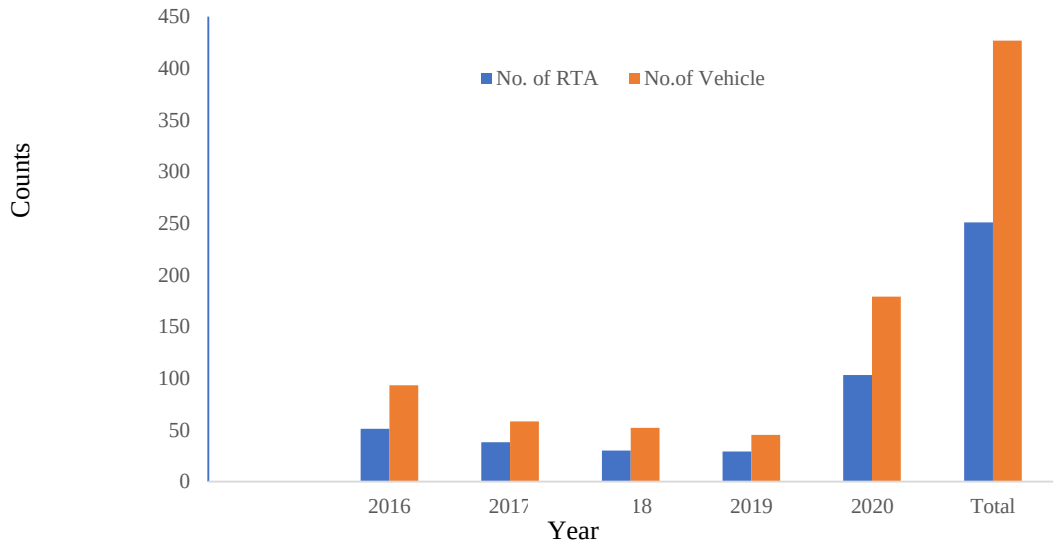


Figure 1. Road Traffic Accident Trend (2016 to 2020)

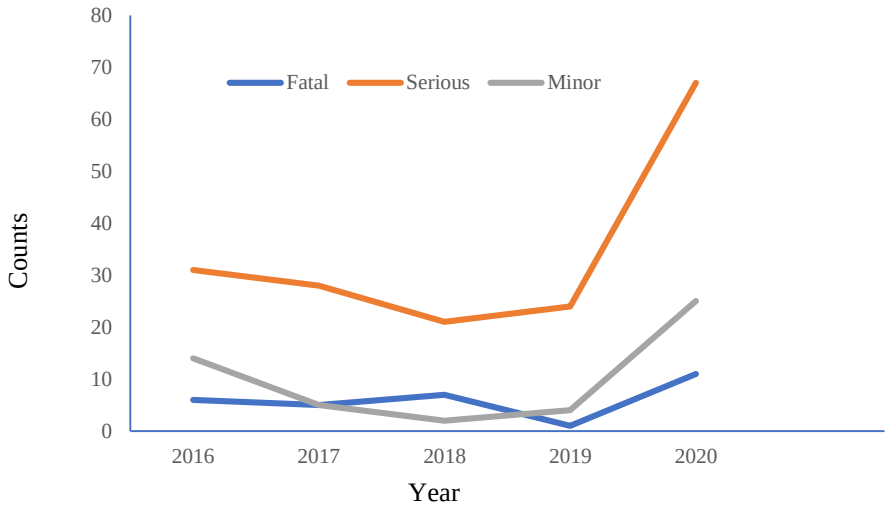


Figure 2. Nature of RTA

Out of the total 251 accidents, 30 were fatal, 171 were serious, and 50 were minor accidents (fIGURE 3). This indicates that serious accidents (68.1%) dominated, suggesting that most crashes resulted in significant injuries rather than minor damages. Fatal accidents (11.9%) represent a substantial safety concern, reflecting the severity of crashes on the road.

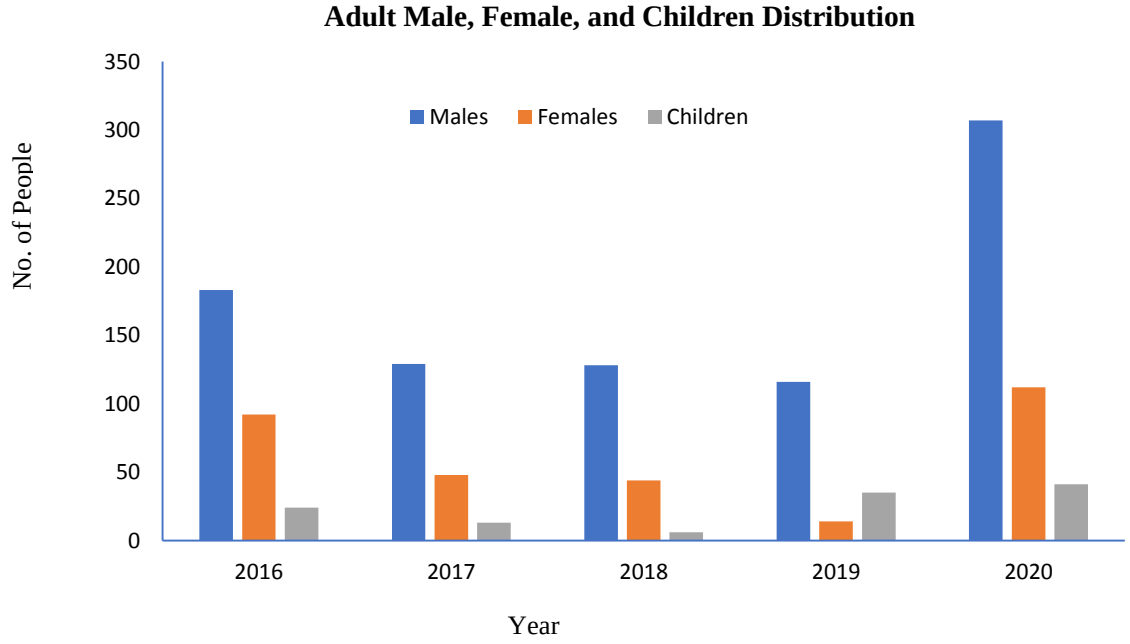


Figure 3. People involved in RTA

Of those involved, 649 (75.2%) were adult male, 54 (6.3%) female and 126(14.6%) children (fIGURE 4). The ocerwhelming male dominance reflects gendered road use patterns, as men are more likely to be drivers, passengers in commercial vehicles, and motorcyclists. The involvement of 126 children is particularly concerning, as it signals a significant social cost in terms of lost future productivity and long term human capital implications.

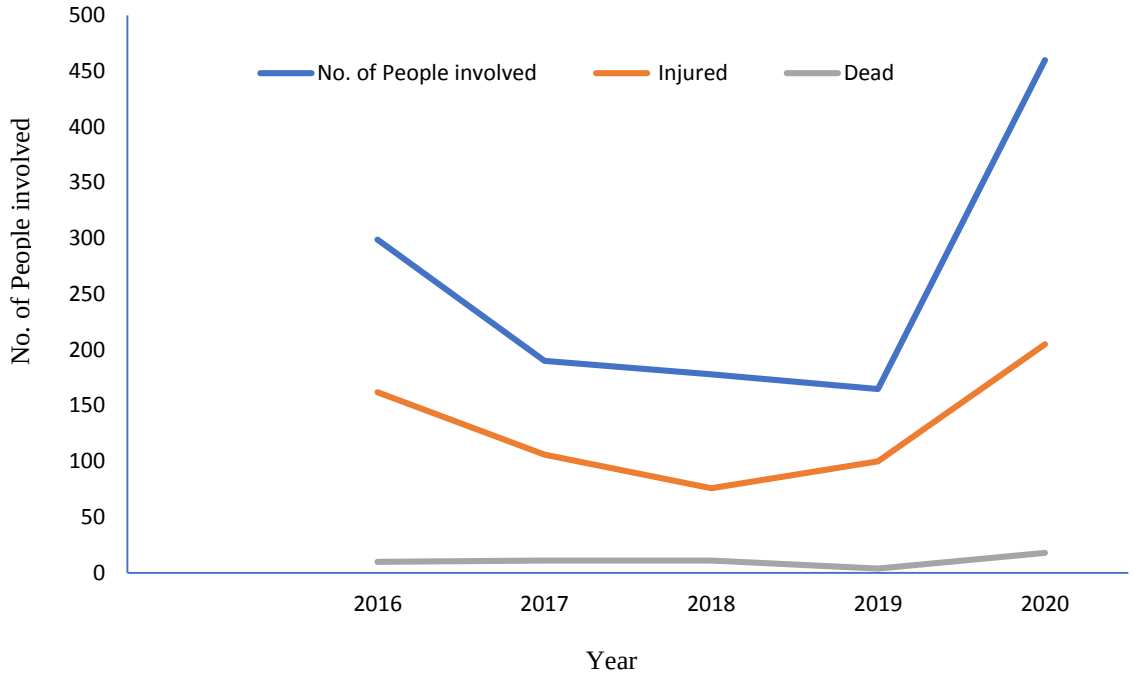


Figure 4. Total Number of People Involved, Injured or Dead in RTAs

Across the five years, 863 people were involved in RTAs, with 310 injured and 119 deaths recorded (Table 4). This means that about 35.9% of those involved sustained injuries, while 13.8% lost their lives. The year 2020 alone accounted for 307 people involvrd, 112 injured, and 41 deaths, repesenting the highest casualty figures during the period. The persistent fatalities highlight the dangerous nature of the Jimeta-Song road and its human cost implications. The data shows that a total of 427 vehicles were involved in RTAs on the Jimeta-Song Road. Of these, commercial vehicles (162, 37.9%) were the most frequently involved, followed by tricycles (127, 29.7%), private vehicles (126, 29.5%), and motorcycles (12, 2.8%). This highlights the higher exposure and vulnerability of commercial transport users. It also implies that the economic burden of accidents is not limited to victims' families but extends to the transport sector and wider economy, given the role of commercial vehicles in daily mobility and trade.

Table 4. Vehicle Types Invoved in RTAs

| Year | No. of RTA | Motorcycle | Tricycle | Private | Commercial | Total |
|---|---|---|---|---|---|---|
| 2016 | 51 | 2 | 20 | 28 | 43 | 93 |
| 2017 | 38 | 1 | 17 | 19 | 21 | 58 |
| 2018 | 30 | 0 | 19 | 9 | 24 | 52 |
| 2019 | 29 | 0 | 21 | 12 | 12 | 45 |
| 2020 | 103 | 9 | 50 | 58 | 62 | 179 |
| Total | 251 | 12 | 127 | 126 | 162 | 427 |

### *4.1.3 Economic Cost of Accidents*

Table 5 shows the average direct costs of road traffic accidents as suggested by the auto-mechanics. Fatal crashes recorded the highest average property damage costs across all vehicle types. SUVs had the highest cost (₦367,857.0), followed by medium cars (₦300,003.2) and pick-up vans (₦282,697.8).

Tricycles (₦172,928.7) and motorcycles (₦122,949.5) recorded the lowest fatal accident costs. The cost of property damage was moderately lower in serious crashes compared to fatal ones. SUVs again recorded the highest average cost (₦333,928.3), followed by pick-up vans (₦210,715.9) and medium cars (₦194,649.6). The least costs were observed in motorcycles (₦107,178.1) and tricycles (₦142,881.6). Minor crashes showed the lowest average costs, with SUVs (₦83,799.8) and pick-up vans (₦81,023.9) still leading. The smallest values were for motorcycles (₦49,501.6) and tricycles (₦65,227.8). Even in minor crashes, SUVs consistently incured the highest costs because of their high replacement and repair expenses. Overall, the results show that SUVs consistently recorded the highest property damage costs across all severity categories. Motorcycles and tricycles recorded the lowest costs in all categories, reflecting their lower economic value despite the high vulnerability of occupants. Costs escalate with accident severity across all vehicle types, showing a direct relationship between the severity of the crash and the repair/replacement value.

Table 5. Average Direct Costs of Property Damage in Road Traffic Accidents

| Nature of RTA | Average Property Damage Costs | | | | | |
|---|---|---|---|---|---|---|
| | SUVs | Medium Cars | Small Cars | Pick-Up Van | Tricycle | Motorcycle |
| Fatal | 367,857.0 | 300,003.2 | 212,506.7 | 282,697.8 | 172,928.7 | 122,949.5 |
| Serious | 333,928.3 | 194,649.6 | 126,429.9 | 210,715.9 | 142,881.6 | 107,178.1 |
| Minor | 83,799.8 | 75,897.9 | 70,994.3 | 81,023.9 | 65,227.8 | 49,501.6 |

Table 6 illustrates the costs of property damage by vehicle types in fatal accidents. Nineteen small cars and 13 medium cars were the most frequently involved vehicle types in fatal accidents category, together making up 32 of the 40 total vehicles (80%). Consequently, they also account for the largest share of the total property damage cost of ₦4.04 million (42.3% of the total) and ₦3.90 million (40.9% of the total) respectively. This suggests that passenger cars are highly vulnerable on this road and are frequently involved in high-severity collisions that result in fatalities. Tricycles (6 vehicles) contributed over ₦1.03 million in property damage. This is notable because tricycles have a lower individual value. The fact that their total cost is so high underscores how frequently they were involved in fatal accidents.

Table 7. Costs of Property Damage by Vehicle Types in Fatal Accident

| Vehicle Types | No. of Vehicles | Average Estimated Property Damage Cost | Total Property Damage Cost |
|---|---|---|---|
| SUV | 0 | 367,857 | 0 |
| Medium Cars | 13 | 300,003.2 | 3,900,041.6 |
| Small Cars | 19 | 212,506.7 | 4,037,627.3 |
| Pick-Up Van | 2 | 282,697.8 | 565,395.6 |
| Tricycle | 6 | 172,928.7 | 1,037,572.2 |
| Motorcycle | 0 | 122,949.5 | 0 |
| Total | 40 | | 9,540,636.7 |

The total property damage cost (Table 7) from serious accidents across all vehicle types was ₦30,559,837.6. This represents the economic burden of property replacement/repairs excluding medical or productivity costs. Medium cars contributed the highest total property cost (₦9,732,480, 31.8%), reflecting their high frequency of involvement (50 vehicles). Small cars (₦8,597,233.2, 28.1%) and tricycles (₦8,572,896, 28.0%) also contributed significantly, each making up almost a third of the costs. SUVs had

highest average per vehicle property damage cost (₦333,928.3), but due to the fewer vehicles involved, their total contribution was lower (₦1,335,713.2, 4.4%).

Table 8. Costs of Property damage by Vehicle Type in Serious Accident

| Vehicle Types | No. of Vehicles | Average Estimated Property Damage Cost | Total Property Damage Cost |
|---|---|---|---|
| SUV | 4 | 333,928.3 | 1,335,713.2 |
| Medium Cars | 50 | 194,649.6 | 9,732,480 |
| Small Cars | 68 | 126,429.9 | 8,597,233.2 |
| Pick-Up Van | 10 | 210,715.9 | 2,107,159 |
| Tricycle | 60 | 142,881.6 | 8,572,896 |
| Motorcycle | 2 | 107,178.1 | 214,356.2 |
| Total | | | 30,559,837.6 |

Table 8 illustrates the costs of property damage by vehicle types in minor accidents. The total property damage cost for minor accidents amounts to ₦5,166,830.2. Among vehicle types, small cars account for the largest share (₦2,058,834.7), making up almost 40% of the total. This shows that in minor accidents, small cars and medium cars together account for nearly 70% of the total property damage costs, suggesting that they are the most commonly affected in such accidents. Motorcycles and SUVs recorded minimal costs, reflecting their lower involvement rate or lesser damage extent in minor accidents.

Table 9. Costs of Property Damage by Vehicle Types in Minor Accidents

| Vehicle Types | No. of Vehicles | Average Estimated Property Damage Cost | Total Property Damage Cost |
|---|---|---|---|
| SUV | 2 | 83,799.8 | 167,599.6 |
| Medium Cars | 19 | 75,897.9 | 1,442,060.1 |
| Small Cars | 29 | 70,994.3 | 2,058,834.7 |
| Pick-Up Van | 6 | 81,023.9 | 486,143.4 |
| Tricycle | 14 | 65,227.8 | 913,189.2 |
| Motorcycle | 2 | 49,501.6 | 99,003.2 |
| Total | | | 5,166,830.2 |

Based on the results shown in Table 9, fatal accidents amounted to total medical expenses of ₦37,929,600 for the 108 people involved. Fatal accidents, though fewer in number, attracted the highest medical costs per person because of longer admission stays, intensive care, and/or surgeries. In the case of serious accidents, 470 persons were involved, and the total medical expenses accrued to ₦133,104,000. This is the highest total medical cost overall, attributable to the large number of people injured. Minor accidents involved 71 persons and total medical expenses of ₦120,700. None of the cases in this category involved admission or surgery.

Table 10. Direct costs of Road Traffic Accidents (Medical Expenses)

| Nature of RTA | No. of People Injured | Medical Expenses (in Naira) | | | | | Total Medical Expenses (₦) |
|---|---|---|---|---|---|---|---|
| | | Cost of AIE Card | Ave. Admission Cost | Ave. Cost Inj./Med. | Cost of Wound dressing/ Observation | Surgery Cost | |
| Fatal | 108 | 21,600 | 30,780,000 | 2,160,000 | 648,000 | 4,320,000 | 37,929,600 |
| Serious | 470 | 94,000 | 111,625,000 | 5,640,000 | 1,645,000 | 14,100,000 | 133,104,000 |
| Minor | 71 | 14,200 | 0 | 0 | 106,500 | 0 | 120,700 |
| Total | 649 | 129,800 | 142,405,000 | 7,800,000 | 2,399,500 | 18,420,000 | 171,154,300 |

Table 10 quantifies the most devastating long-term economic impact of road accidents, the loss of productive potential from the workforce. The figures reveal a serious drain on the local and national economy. The total cost of lost productivity from accidents on this road over five years is a staggering ₦644,520,000. This figure dwarfs the combined costs of property damage (₦45.3m) and medical expenses (₦70.7m), highlighting that the greatest economic cost of RTAs is the loss of human capital. Productivity Loss from Deaths as a result of fatal accidents accrued to overwhelming economic loss of ₦447,120,000 (69.4% of the total productivity loss); of which ₦97,200,000 was from Injuries and ₦349,920,000 from deaths. The economic cost of 54 fatalities is immense. This calculation represents the total lost future earnings of these individuals, effectively removing them from the economy decades prematurely. This creates a permanent, irreversible loss for their families and the community, often plunging dependents into poverty. The cost from injured victims in fatal accidents is also high, reflecting long-term or permanent disabilities that prevent a return to work. Serious accidents also have severe long-term drain on the economy. This is evident in the ₦197,400,000 (30.6%) of the total productivity loss from Injuries. While Serious accidents did cause immediate fatalities, they resulted in severe injuries that led to extended or permanent absence from the workforce for 470 people. This represents a massive, long-term drain on productivity, as victims may have been unable to work for months or years, or may have been forced into lower-paying jobs due to disability. Minor accidents, while frequent, have negligible impact on productivity costs. There was no productivity loss. This means that minor accidents result in injuries that do not require significant hospitalization and presumably allow for a quick return to work, resulting in no measurable loss of productivity.

Table 10. Direct costs of Road Traffic Accidents (Loss of Productivity)

| Nature of RTA | No. of People Injured | Loss of Productivity in ₦ (those injured) | No. of People Dead | Loss of Productivity in ₦ (those dead) | Total in ₦ |
|---|---|---|---|---|---|
| Fatal | 108 | 97,200,000 | 54 | 349,920,000 | 447,120,000 |
| Serious | 470 | 197,400,000 | 0 | 0 | 197,400,000 |
| Minor | 71 | 0 | 0 | 0 | 0 |

Analyzing the total direct costs of road traffic accidents based on all three components (Table 11), fatal accidents are by far the most costly, with ≈90% of the cost coming from loss of productivity due to deaths. Serious accidents have higher property and medical costs than fatal cases, but overall cost is lower because no deaths occurred. Loss of productivity from long-term injuries is still significant (≈55% of total). Minor accidents contribute very little to the overall cost (≈1%), most from property damage. Medical and productivity costs are negligible.

Table 11. Total Direct Costs of RTAs

| Components | Fatal Accident (₦) | Serious Accident (₦) | MinorAccident (₦) |
|---|---|---|---|
| Property Damage | 9,540,636.7 | 20,550,837.6 | 5,166,830.2 |
| Medical Expenses | 37,929,600 | 133,104,000 | 120,700 |
| Loss of Productivity | 447,120,000 | 197,400,000 | 0 |
| Total | 494,590,237 | 361,063,837.6 | 5,287,530.2 |

The analysis revealed a profound economic impact. The total cost of accidents on the Jimeta-Song road over the five-year period is a staggering ₦1,180,380,992 (approximately ₦1.18 Billion). This huge figure represents the burden shouldered by victims, their families, the healthcare system, insurers, and the broader economy of Adamawa State. Fatal Accidents, which is obviously the primary driver of total cost took up Total Accident Cost (TAC) of ₦633,075,503 (53.6%). Despite involving the fewest number of incidents (30), fatal accidents account for more than half of the entire socio-economic burden due to the immense value of lost future productivity (Direct Cost) and the profound human cost of pain, grief, and suffering. Serious Accidents, also representing a significant burden consumed Total Accident Cost (TAC) of ₦491,364,507 (43.5%). This category, with a high number of victims (470 injured), represent a massive cost driven by long-term productivity loss from injuries and the significant intangible suffering (Indirect Cost) experienced by a large number of people. Minor Accidents on the other hand took a minimal overall share of Total Accident Cost (TAC) of ₦5,551,907 (0.5%). While frequent, the economic impact of minor accidents is negligible at the aggregate level, constituting only half a percent of the total billion-Naira burden. Total Accident Costs on Jimeta-Song Road for 2016 to 2020 Using equation 2.

$$TAC = TDC + TIC \quad (2)$$

Where TIC is taken as 28% for Fatal Accident, 50% for Serious Accident, and 8% for Minor Accident, the total RTA cost is shown in Table 12.

Table 12. Total Accident Costs

| Accident Severity | Total Direct Costs (₦) | Indirect Cost (₦) | Total Accident Costs (₦) |
|---|---|---|---|
| Fatal | 494,590,237 | 138,485,266 | 633,075,503 |
| Serious | 361,063,837.6 | 180,531,918.8 | 541,595,756.4 |
| Minor | 5,287,530.2 | 422,202.4 | 5,709,732.6 |
| Total Accident Costs | 860,941,604.8 | 319,439,387.2 | 1,180,380,992 |

## 4.2 Discussion

The findings of this study vividly illustrate and empirically validate the broader themes and specific concerns raised in the existing literature on the economic impact of Road Traffic Accidents (RTAs). The estimated total cost of ₦1.18 billion over five years provides a stark, localized confirmation of the global premise that RTAs represent a significant social and economic burden [2] and consume a substantial portion of a nation's economic resources, a concern highlighted by the [3]. This figure translates the macro-level estimates, such as the national Nigerian cost of N80 billion indicated by [14], into a tangible micro-level reality for a specific regional corridor, highlighting that the national crisis is a collection of severe localised economic drains. Methodologically, this study successfully demonstrates the practical application and value of the Human Capital Approach (HCA) in a developing world context, as advocated by scholars like [18] and [19]. While the literature acknowledges that the Willingness-to-Pay (WTP) approach is theoretically superior [11], this study is in agreement with the point made by [13] that the HCA's transparency and relative simplicity make it a viable and crucial tool for generating preliminary economic data in resource-constrained settings. The successful deployment of the HCA to derive a comprehensive cost estimate for the Jimeta-Song road proves its utility for evidence-based policymaking in Nigeria and similar countries, precisely filling the methodological gap identified in the literature for such regions. The breakdown of cost components offers powerful support for the argument put forth by [6] and [7] that the true cost of RTAs

extends far beyond immediate direct monetary expenses. The fact that lost productivity, an indirect cost, constituted the largest share of the economic burden (₦644.5 million) powerfully validates the literature's claim that indirect losses ripple through the economy and are often more substantial [7]. This finding confirms that the greatest long-term economic threat from RTAs is not the visible property damage or even the medical bills, but the permanent depletion of human capital and the loss of future economic output, particularly from fatal accidents. This aligns with the conceptual framework of [9], who emphasize the profound impact of lost future earnings. Furthermore, the data on vehicle types involved and the causes of accidents resonate strongly with prior Nigerian studies. The high involvement of commercial vehicles and tricycles aligns with research identifying human factors and poor vehicle maintenance as predominant causes [16, 17]. The significant economic cost attributed to tricycle accidents, despite their lower individual repair costs, due to their high frequency of involvement mirrors the findings of [15] on the Lagos-Portharcourt, Lagos-Aba, Lagos-Abuja expressways, suggesting a nationwide pattern where high-volume commercial transport modes are major contributors to both accident frequency and economic loss. Finally, the core purpose of this study, as outlined in the introduction, was to enable the efficient allocation of resources by quantifying safety benefits, a process [5] identified as pivotal for cultivating societal value for safety. The staggering cost figure of ₦1.18 billion achieves exactly that. It provides an undeniable economic justification for the targeted investments in road safety measures, improved infrastructure, and stricter enforcement that are universally recommended in the literature [4, 3]. By monetizing the loss, this study moves the conversation beyond moral and social arguments and into the realm of economic imperative, demonstrating that investing in road safety on the Jimeta-Song road is not an expense, but a critical investment in preserving the state's and the nation's economic assets.

## 5 CONCLUSIONS

This study conclusively demonstrates that Road Traffic Accidents (RTAs) on the Jimeta-Song road constitute a severe and substantial economic burden, estimated at ₦1.18 billion in just five years from 2016 to 2020. The most significant cost component is the loss of productivity, particularly from fatal accidents (accounting for 56.0% of the total), which represents a permanent drain on the local economy by removing breadwinners in their prime productive years. The high proportion of costs attributed to serious accidents further indicates a high rate of debilitating injuries that have long-term consequences for victims and their families. The spike in accidents in 2020 warrants further investigation but suggests factors like potentially reduced enforcement during lockdowns or increased stress among drivers may have played a role. This study concludes that the economic cost of RTAs is not merely a statistical figure but a reflection of immense human suffering, lost potential and a preventable drain on the economy. The findings transform road safety on the Jimeta-Song road from a social concern into a critical economic development and construction cost management priority. The annual recurring loss of millions of Naira represents capital that could otherwise be allocated to new infrastructure projects and essential asset maintenance, thereby directly accelerating national development goals.

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