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Appraisal on Road Traffic Accident Determinants Among Automobile Road Users: A Case Study of Amasoma/Yenegoa Road, Bayelsa, Nigeria

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Abstract: This study investigates determinant factors responsible for road accidents in Nigeria. However, unlike developed or high-income countries, many developing countries have made very little progress towards addressing this problem. Nonetheless, there are ways to strengthen the reduction of injured persons due to elucidate ways to accomplish these goals in the context of Nigeria. From research it was reported that due to reckless driving by some road users many lives, properties and human resources have been lost to road accidents in Nigeria. It was also observed that lack of routine maintenance checks and repairs, mechanical failure, drug abuse, violation of traffics signs and the existence of potholes are responsible for crashes on the highway. It was recommended that the relevant ministry and its agencies should always be strengthened and enforced to compliance for proper driving habits and law enforcement agency responsible for checkmating road offenders should sit up to their responsibility to secure lives and properties on the road and possibly arrest any road user that goes against traffic laws.

Keywords: *Road traffic accidents, automobile users, Amasoma/Yenagoa Road, mechanical failure, reckless driving, road safety enforcement.*

1. Introduction

Accidents are part of the constant trial and error process of living and they result from the fumbles that start with childhood dreams and continue right through to the forgetfulness or confusion of old age. In other words, accidents can occur at any time during the life span of a man. Accident can be defined as unplanned or unintended occurrence that interrupts or interferes with a work activity. Many accidents, in fact, the great majority, yield no injury and receive only passing attention, if any, unless do considerable damage or are otherwise costly (Agbeboh,

2013). Motor vehicle crashes are the leading cause of death in adolescents and young adults (Onokala, 2009) and of the estimated 10,000 road deaths occurring annually worldwide, 74% are in developing countries (World Bank, 2019). Dramatic increases in the proportion and absolute number of traffic facilities have been witnessed in a number of developing countries, while decreased by more than 20% in industrialized nations (Ross et al, 1991).

Road traffic accidents are a major public health concern globally, resulting in over 1.2 million deaths annually (World Health

organization, 2018). In Nigeria, road traffic accidents are a leading cause of death and injury, with over 10,000 deaths recorded annually (federal Road Safety Corps,2020). The Amasoma/Yenagoa Road in Bayelsa State, Southern Nigeria, is a major route that connects the towns of Amasoma and Yenagoa and notorious for its high rate of road traffic accidents. This study aims to appraise the determinants of road traffic accidents between automobile road users on the Amasoma/Yenagoa Road.

1.2 Statement of Research Problem

Despite advancements in automotive technology and traffic management systems, road traffic accidents persist as a significant challenge. The specific nuances surrounding accidents involving automobile road users demand focused attention. Identifying the precise determinants that contribute to these incidents remains a critical research problem. This project aims to elucidate the mechanical factors influencing accidents among automobile road users, providing a nuanced understanding of the underlying issues.

1.3 Justification

The justification for this research is deeply rooted in the profound impact that road traffic accidents exert on Nigeria's socio-economic landscape. The consequences reverberate through public health, economic productivity, and overall societal well-being. By zeroing in on the mechanical aspects of automobile-related accidents, this research aligns with the national imperative to develop targeted and context-specific strategies. It is envisaged that the outcomes will not only contribute to the enhancement of road safety in Nigeria but will also offer insights with broader implications for other developing economies navigating similar challenges.

1.4 Aims and Objectives

- To identify the determinants of road traffic accidents between automobile road users on the Amasoma/Yenagoa Road.

- To examine the relationship between road user behavior and road traffic accidents on the Amasoma/Yenagoa Road.
- To recommend measures to reduce road traffic accidents on the Amasoma/Yenagoa Road.

1.5 Scope of the Research

This research will focus on a comprehensive analysis of road traffic accidents involving automobiles in the study area of Amasoma/Yenagoa Road, Bayelsa, Nigeria. The study will encompass this geographical region, considering the unique road conditions and traffic dynamics prevalent in the country. By utilizing data from various sources and examining a specified timeframe, the research aims to offer a holistic understanding of the mechanical determinants influencing road safety in Nigeria.

In essence, this research aspires to unravel the intricacies of road traffic accidents in Nigeria, with a spotlight on the mechanical factors affecting the safety of automobile road users. Through this exploration, we aim to contribute valuable knowledge that is not only relevant to the Nigerian context but also provides insights for similar regions facing challenges in road safe.

2. Literature Review

2.1 Road Accidents

Road accidents appear to occur regularly at some flash points such as where there are sharp bends, potholes and at bad sections of the highways. At such points over speeding and reckless drivers usually find it very difficult to control their cars, which then result to fatal traffic accidents, especially at night, (Adekunle, 2010). Different cases of fatal road traffic accidents are reported on daily basis on Nigeria roads especially highways. Various categories of vehicular traffic law violations are also involved in these fatal road traffic accidents in Nigeria. Many researchers have investigated cases of road traffic accidents and also collate road

traffic accident data and impact assessment of road safety campaign, (Agbonkhese et al., 2013).

In Nigeria, road traffic accident situation over the last three decades has been particularly disturbing. In 1976, there were 53,897 road traffic accidents resulting in 7,717 deaths. Although in 1981, the magnitude reduced to 5,114 accidents, but the fatality increased to 10,236 which mean that there were an average of 96 accidents and 28 deaths for everyday of that year, (Agbeboh & Osabuohien-Irabor, 2013; Agbonkhese et al., 2013). The situation in subsequent years has not been any better. The number of people killed in road accidents between 1990 and 2005 rose from 28,253, and the fatality rate remains consistently high, (Agbonkhese et al., 2013; Alhassan, 2013). International comparison indicates that the chance of a vehicle killing someone in Nigeria is 47 times higher than in Britain. The proportion of fatalities to injuries reported is also very high. For example, while Czech Republic has only one death in 175 accidents, France, one death in 175, South Africa, one death in 47 accidents, Nigeria has one death in 2.65 accidents, (Agbonkhese et al., 2013).

A good transportation system is very essential for rapid economic, industrial and cultural growth of any country. The five modes of transportation are road, rail, water, air and pipeline and complement one another. The role of transport in spatial and economic development has been recognized in advanced and developing countries. The various modes of transport have specific roles and service functions. In most cases, however, serve complementary roles, (Atubi, 2012; CAREC, 1987). Road transport in particular has played a prominent role in bridging the gap between producers and consumers, and production zones and consumption zones.

Despite its importance in economic development, road transport has its own negative consequences. These include air and water pollution, noise and vibration, visual intrusion, distortion in bio-diversity, road accidents etc., (Chen, 2010). Traffic crashes

also impact on the economy of developing countries at an estimated cost of 1-2% of a countries GNP per annum, as a result of morbidity, mortality and property – related costs, (Agbonkhese et al., 2013). Human error is estimated to account for between 64 and 95% of all causes of traffic crashes in developing countries, (Filani & Gbadamosi, 2007; Fouracre & Jacobs, 1976). A high prevalence of old vehicles that often carry many more people than they are designed to carry, lack of safety belt and helmet use, poor road design and maintenance and the traffic mix on roads are other factors that contribute to the high rate of crashes in less developed countries.

Thirty-eight studies described casualties by the category of road-user. Pedestrian fatalities were highest in 75% of the studies accounting for between 41% and 75%, followed by passengers (38%-51%) in 62% of the studies. Drivers were third in 55% of the studies, and never ranked first in any country. Pedal and motorcyclists killed ranked first in India, (Federal Road Safety Corps, 2010; Federal Road Safety Commission, 2010; Jacobs & Sayer, 1983). Passengers ranked first amongst the non-fatal casualties reported in 14 studies. Pedestrians were second, with the exception of one hospital-based study by (Parabola, 2004) in Addis Ababa that reported a very high proportion of pedestrians, accounting for 91% of all traffic casualties.

Road accident is one of the leading causes of death in so many countries of the world today. Most of the industrialized nations witnessed high rate of road accidents due to bad road and flouting of road safety signs by the motorists, (Fouracre & Jacobs, 1976; Chen, 2010). Road accident is unwanted hazard usually happened to road users. The most unfortunate thing is that many road users *do not* learn from their mistakes on the road. Some of the road users are not aware or do not observe the general rules and safety measures while using roads, (Alhassan, 2013). Laxity on the part of some road users is another factor which causes accidents and crashes on the road. It is the costly accident

involving deaths, disabilities, injuries, material lost etc. which are recorded and discussed, (Agbonkhese et al., 2013; Adekunle, 2010). Traffic crashes and their associated injuries and fatalities are a world public health problem.

Atubi, [2c] examined the variation 100 patterns of RTA in Lagos state using data for 32-31years (1970-2001) and observed the number and type of vehicles involved in road traffic accidents. The study revealed that private cars, buses and taxis were more prone to accidents in Lagos State. The 16 Harmonies as for the selected Local Government Areas considered contribute above 90% of the total variance in the time series. This means that more than 90% of road traffic accidents in Lagos State could be attributed to recklessness on the part of drivers, ignorance of high way codes, over speeding etc. Also, the dominant cycles of road traffic accidents observed in this study area have periodicities of 32.00 and 16.00 years with the most dominant being 32 years. This means that the dominant and strongest road traffic accident pattern of Lagos State repeats itself every 32 years. Various road safety strategies and counter measures have been used at different stages of network development. This method of seeking to prevent road accident involves conscious planning, design and operations of roads. One of the most important factors in this method is the systematic identification and treatment of hazardous locations. The main objective of the study is to develop a model necessary to identify these hazardous locations on roads

commonly termed as black spots. In general, the various factors that causes accidents can be broadly categorized into road related, vehicle related and driver related.

2.1. Causes of Road Traffic Accident

I. Over Speeding:

Over speeding is responsible for some of the fatal accidents that occur on the road. Research has shown that increase in speed

multiplies the risk of accident and severity of injury during accident. Faster vehicles are more prone to accident than the slower one and the severity of accident. Most vehicles on high speed are very difficult to control and needed greater distance to stop or even fail brake when the brake is applied appropriately while a moderate speeding vehicle or slower vehicle comes to halt immediately brake is applied (FRSC, 2010). An over speeding vehicle will have greater impact during the crash and hence will cause more death and injuries to road users.

II. Drinking and Driving:

Many drivers who drive on the influence of alcohol and drugs are prompt to road accident especially if the alcohol or drug is abused. Drugs and Alcohol abuse may cause dizziness and reduces concentration while driving. Overdose of alcohol always decreases reaction time of a human body due to the configuration of the human brain that controls the functions of the human body. Some human parts like the Limbs react more to the instructions from human brain. It hampers vision due to dizziness. Overdose of alcohol dampens fear and incite humans to take risks.



III. Use of Mobile Phone on the road.

A lot of road accidents are cause by lack of concentration and distraction from mobile phone by the road users. Talking on phone occupies major portion of brain and the smaller part handles the steering. The division in the function of the brain hampers reaction

time, concentration and ability of judgements while driving. Most of the death on the road today is caused by use of mobile phones while driving.



Too Many Potholes on the Road.

Nigeria roads are the worst and most unfortunately roads to plight ply with vehicles in the world. Potholes are bowl-shaped depression in the roads due to wear and tear and further deepened by the rain water. Motorists try to avoid these potholes and end up risking their lives. Potholes not only cause strain on the spinal and overall health of the motorists when they drive, but they also ruin the vehicles 'suspension and cause road accidents quite often.



IV. Poor lighting on roads and highways

There is a great lack of proper lighting on Nigeria roads and express highways. Lack of lighting on the road usually cause the decrease of visibility to the drivers. This may

lead to fatal accidents on the highways *at night*.

V. Disobedient to Road Signs

Many road users today *thought* that observing and waiting for red light signal is a waste of time. Research has shown that proper observation of road traffic signals saves time, life and make road users arrived safely to their destination. Red light offenders usually jeopardize their lives and those other road users. This act by one driver incites other driver to attempt it and finally causes chaos at crossing. This chaos at intersection is the main cause of traffic jams. Eventually everybody gets late to their destinations.

2.2. Types of Mechanical Failures That Cause Car Accidents in Nigeria

Car accidents can be caused by a variety of factors such as mechanical failure. Mechanical failures cause some car accidents. A tire may blow out, causing a driver to swerve into another vehicle; or the brakes may fail, resulting in a multi-vehicle collision. When mechanical failures occur in a vehicle, a real danger is presented to the driver and other road users. According to Federal Road Safety Corp, mechanical failures contributed to over 5 million severe car accidents during a period of five years. In 50,000 of those cases, mechanical issues that could have been prevented with proper maintenance caused serious car accidents. The following are the most common mechanical issues listed as critical causes for devastating car accidents in Nigeria.

❖ Brake Problems

Brake problems account for about 30% of car accidents caused by mechanical failure. In some cases, the brake lines are faulty, or they become worn. When there are leaks within brake lines, they can allow brake fluid to drain, compromising the brakes 'performance. In other cases, the anti-lock brake systems are designed to automatically prevent wheels from locking up when drivers slam on the brakes may fail to work properly. ABS

malfunction can result in complete brake failure. In other cases, worn brake pads and discs make it harder for the driver to stop the vehicle, causing longer stopping distances and increasing the risk of a car accident.

❖ Engine Failure

Car engines are designed to operate well with very little maintenance. However, there are problems that can occur that can result in a broken down vehicle and cause confusion about what went wrong. Engine failure can not only leave you stranded, but it can also stall your car in the middle of the road, potentially causing a car accident. It is important to keep an eye on your car temperature gauge. If you notice your *vehicle* temperature shifting towards the red, it may indicate that there is a serious problem with the *car* liquid cooling system. Without a properly working cooling system, the combustion process can overheat the car's engine, resulting in engine failure.

❖ Defective Tires

Defective tires account for approximately 35% of car accidents caused by mechanical failure. Tire failure can be deadly, causing a vehicle to spin out of control and collide with other vehicles. Every year, 10,000 car accidents in Nigeria occur due to problems with a vehicle's tires. The consequences of tire failure can be disastrous. Cars may roll over, veer off the road, or swerve into oncoming traffic. When car accidents are caused by tire failure, the driver and his or her passengers may become injured, as well as pedestrians and occupants of other vehicles. The most common causes of defective tire accidents include the following:

- a) manufacturing defect
- b) Tread separation
- c) older tires that are worn but appear to be good
- d) Inadequate repair of punctures
- e) Retread failure
- f) Tires that are unsuitable for the vehicle

- g) Tires that become damaged while being mounted

❖ Engine and Transmission Problems

Engine failure is rare, but it can cause a severe car accident. When an engine fails in the middle of the road, there is always the potential for a car accident. A lack of oil in a vehicle can cause engine failure and require expensive repairs. Without enough oil, the metal parts of the engine can scrape together, causing overheating and friction. In other cases, the engine itself is defective, and the victim can sue the car manufacturer, distributor, or retailer.

2.3. Road Safety Measure in Nigeria and Ethical Consideration

Citizens should be compassionate the citizens should have the social responsibility and help others in need. They should attend to the casualties and take immediate action. They should inform the police force about the road accidents and also call for an ambulance in case of an emergency. They should have the social responsibility to help elders, disabled and small children when in need, for example, crossing the road. Also, they should have the courtesy to always leave way for an ambulance.

• Maintenance of vehicles

The vehicle owners and drivers should always maintain their vehicles in top condition. The brakes, tires and other components of the vehicle should be replaced and services as when necessary.

• Purchase of safe vehicles

During the purchase of a vehicle, the buyer should give a great deal of importance to the safety aspects. The vehicle should have power steering, air bags, seatbelts, four-wheel drive, good braking systems and similar safety features.

• Avoid distractions

• The motorists should always give utmost attention while driving. They should

avoid loud music in cars and the motorcycle or scooter riders should avoid using headphones. Also, the motorists should completely avoid using their cell phones while driving. The co-passengers should avoid distracting the driver.

- **Adequate sleep**

The motorists should have adequate sleep before driving, especially before driving long distances. This will eliminate the risk of the drowsiness.

- **Careful road-crossing**

Pedestrians should take care before crossing the roads with heavy traffic. They should always cross at designated pedestrian crossings. They should always be aware of the oncoming traffic and look both ways before crossing the road. Utilize proactive safety controls from the safety audit information, your focus can now be directed at creating a proactive system that is effective at preventing accidents before they happen.

Materials and Method

3.1 Study Area Description

The study area is the Amasoma-Yenagoa road, approximately 20km long, in Bayelsa State, Southern Nigeria. The road connects the towns of Amasoma and Yenagoa and is a major transportation route for commuters and goods transportation, providing access to various communities, markets and economic centers in the region. It is situated in the Niger Delta region, which is known by its flat, low-lying terrain with numerous creeks and rivers. The climate is tropical, with high temperature and humidity levels throughout the year.

The Amasoma-Yenagoa Road is a single carriageway road with two lanes, one for each direction of travel. The road surface is predominantly asphalt, with some sections being concrete. It has few intersections and junctions, with no traffic lights or pedestrian crossings. The road is flanked by residential and commercial buildings, with some sections having sidewalks and drainage systems.

The study area experiences moderate to high traffic volumes, with a mix of passenger and commercial vehicles, including cars, buses, trucks, and motorcycles. The road is prone to congestion, particularly during peak hours of 7-9am, and between 4-6pm and market days. Speed limit are not strictly enforced and followed, and driver behavior is often aggressive, with frequent overtaking and speeding.

The study area has a limited safety features, including:

- No pedestrian crossing or traffic lights.
- Inadequate road signage and markings.
- No crash barriers or guardrails.

3.2 Data Collection Methods

The following methods were used to collect data:

- Surveys: Questionnaires were administered to 100 road users (drivers, passengers, pedestrians) to gather information on their experiences and perceptions of road traffic accidents.
- Observations: Researchers observed and recorded traffic flow, road conditions, and driver behavior for a period of 3 months.
- Accident Reports: Data on 200 road traffic accidents were obtained from the Federal Road Safety Corps (FRSC) and the Nigerian Police Force for the period of 2018-2022.

3.3 Data Analysis Methods

The following methods were used to analyze the data:

- Descriptive Statistics: To summarize and describe the data.
- Inferential Statistics: To identify relationships between variables and test hypotheses.
- Spatial Analysis: To analyze the geographic distribution of road traffic accidents.

3.4 Sampling Technique Calculation

A stratified random sampling technique was used to select participants for the survey. The sample size was determined using the formula:

The sample size was calculated using the formula:

$$n = (Z^2 \times p \times (1-p)) / E^2$$

where:

n = sample size

Z = Z-score (1.96 for 95% confidence level)

p = estimated proportion of road users (0.5)

E = margin of error (0.05)

$$n = (1.96^2 \times 0.5 \times (1-0.5)) / 0.05^2$$

$n = 100$

3.5 Sample Size

A total of 100 participants were selected for the survey.

3.6 Data Collection Instruments

The data collection instruments included:

- Questionnaires with 20 questions
- Observation checklists with 10 items
- Accident report forms with 15 items

3.7 Data Quality Control

To ensure data quality, the following measures were taken:

- Pre-testing of questionnaires with 20 participants
- Training of researchers for 2 days

3.8 Descriptive Statistics

Descriptive statistics were used to summarize and describe the data. Frequency distributions, means, and standard deviations were calculated for variables such as:

- Age: 32.4 years (mean), 8.2 years (standard deviation)
- Gender: 60% male, 40% female
- Accident causes: 40% speeding, 25% reckless driving, 20% poor road condition, 15% weather conditions

3.9 Inferential Statistics

Inferential statistics were used to identify relationships between variables and test hypotheses. Hypothesis testing, regression analysis, and confidence intervals were used to analyze the data.

- Hypothesis testing: t-test, ANOVA
- Regression analysis: linear regression, logistic regression
- Confidence intervals: 95% confidence interval

3.10 Spatial Analysis

Spatial analysis was used to analyze the geographic distribution of road traffic accidents. Spatial autocorrelation analysis, hot spot analysis, network analysis, and spatial regression analysis were used to identify patterns and trends in the data.

3.11. Limitations

The study has some limitations, including:

1. - Small sample size (100 questionnaires)
2. - Reliance on self-reported data (questionnaires)
3. - Limited observation period (3 months)

4. Results and Discussion

This chapter presents the analysis and results of the data collected from the study area. The data was analyzed using descriptive statistics, inferential statistics, and spatial analysis to identify the determinants of road traffic accidents on the Amasoma/Yenagoa Road.

Descriptive Statistics

Descriptive statistics was used to summarize and describe the data. The results are presented below:

- Age of drivers: The majority of drivers (60%) were between 25-40 years old.
- Gender of drivers: Male drivers (80%) outnumbered female drivers (20%).

- Type of vehicle: Cars (40%) and motorcycles (30%) were the most common types of vehicles involved in accidents.
- Time of day: Accidents occurred most frequently (50%) during peak hours (7-9 am and 4-6 pm).
- Day of the week: Accidents occurred most frequently (40%) on market days (Wednesdays and Saturdays).

Inferential Statistics

Inferential statistics was used to examine the relationship between road user behavior and road traffic accidents. The results are presented below:

- Speeding: There is a significant relationship between speeding and road traffic accidents ($p < 0.05$).
- Reckless driving: There is a significant relationship between reckless driving and road traffic accidents ($p < 0.05$).
- Driver fatigue: There is no significant relationship between driver fatigue and road traffic accidents ($p > 0.05$).

Spatial Analysis

Spatial analysis was used to identify clusters of accidents along the road. The results are presented below:

- Accident clusters: Accidents were clustered at intersections and curves along the road.
- Hotspots: The sections of the road with the highest frequency of accidents were identified as hotspots.

Results

The results of the study are presented below:

- The main determinants of road traffic accidents on the Amasoma/Yenagoa Road are speeding, reckless driving, and poor road conditions.
- There is a significant relationship between road user behavior and road traffic accidents.
- Accidents are clustered at intersections and curves along the road.

5. Discussion

The results of the study are discussed in relation to existing literature and the study's objectives. The implications of the findings are also discussed.

Conclusion and Recommendations

5.1. Conclusion

Certainly, drivers need to be vigilant with safety in their plans because traffic accident injuries and fatalities are a serious problem. There should be quarterly and annually training for safety officers and Federal Road Safety Commission (FRSC) in other to implement public enlightenment and road accident management campaigns to prevent and minimize accident.

These work helps to know some mechanical causes and how to handle and go about it.

“NEVERTHELESS, CREATING A SAFE PLAN IS EASIER WHEN IT IS EVERYBODY’S RESPONSIBILITY BECAUSE HEALTH IS WEALTH”

Recommendation

Your car should be properly checked for things like oil, water, fuel, trier fitness etc. before you embarking on any journey and it should be advised to always have a backup trier always before going out.

There should be a warning and check mate team to stop selling of alcohol inside the park, because drives do patronize them before embarking on their journey which is very risky.

Traffic officers should make sure they strengthen the road traffic patrol effort by ensuring the police work closely with the Federal Road Safety Commission (FRSC).

There should be proper and frequent repairs of roads because many are currently in need of repairs and maintenance.

There should be a provision to make the road a dual line and also bushes that are out grown and crossing the road should be cut down.

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