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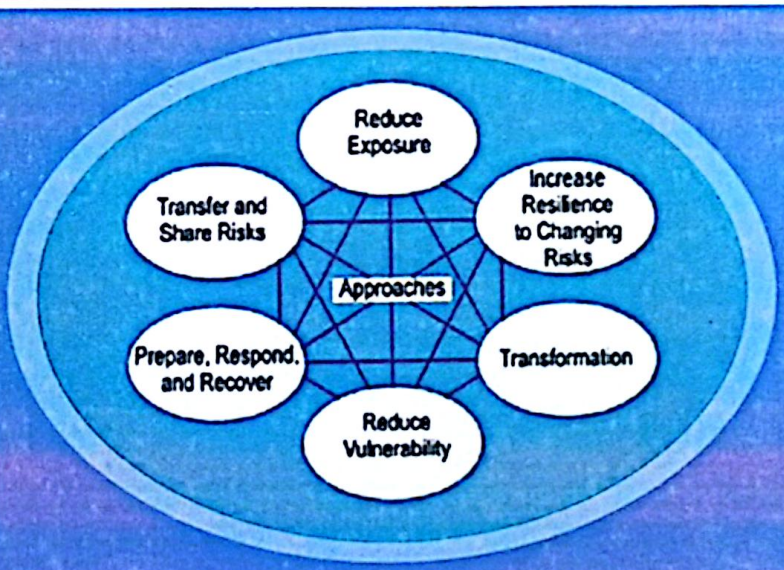

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ASSESSMENT OF ROAD TRAFFIC ACCIDENT IN MINNA METROPOLIS, NIGERIA

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ABSTRACT

Transportation disasters have increased significantly over the years and across the globe irrespective of the socio-economic status, thus becoming a worrisome menace resulting in loss of lives and destructions of properties most especially in developing urban centre like Minna. This study goalis to assess road traffic accidents (RTA) in Minna Metropolis, Nigeria. A survey approach was used through the administration of 400 questionnaires using simple random sampling technique to motorists in 8 selected major motor parks/ terminals. Data gathered through primary sources were achieved from administered questionnaires to motorists whereas, secondary data were sourced through National Population Commission (NPC) 2006, Federal Road Safety Corps (FRSC) in Minna and online journals. Data collected were also analyse into tables and charts using descriptive statistics. Findings revealed that 24.5% of respondents had been involved in road accidents. The year 2016 experienced 415 road traffic accidents while 432 fatalities were recorded in 2015. The human factor wasobserved as the major causes of RTA in Minna. Brake failure is a significant vehicular cause of RTA. 76.1% motorists seldom use seat belt while driving. Consequently, the study recommends that government should give priority to maintenance of existing road networks to reduce RTA in Minna;road safety agencies should pay more attention to speed limit violation by motorists in Minna. Moreover, researcher suggests installation of speed limit devices on vehicles plying intra and intercity routes; educative programs should be setup by relevant government agencies to enlighten and educate motorist on road safety measures, ethics, rules and regulations.

Keywords: *Transportation disasters; Road Traffic Accidents (RTA); Motorists; Fatalities; Violation; Safety.*

1. Introduction

Road transportation disasters have increased significantly over the years in developing countries irrespective of the socio-economic status, thus becoming a worrisome menace resulting in lost lives, human suffering and destruction of properties and environment (Worley, 2006). Traffic capacity is becoming enormous and is growing daily; resulting to the increase in road traffic accidents over the years leading to a day-to-day occurrence. The scale-up of road traffic accident (RTA) is credited to abrupt peak in population and high level of motorisation (Gopalakrishnan, 2012). Motor vehicle accident ranks the highest as a cause of death among the young people (Atunbi, 2009). An occurrence of large number of road accidents were observed in many third world countries unlike the 20% scale-down in the industrialised nations (Emenike and Ogbole, 2008).

Road traffic crashes lead to deteriorating consequence in the nations. Of all transportation disasters, road traffic crashes hugely affect people and tend to pose as the most significant problem globally (Kual, et al., 2005). Globally the death associated to road transport accidents in a year is almost about 1.3 million whereas the rate of injured persons could be about 50 million (WHO, 2018). In recent time, crashes due to motor vehicle rank 9th among disease burden and are expected to rank about 3rd in 2020. Projection indicated that 59,000 inhabitants in Africa died in road accidents in the year 1990 while there is tendency that the number will increase to 144,000 people in 2020 which is about 144 percent increase (Kopits, 2005).

Three-quarters of deaths as a result of motor accidents take place in emerging countries (Odero, 1998). Moreover, this issue seems is snowballing swiftly across developing nations. Aside humanitarian facet of the issue, traffic crashes and injuries in these nations suffer a yearly loss of about $100 billion (Jacobs, et. al 2000). These comprise forfeiture of earnings and load burdened on relatives to attend to their wounded relations (Jacobs, Aeron-Thomas and Astrop, 2000). Consequently, Nigerians are profoundly disturbed on the alarming frequency of road crashes and avoidable consequential loss of lives and properties. Despite various precautionary methods adopted accidents on roads are still at its peak. In view of this, this study attempts to provide critical insight and information on road transport disaster in Minna Metropolis. Therefore, this study consequently attempts to evaluate causes and other underlying factors of road crashes in Minna.

A Road Traffic Accident (RTA) occurs whenever collision among vehicles, pedestrian, animal or any form of geographical or architectural hindrance takes place. Injury, damage to property, and death arises as a result of RTA leading to an annual loss of 1.2 millionpersonsglobally causing damagesas often as possible (WHO, 2004). The research explains that a road traffic accident is defined as accident which took place on the road between two or more objects, in which one must be any kind of a moving vehicle (Jha, et al., 2004). The dynamics of increase in Road Traffic Accidents (RTAs) is currently among the foremost causes of death in emerging nations.

The injury coupled with death burden in developing nations is increasing as a result of various factors, including swift motorisation, bad highway and road traffic infrastructure coupled with the character of people making use of the road (Nantulya and Reich, 2002). This is different with industrialised nations showing a drop in indicators (Oskam, Kingma & Klasen, 1994; O'Neill and Mohan, 2002). Nigeria, a more motorised nation exhibiting a meagre road situations and transport systems reflects an increase in Road Traffic Accidents (RTAs) with high upsurge propensity. This is no different from Minna, the capital city of Niger State. The acknowledgement of RTA as a menace brings about the establishment of the Federal Road Safety Commission (FRSC) in Nigeria. Sumaila (2001) opined that motorised road crashes in Nigeria claims more lives than deaths due to communicable diseases. Nigeria has the topmost documented reports of road traffic accident in Africa. The study carried out by WHO in 2013 revealed the occurrence of higher deaths rate in Africa region happens on roads in Democratic Republic of Congo, Ethiopia, Kenya, Nigeria, South Africa, Tanzania and Uganda cumulating to 64% of all deaths in road transport disaster in Africa. Notwithstanding various steps implemented recently to tackle the issue, the injury coupled with death from road accidents in Nigeria still rises yearly with 33.7 death per 100,000 population (WHO, 2013).

The Federal Road Safety Corps (FRSC) in 2013 also reported an increase of 2% in road transport disasters and 6% increase in fatalities over what was recorded in 2012. The recognition of RTA as a disaster in Nigeria resulted in the establishment of the Federal Road Safety Commission (FRSC) via Decree 45 of 1988 as amended by Decree 35 of 1992, with effect from 18th February, 1988. The Commission was charged with responsibilities for, among others, policymaking, organisation and administration of road safety in Nigeria (Ajiboye,et al., 2020).

Haddon (1980) is a common paradigm adopted in the injury deterrence field. It was formulated using elementary ideologies of municipal health to challenges of traffic wellbeing. The matrix developed by Haddon helps in creating concepts to reducing injuries in diverse form. It provides an interesting framework for unravelling origin of injuries and classifying diverse preventive tactics to tackle the challenges. The Haddon Matrix has four columns and three rows which invariably addmunicipal health philosophies of Host-Agent-Domain as goals of modification with the notions of Primary - Secondary - Tertiary prevention.

Explicitly the Haddon Matrix pillars explain interrelating features that coupled with injury course. The physical environment covers all features of how the injury occurs like road and building while the community environment includes; social and legal norms as liquor drinking or procedures about authorising motorists. In nut shell, the Matrix recognises and reflects the essential of human as a go-between, and environmental features as both contributing variables and resistor measures before, during, and after an injury as reflected in Table 1.

Table 1 Typical Haddon Matrix

Phase	Human factors	Vehicles and equipment factors	Environmental factors
Pre-crash	-Information - Attitudes -Impairment -Police Enforcement	-Roadworthiness -Lighting -Breaking -Speed management -Occupant restraints	Road design and road layout Speed limits Pedestrian facilities
Crash	-Use of restraints Impairments	-Other safety devices -Crash-protective design	–Crash-protective roadside objects
Post-Crash	- First-aid skills - Access to medics	–Ease of access - Fire risk	Rescue facilities Congestion

Source: After Haddon, 1970.

2. Causes of Road Traffic Accident

Onakomaiya, (1988) opined that road traffic crashes is an unforeseen phenomenon which occurs due to the action of vehicles. Whereas anything that occurs unexpectedly due to chance is referred to accident. Furthermore, untimely demise of motorists and other road users can be deadly due to road crashes. Road crashes related to transport are not coincident but established due to various factors. A respectable cognisance with understanding of the sources of traffic crashes aids in preventing them. Moreover, the origin of road traffic crashes can be categorised into three main groups namely; human factors, mechanical factors and the environmental factors.

2.1. The Human Factor

Afolabi and Gbadamosi (2017) opined that a substantial proportion (80%) of origin of road traffic crashes is linked to human factors in Nigeria. Human factors constitute major components comprises of the following; law enforcement agent, pedestrian, drivers and not forgetting the engineers. Most motorists on Nigeria road exhibit attributes like, insolence, rude and have slight respect for human life. Moreover, it has led topping the list of virtually all major factor coupled with frightening rate of crashes on roads in Nigeria.

2.2. The Mechanical Factor

A major significant contributor among the factors of road crashes is the vehicle. Safety on the roads however exceeds routine investigation and often repairs of vehicles. This should be a repetitive care and check of entire vehicles mechanisms. Another significant vehicle factors are flaws in tyres, brakes and inputs resulting due to in adequate vehicle care. The worldwide economic decline has hugely impacted on products quality in the Nigerian markets making people to go after second-rated goods in the form of used tyres, spare parts and second-hand vehicles. Moreover, excessive speed

and carefree driving, contradict the rules of safety in line with the second-handed vehicles bought. Malfunction of any of this part could result in poor optimum performances invariably affecting smooth driving that could result in accidents (Afolabi and Gbadamosi 2017).

2.3. The Environment Factor

In the context of Nigeria there is a robust debate on increase in road crashes been linked with poor roads if not an opposing role of repercussion of having a smooth road. Against this backdrop even with the creation of new roads in Nigeria, significant decrease has not been experienced rather accidents rates seem to be increasing (Afolabi and Gbadamosi 2017).

3. Phases of Accident

Accidents do not just happen they are caused. An insight to the occurrence of accident timeline shows three stages of accidents which are; Pre-Accident phase, the Accident phase, and the post-Accident phase of highway safety (Afolabi and Gbadamosi 2017).

3.1. Pre-Accident Phase

All cautionary measures in the pre-crash phase are designed to monitoring or reducing road accidents. All the causative factors including road users, environment, vehicle and precautionary approaches used in preventing accidents. This is a sign relating to numerous situations leading to crashes. Furthermore, it reveals all conditions and circumstances prior to crashes happening. Certain condition can be evaluated whichcould cause a crash prior to the accident been recorded.In nutshell, this stage focuses on accident avoidance.

3.2. The Accident Phase

The un avoidable occurrence of the pre-crash stage brings about the crash stage which is when the accidents take place due to the involvement of the mechanical device in real collision leading to accident. The outcome of the crashes to the victims also goes to this stage. Correspondingly, this is the stage of the occurrence of crashes at any period showing all indicators of the crash stage. Afolabi and Gbadamosi (2017) findings shows that around 80% decrease in deaths of drivers and passengers is attainable by using safety belts alone. While, the second stage therefore, laid emphasis on injury prevention.

3.3. Post-Accident Phase

The post-crash phase is simply the procedure of appraising or weighing the costs of road crashes. This assessment basically is on the socio-economic, environmental and political impacts, making use of measurable and qualitative investigative apparatus. This stage is concerned with saving people who ought not to die, minimising hospitalisation, permanent disability and avoidable deaths. Succinctly, the aim is on approachability to adequate and prompts emergency communications, transportation andmedical care leading to the continual survival of the survivors of the crashes. More so, this stage lay emphasis on acute decrease, including the presence and capability of ambulance drivers and attendants in attending to victims at crash site(Afolabi and Gbadamosi 2017).

Materials and Methods

The Study Area

Minna is a rapid emerging city in Nigeria found in Niger State. It is the state capital and is positioned in between Latitudes $8^{0}30'$ E

and 7°20' and invariably lies with estimated population of 394,897 as at 2018. Minna lies solely in the middle belt of Nigeria. The entire land area of Minna is 74,344km^2 wide with about 8% of the land extent of Nigeria. Minna is a traditional, modern and heterogeneous society predominantly dominated by Gwari's and Nupe people.

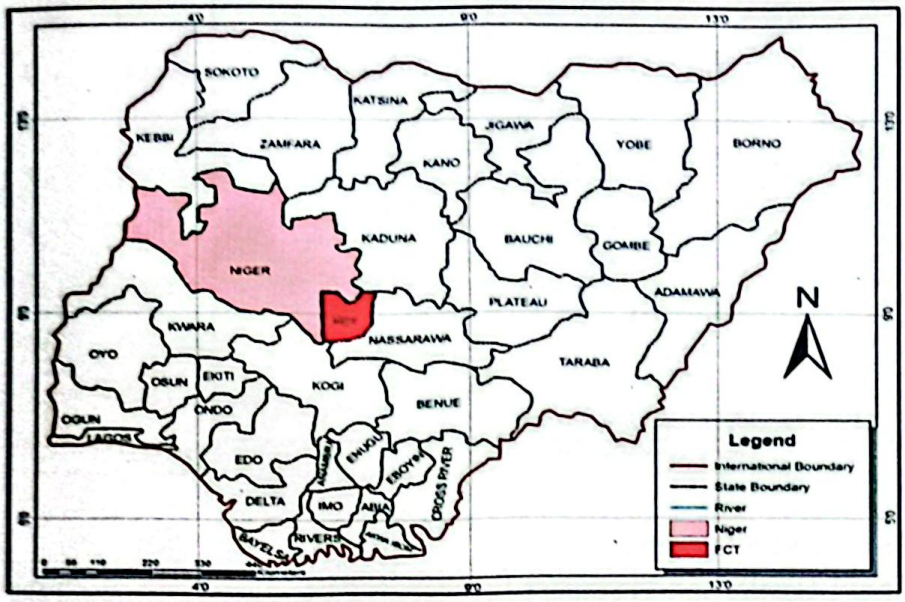

Figure 1: Map of Niger State in the context of Nigeria.
Source: Department of Logistics and Transport Technology FUT Minna.

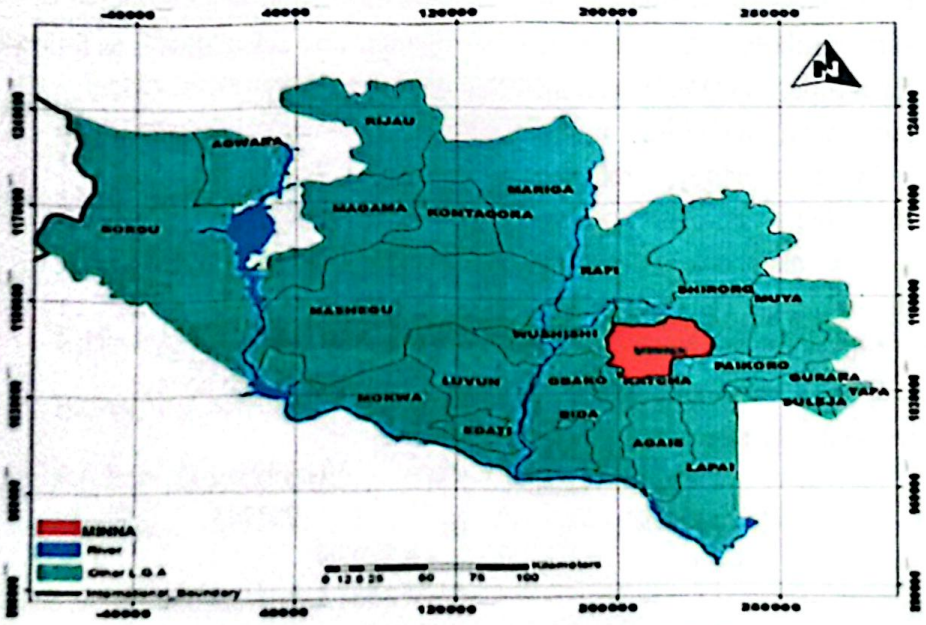

Figure 2:Map of Minna in the context of Niger State.
Source: Department of Logistics and Transport Technology FUT Minn a.

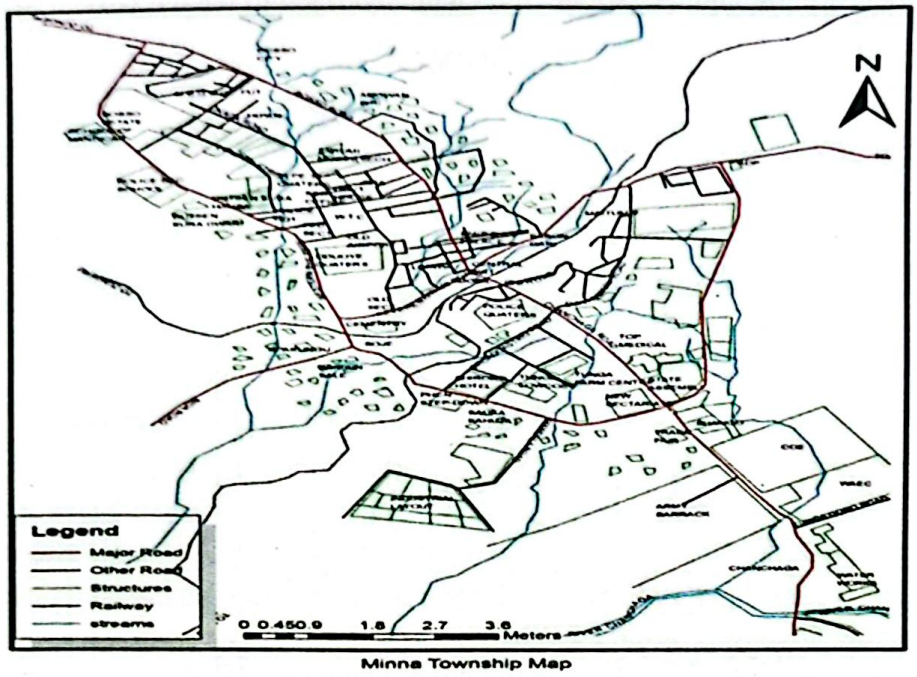

Fig.3 Map of Traffic Corridors in Minna
Source: Department of Logistics and Transport Technology FUT Minna.

Methodology

A survey approach was used to assess road traffic accidents in Minna. Questionnaire was generated and administered to respondents. This study is city-wide, needing minimum sample size for each identified motor park/terminal. In this study, reduced proportions of the selected motor parks/terminals were taken out of the total population of the study area. The study makes use of Yamane (1967) sample size formula in determining the appropriate sample size. Presented below is the formula:

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

Where;
n = sample size,
N = population of the study, and
e = level of significance or (limit of tolerable error) = 0.05.

Therefore, from the equation,

Where;
N=394,897
e=0.05.
Sample size calculation is as follows;

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

$$n = \frac{394,897}{1+394,897\ (0.05)^2}$$

$$n = \frac{394,897}{394,898\ (0.0025)}$$

$$n = \frac{394,897}{987245}$$

n = 399.99
n ≈ 400 (Approximately sample size).

The questionnaires were administered on the respondents at the selected motor parks/terminals in the study area using simple random sampling technique based on 400 achieved as the sample size.

5. Discussions and Findings

Table 2: Proportion of Questionnaires Distribution and Administration.

S/No	Motor Parks/Terminals	Sample size
1.	Abdulsalam (Tunga)	50
2.	Mobil (Mobil)	50
3.	NSTA (Tunga)	50
4.	Kpakungu	50
5.	Bahago Round About (Bosso Road)	50
6.	A.A Rano (Kpakungu)	50
7.	PMT (Tunga)	50
8.	Kasuan Gwari	50

Table 2 indicates the proportion of questionnaires distributed across 8 selected motor parks/terminals in Minna.

Table 3: Breakdown of Questionnaires Retrieved from Selected Motor Parks

S/No	Motor parks/terminals	Proportion Administered	Proportion of Retrieved	% Proportion of Retrieved
1	Abdulsalam	50	41	12.7
2	Mobil	50	39	12.1
3	NSTA	50	44	13.7
4	Kpakungu	50	42	13.0
5	Bahago Round About	50	41	10.9
6	AA Rano (Kpakungu)	50	38	11.8
7	PMT	50	45	14.0
8	Kasuan Gwari	50	38	11.8
	TOTAL	**400**	**328**	**100**

Table 3 shows a breakdown of questionnaires distributed to eight (8) selected motor parks/terminals in Minna. Findings indicates that out of the 400 questionnaires distributed about 328 questionnaires were returned valid. This shows 82% response rate by the respondents.

Rate of Road Traffic Accident

Table 4:Distribution of Road Accident.

Involvement in RTA	Frequency	Percent
Yes	79	24.5
No	243	75.5
Total	**328**	**100.0**

Table 4revealsthat 75.5% of respondents got involved in one road traffic accident or the other while 24.5% never got involved in road traffic accidents. This finding invariably draws attention to the severity of the impact of RTA in Minna.

Table 5: Frequency of Road Traffic Accident in Minna

MONTH/YEAR	2012	2013	2014	2015	2016	Total
Jan	14	34	36	32	54	170
Feb	10	32	29	41	41	153
Mar	9	26	40	36	51	162
Apr	16	29	37	35	38	155
May	8	32	32	27	27	126
Jun	11	30	34	42	18	135
Jul	15	35	38	44	42	174
Aug	9	38	41	39	36	163
Sept	10	33	35	30	16	124
Oct	7	31	29	33	11	111
Nov	12	34	33	38	37	154
Dec	21	27	32	35	44	159
Total	**142**	**381**	**416**	**432**	**415**	**Grand Total = 763**

Table 5 shows the frequency of accidents in Minna from the year 2012-2016. From the table it can be deduced that road accident is on a rise, the lowest number of accidents was recorded in 2012 with only 142 crashes all through the year. In the year 2013 there was an increase in the figure of crashes which is more than double the previous year at 381 crashes. Moreover, there was a further increase in years 2014 and 2015 at 416 and 432 crashes respectively. Then a slight drop in 2016 to 415 crashes. The trend is generally towards an upsurge in the aggregate rate of road traffic accidents recorded in Minna. The increase in total accident rate year by year is a worrisome trend which would be on increase if not curb.

Fatality Rate of Accidents in Minna from 2012-2016

Table 6: Fatality of Road Accident in Minna

Year	Fatal	Serious	Minor	Total
2012	22	103	17	142
2013	86	290	5	381
2014	90	308	18	416
2015	80	322	30	432
2016	63	260	69	392
Total	341	1283	139	Grand total: 1763

Table 6 indicates fatality rate of accidents in Minna from 2012 to 2016 is about 19.34% of the cumulative crashes. Study reveals fatal crashes figures have been rising between 2012 to 2015 except the slight dropped in 2016. The trends shows 142 fatalities in 2012, 381 fatalities in 2013, 416 fatalities in 2014, 432 fatalities in 2015 and 392 fatalities in 2016. It could then be deduced that the rate of road traffic accident is quite serious in Minna and these dangerous trends must be curb.

Figure 4 shows the fatality rate of road traffic crashes from the year 2012 to 2016 on a line graph, it shows a total of 341 fatal crashes through the five years, 1,283 and 139 serious and minor respectively. Thus, 341 fatal crashes hold a 19.3% of the total accidents in five years, 1283 serious crashes hold a 72.8% of the total crashes while 139 minor crashes carry 7.9% of the total amount of crashes in five years. It could then be deduced that the rate of road accident is quite serious in Minna and remedies needs to found to reduce the rate of accident.

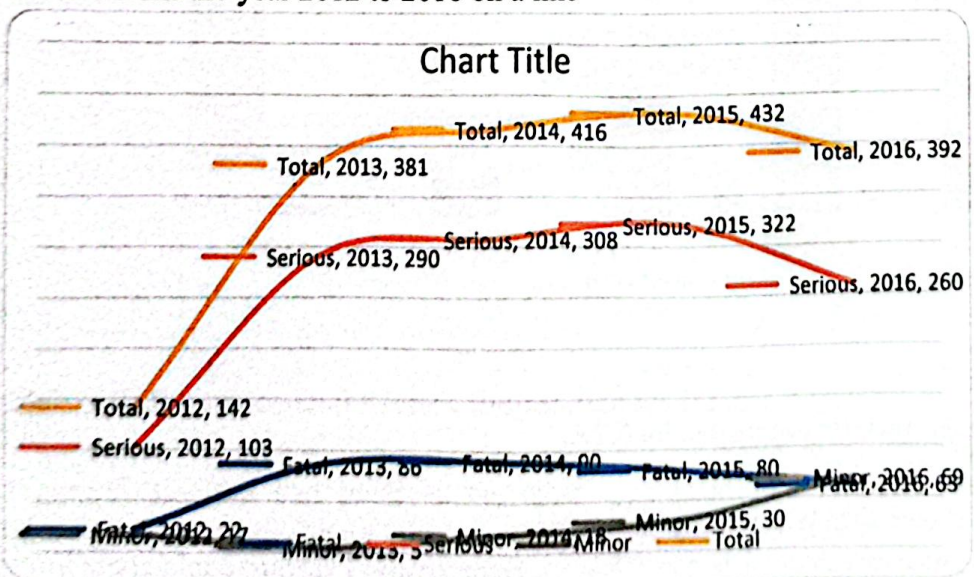

Figure 4: Fatality Rate of Road Accident

Major Factors Responsible for Road Traffic Accidents

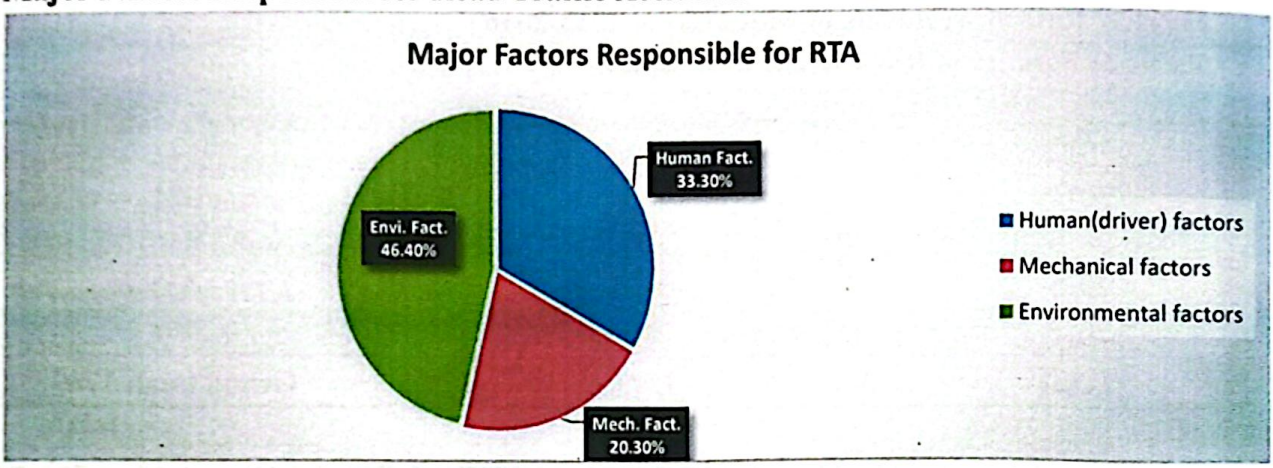

Figure 5: Factors responsible for RTA.

Figure 5 shows that environmental factor is the most prominent cause of road traffic accidents in Minna with 46.4%. These environmental factors could come in the form of bad road, poor weather condition, dangerous bends, animals not under custody staying on the road and any form of obstruction on the road without official notice or warning. Moreover, followed is human factor at 33.3% and mechanical fault in vehicle at 20.3% respectively.

Vehicular Causes of Road Accident

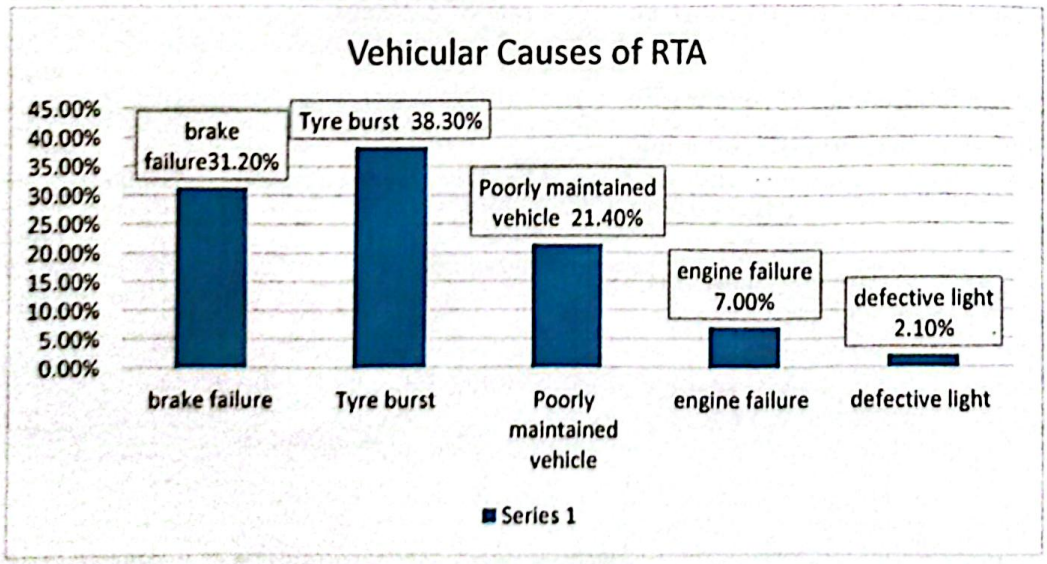

Figure 6: Vehicular factors responsible for RTA.

Figure 6 above shows that tyre burst is the most prominent cause of vehicular factors of road traffic accident at 38.3%, brake failure at 31.2% and poorly maintained vehicles at 21.4% respectively. Tyre bust could come inform of over gauge by vulcanizer, worn-out tyres or buying of expired foreign used tyres (also known as Tokunbo).

Human Causes of Road Accident

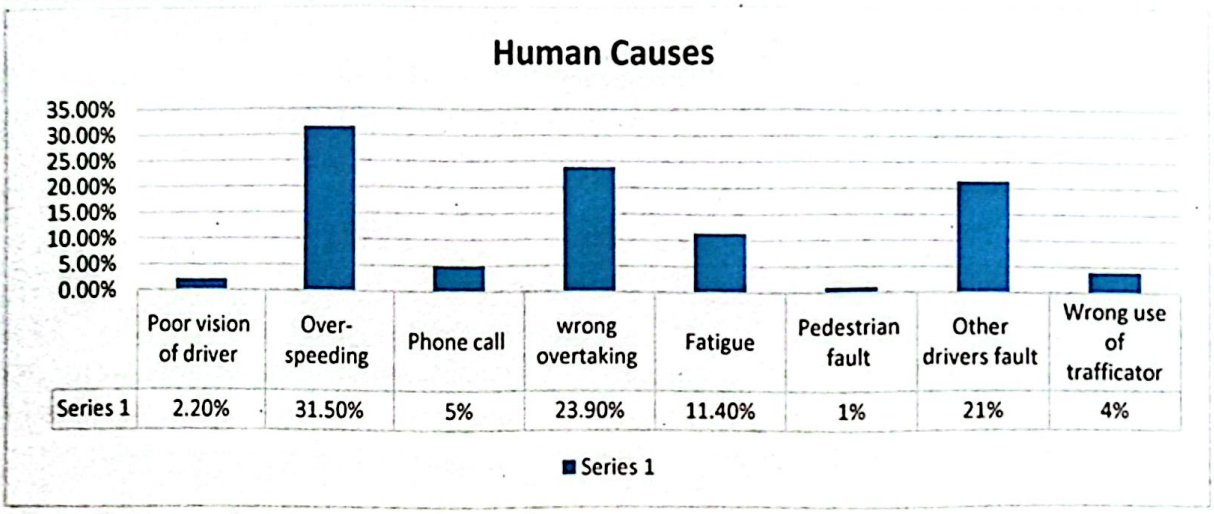

Figure 7: Human Factors Responsible for RTA.

Figure 7 shows over speeding as the most probable cause of road accidents under human causes at 31.5%, wrong overtaking at 23.9% and the fault from other drivers at 21%. Hence, due to overspeeding, vehicles should be calibrated with speed limit devices to reduce excessive speeding.

Environmental Causes of Road Traffic Accident

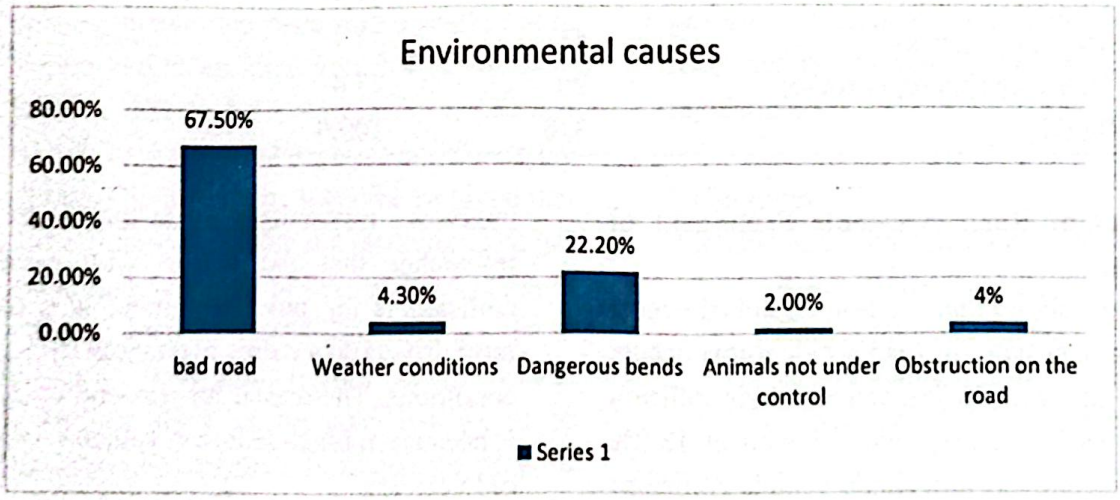

Figure 8: Environmental Factors Responsible for RTA.

Figure 8 signifies bad roads as the most environmental cause of road traffic accident in Minna at 67.5%, followed by dangerous bends of roads at 22.2%. This shows the bad state of roads in Minna as a major cause of road accidents.

Use of Seat Belt among Respondents

Table 7: Proportion of Seat Belt Usage

Seat Belt	Frequency	Percent
Often	77	23.9
Seldom	245	76.1
Total	**322**	**100.0**

Table 7 indicates that 76.1% of respondents seldom uses seat belt while only 23.9% use seat belts often while driving. The importance of seat belts cannot be over emphasised in the reduction of fatality in road accidents, as it tends to save the lives of the people involved in such accidents.

Major Types of Road Traffic Accidents in Minna

Type of Road Accident Occurrence

Table 8 shows the proportion of the road type in which most accidents occur, 58.8% of accidents occur on one-carriageway, while the second largest proportion is One-way (improper route) at 27.4%, and the two-carriageway at 13.7%.

Table 8: Proportion of Road Types where Traffic Accidents Occur in Minna

ROAD TYPE	Frequency	Percent
One-carriageway	193	58.8
Two-carriageway	45	13.7
One-way (improper route)	90	27.4
Total	**328**	**100.0**

Types of Road Accidents Prominent in Minna

Table 9 shows that head-on crash is the most prominent types of road accident that occurs in Minna with 38.7%, and rear-ends collision follows by 32.6%, side collision at 18.9% while rollovers and single vehicle collisions at 4.3% and 5.5% respectively. Through oral interview, respondents made known to the researcher that the reason why head-on collision is the most prominent is because most drivers do a wrong overtaking in clumsy conditions. The reason for rear-end collision is because of brake failure in vehicles, mostly old vehicles.

Table 9: Major Types of Road Accidents

Type of RTA	Frequency	Percent
Head-on collision	127	38.7
Rear-end collision	107	32.6
Rollovers	14	4.3
Side collision	62	18.9
Single vehicle/lone accident	18	5.5
Total	**328**	**100.0**

Table 10 shows that 1,111 people were involved in RTA in 2015, 141 people were killed, 809 people were injured and 768 vehicles were involved in RTA in Minna which were the highest recorded except in 2013 which shows that 784 vehicles were involved in RTA. These figures as revealed above are terrifying as they show a grand total of 4885 people were involved in RTA while 3509 were injured between 2012 and 2016.

Table 10: Number of killed and injured victims in RTA

Year	Total Involved	Total killed	Total Injured	Others	Vehicles Involved
2012	929	97	595	237	532
2013	972	126	702	144	784
2014	988	112	756	120	707
2015	1111	141	809	177	768
2016	885	187	647	51	732
Total	**4885**	**663**	**3509**	**1229**	**3523**

Source: FRSC Minna, 2018.

Conclusion and Recommendations

This study confirmed to the fact that rate of road transport disasters in Minna is gradually scaling up over the years with a yearly rise in values of total accident from 142 accidents in 2012 to 381 in 2013, 416 in 2014, 432 and 415 in 2015 and 2016 respectively. Due to the findings in this study, it can be resolved that road transport disaster is a challenge that has been leading to loss of lives and properties in Minna which need to be addressed in order to mitigate daily human loss on the roads. Solutions need to be provided so as to suspend the negative consequences that of road transport disasters has on the citizens and residents of Minna. This study has shed more light on the menace of RTA in Minna and thrown up vital information and data. The study recommended that government gives priority to maintenance of existing road networks due to its being the major cause of road crashes in Minna; road safety agencies should pay more attention to speed limit violation by motorists in Minna; the speed limit devices on vehicles plying intra and intercity routes should be installed; and programs should be setup to by relevant government agencies to educate motorist on road safety measures, ethics, rules and regulations.

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