
Accidents Mapping in Minna: A Systematic Use of Information as a Basis of Prevention

Ortserga Saakuma

Department of Urban and Regional planning,
Federal University of Technology Minna, Niger State
Email: jsortserga3@gmail.com

ABSTRACT

The paper argued that road traffic accidents information collected from field survey can be used in reducing and preventing road traffic accidents. The study investigated causes and black spots of road traffic accidents in Minna. Information on accident such as place of accident, type of accident, and nature of accident were sought through field survey, and the descriptive analysis was use with Geographical Information System (GIS) to conduct the study. The result of the analysis shows that, on type of accident, motorcycle is rank 1st with 19.9%, followed by car 17.0%, tricycle 4.8%, pedestrian 4.5%, bus 4.2%, and truck 2.1%. On nature of accident, 27.9% nature of accident is inside vehicle, and 24.1% nature of accident is hit by a vehicle. And the black spots of road traffic accident in Minna are Bosso, Kpakungu, and Tunga which are centrals of economic activities in Minna. The study finally uses information from the accident survey as a basis for reducing and preventing road traffic accident. And recommendations are made on sustainable economic empowerment, and decentralization of centers of economic activities as a way of reducing and or preventing accident in Minna.

Key words: Road traffic accident, Mapping, Accidents Information, Black spots

INTRODUCTION

The world Health Organization (WHO) estimated that More than 1.17 million deaths occur each year worldwide due to road traffic accidents. A breakdown of the figure shows that developing countries account for 70 percent of these deaths. In Nigeria, road traffic accidents are estimated to cause between one-quarter to over one-third of road related deaths, (Agbonkhese, 2013). While research on road traffic accidents have focused more on causes of road traffic accidents, collection of road traffic accident statistics and impact assessment of road safety campaign, not much attention have being focus on mapping the black spot of accidents that will help provide information needed to prevent future occurrence.

The opposite of accident is safety and it is concerned with taking of all necessary precaution against the occurrence of road traffic accident which is caused by unforeseen circumstances usually producing unpleasant and

unexpected consequences, (Ortserga, 2016). Kaled, (2004) made us to understand that road accident can be reduced if information on road traffic accidents are properly provided for safety precautions on the roads. But these safety information needed to reduce road traffic accident can only be available if and only when data on road traffic accident are gathered, analyzed and interpreted in order to identify reasons for the accidents, so that measures will be put in place to reduce or prevent its recurrence. The basic argument of this paper is that, road traffic accident can be reduced if information on road traffic accident are collected, analyzed and interpreted for urban governances, and the general public to be informed and educated on safety precaution needed to help reduce their vulnerability to road traffic accidents.

The aim of this study therefore is to examine and map the neighborhoods with black spots of road traffic accidents in Minna, in order to provide information on accidents and safety measures aimed at reducing road traffic accident in Minna. The mapping of accident is done at the neighborhood level, as it was difficult to get data and co-ordinate at accident spot.

Theoretical Framework

The theoretical framework of this study is based on the idea of safety epistemology. Since it is geared towards gaining the understanding of accidents and how it can be prevented, as written by (Kaled, 2004) that accident can be reduced or prevented if the important information needed for safety precaution on the road are available and put into use. According to Kaled, (2004) this can be done by analyzing data on road accident in order to identify the causes and black spots of accident so that measures can be put in place to prevent future occurrence of such accidents.

Jorma (2012) noted that this type of research is characterized by a purpose to discover and interpret the reality within a particular place or setting. Thus the research usually provides various details including the background of the people, their culture and environment. Also Kirsten, (2008) noted that, this type of research makes use of multiple methods and multiple data sources to support the strength of interpretation and conclusion.

STUDY AREA AND METHODS

For a better understanding of accident mapping in Minna, the State Capital of Niger State, it is important to have a thorough understanding of

the town which is the study area. In this section, the location, population, socio-economic and transportation will be discussed.

Location: Minna, which is the focus of this study, is the state capital of Niger state. It is located on latitude $9^{\circ} 36' 22''$ to $9^{\circ} 43' 61''$ N and longitude $6^{\circ} 33' 15''$ E to $6^{\circ} 51' 03''$ E on a ground-base of complex rocks, mainly gneiss and magmatite (Jibrin, 2007). Minna has a free population of 223, 741 (NPC, 2006) and a projected population of 315,609 in 2016.

Socio-economic setting of Minna: The economic activity of the town is sustained basically by formal and informal activities as opposed to industrial towns, with which urban centres are usually associated with. A large number of the residents are employed in the civil service sector with the presence of Federal, State and Local Government Secretariat together with educational institutions from primary to the tertiary level. An insignificant number of people also find employment on the Banking, insurance and few private firms.

Existing road network pattern of Minna: Minna transportation system relies heavily on its road network. The road network is characterized by typical crisp-cross road that passes through the town from the Eastern part to West and the North to the South. These major roads are link to the collectors and distributors which distribute traffic to the various neighborhoods of the town. These major roads further connect to arterial roads that feed the access road which leads to the residential areas. And majority of these road are in bad condition. Figure 1 shows the road network of Minna town and it neighborhoods.

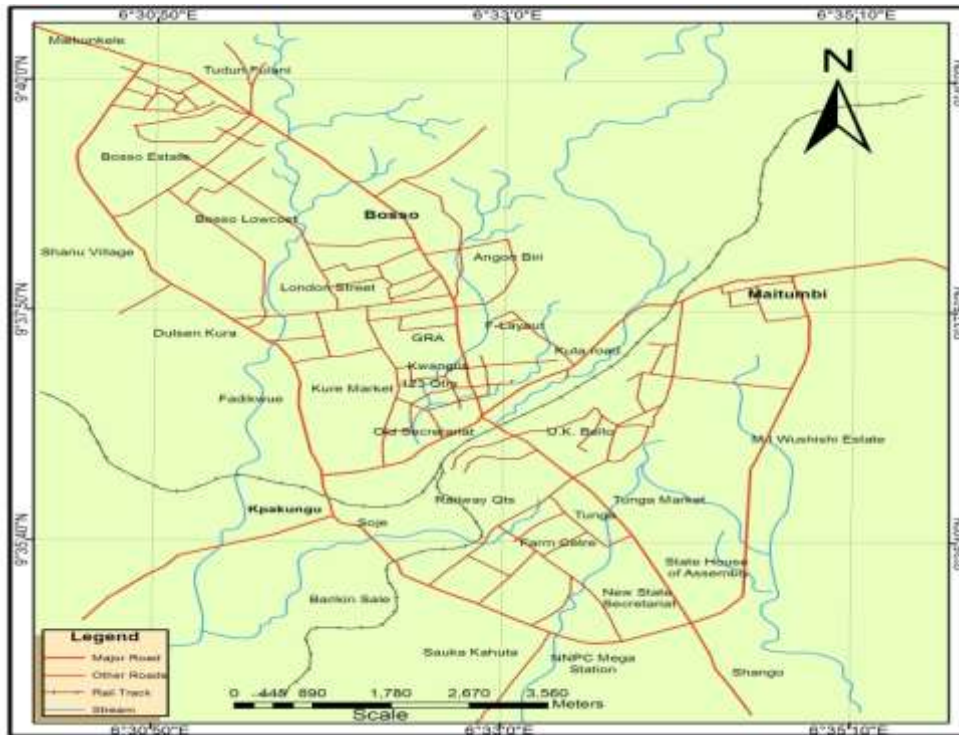


Figure 1: Road Network Map of Minna Town
Source: Department of U.R.P Fut Minna

Considering the complexity and heterogeneous nature of the topic within the geographic spaces, field investigation form the drive and provide the framework for the type of data required for this study. The types of data used for the study is primary data. The primary type of data includes information on socio economic characteristics of respondent, (like location, gender, age, occupation, and employment status). Also the primary type of data includes accident status of respondents, nature of accident, and place of accident were accessed through field survey.

The questionnaires were used to acquire first hand information on issues relating to the objectives of the study. The structure questionnaire was divided into two sections. Section (A) sought information on respondent personal attributes such as location, sex, age, education, employment status, and occupation. Section (B) sought information on accident status of respondents, such as involvement in accident, place of involvement, type of accident, and nature of accident.

The study population covers 24 neighborhoods in Minna Town. These neighborhood include, Limawa, Tunga Maitumbi, Makera, Minna Central, Sabon Gari, Tudun wada North, Tudun wada South, Kpakungu, Tunda Fulani, Jikpan, Tayi village, GRA, Sauka Kahuta, Fadikpe, Sango,

Angwan Daji, Barkin sale, Bosso Estate, Bosso town, Chanchaga, Dutsen Kura, Nassarawa and F-Layout.

The sample frame is as follows

Population of Minna as projected is 315,609

Now, using Yamane's formula $n=N/1+(Ne^2)$

Where

n= population simple frame

N= total population of a particular study area

e is the level of significant = 0.05

The questionnaire was administered in Minna (being the study area).

Therefore the population sample frame was determined as follows

$$n=315,609/1+(315,609 \times 0.05^2)$$

$$n=315,609/1+(315,609)0.05^2$$

$$n=315,609/1+(315,609)0.0025$$

$$n=315,609/789$$

$$n=399$$

So based on Yamane's Formula used in the above calculation, 399 questionnaires were distributed but only 377 questionnaires were duly completed and returned. Simple random sampling method was used for the selection of few individuals that represented the population under study. This was done in a fair way that ensured all people in the selected neighborhood to have a fair chance of being picked for the study. The distribution of questionnaires was done using simple random sampling method, were distribution of questionnaires was done without any pattern or systematic procedure to the above mentioned neighborhoods in Minna.

Also figure 2 shows the points of distribution of questionnaire within the 24 neighborhoods. The Global positioning system (GPS) was used to pick co-ordinates or points of distribution in Minna. The mapping of field survey is shown in figure 2 below.

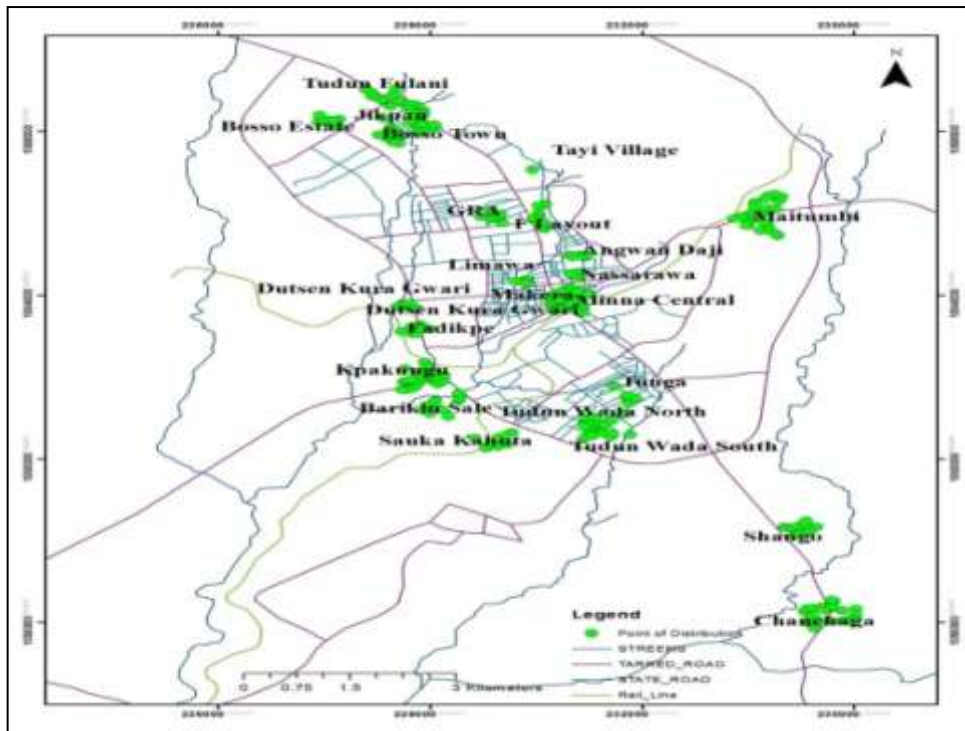


Fig 2 Map Showing Point of Distribution in the study Area
 Source: Authors Field work 2016

RESULTS AND DISCUSSION

Table 1: Accident Status of Respondents in Minna

Variables	Categories	Frequency	Percentage
Accident status	Yes	196	52.0
	No	181	48.0
Type of Accident	Motorcycle	75	19.9
	Tricycle	18	4.8
	Car	64	17.0
	Bus	16	4.2
	Truck	8	2.1
	Pedestrian	17	4.5
	Nature of Accident	Inside vehicle	105
Outside vehicle		91	24.1

Source: Author's field survey 2016

Table 1, analyzes accident in Minna. The table shows that 52.0% of respondents have accident, and 48.0% of respondents have no accident. This is to say more than half of the sample size had accident. This implies that in every 93 people in Minna 47 are likely to have accident.

On the type of accident, the table shows that 19.9% of respondent's accident type is motorcycle, 4.8% of respondent's accident type is tricycles,

and 17.0% of respondent's accident type is car, 4.2% is bus, and 2.1% of respondent's accident type is truck, while 4.5% of the respondent accident type is pedestrian. This implies that motorcycle is the highest and commonest type of accident in Minna; this is because of high use of motorcycle as a source of livelihood by youth who are not employed in the formal sector of the economy.

Table 2: Accident type among Neighborhood

Neighborhood	Motorcycle	Tricycle	Car	Bus	Truck	Pedestrian
Bosso town	16	2	6	1	1	3
Shango	0	1	4	0	0	0
Sauka kahuta	3	0	5	0	0	0
Barkin sale	2	0	3	0	1	0
Kpakungu	10	2	4	1	0	3
Minna central	3	2	6	4	1	3
Tudun Fulani	2	0	0	0	0	0
Chanchaga	3	1	4	2	1	0
Bosso Estate	1	0	3	1	0	0
Tayi village	0	0	0	0	0	0
Angwan Daji	4	0	3	0	0	1
Tunga	6	0	1	0	0	0
Tudun Wadan	3	2	0	0	0	0
Tudun Wadas	4	0	1	0	0	0
Makera	3	0	3	2	1	3
Sabon Gari	1	1	1	2	0	0
Maitumbi	5	2	4	1	0	0
Nassarawa	1	1	1	1	0	1
F-Layout	0	2	5	0	2	0
Limawa	1	0	2	1	1	0
Fadikpe	1	1	0	0	0	2
GRA	2	0	2	0	0	0
Dustsen kura	3	0	6	0	0	0
Jikpan	1	1	2	0	0	1
Total	75	18	64	16	8	17

Source: Author's field survey 2016

The result for accident type as shown in table 2 reveals that, a total of 75 respondent's type of accident is motorcycle. The data shows that, Bosso town has the highest number of motorcycle accident (16) followed by Kpakungu (10) then Tunga (6). This is because of the high concentration of economic activities in these neighborhoods. The mapping for motorcycle accident among the 24 neighborhoods is shown in figure 3 below.

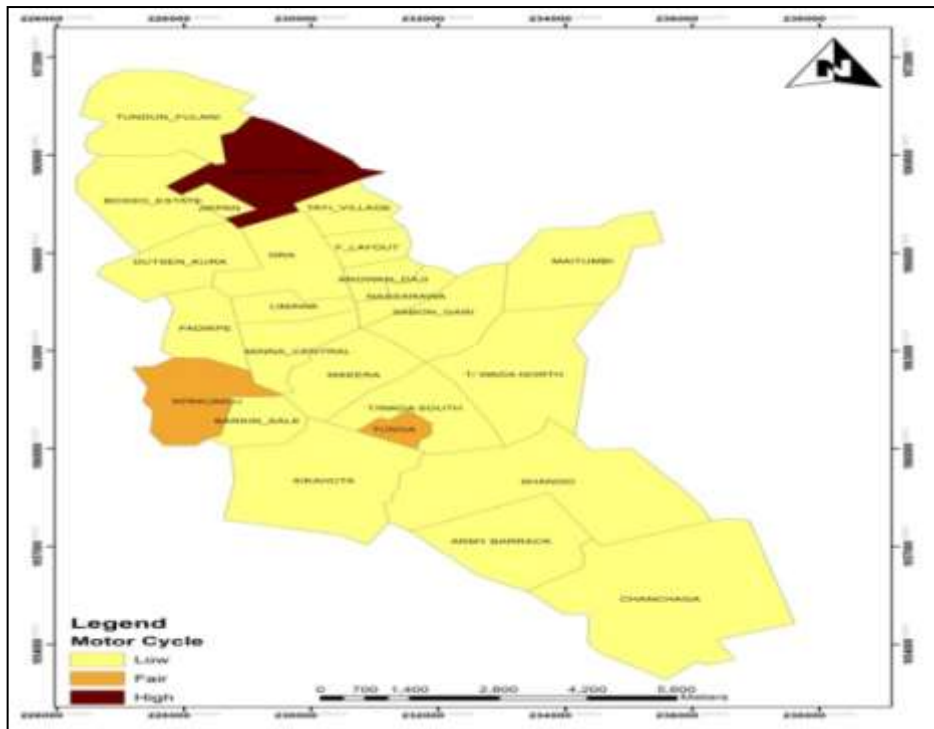


Figure 3: Neighborhoods accident ranking of motorcycle in Minna
Source: Modified by Author 2016

Result for accident type as shown in table 2, have car accident as the second highest type of accident in Minna town. The table shows that, a total of 64 respondents have car accident, and the neighborhood with the highest car accidents is Bosso town, Dustsen kura, followed by Sauka Kahuta and F-Layout, While Tudun Fulani, Tayi village, Tudun wada, and Fadikpe have the lowest car accident among the 24 neighborhood in Minna. The mapping for car accidents among neighborhoods in Minna is shown in figure 4 below.

For tricycle, the result reveals that tricycle is ranked third on accident type in Minna. Table 2 shows that 18 respondents have tricycle accident type in Minna, and the neighborhood with the highest number of tricycle accidents is Bosso town, Kpakungu, Minna central, Tudun wada North, Maitumbi, and F-Layout. While Bosso Estate, Tayi village, Angwan Daji, Tudun wada South, Makera, Limawa, GRA, and Dustsen kura has the lowest tricycle type of accidents among the 24 neighborhood. The mapping for tricycle accident among neighborhoods in Minna is shown in figure 5 below.

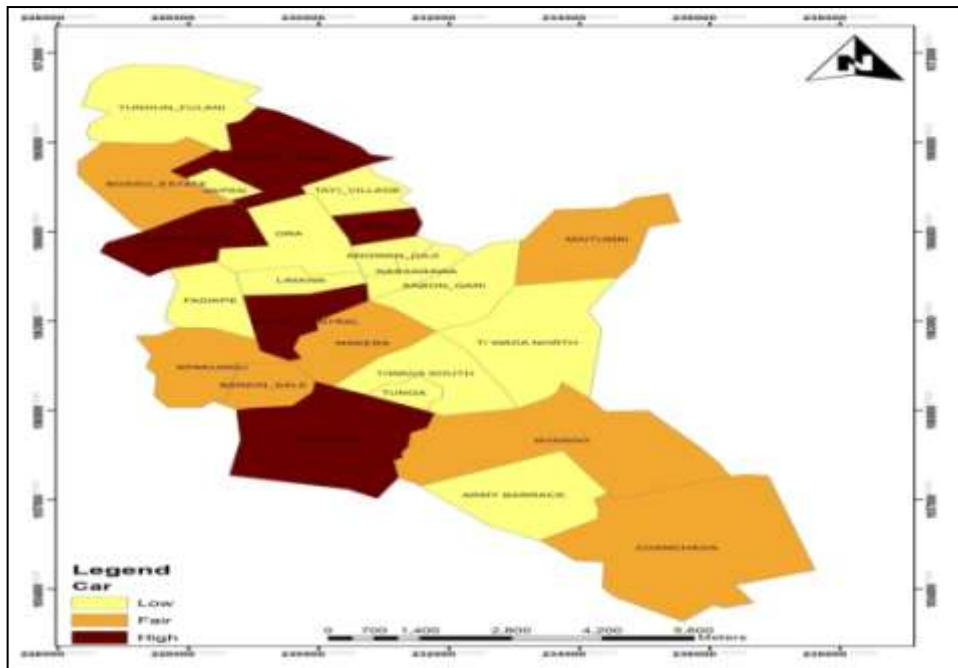


Figure 4: Neighborhood accident ranking of car in Minna
 Source: Modified by Author 2016

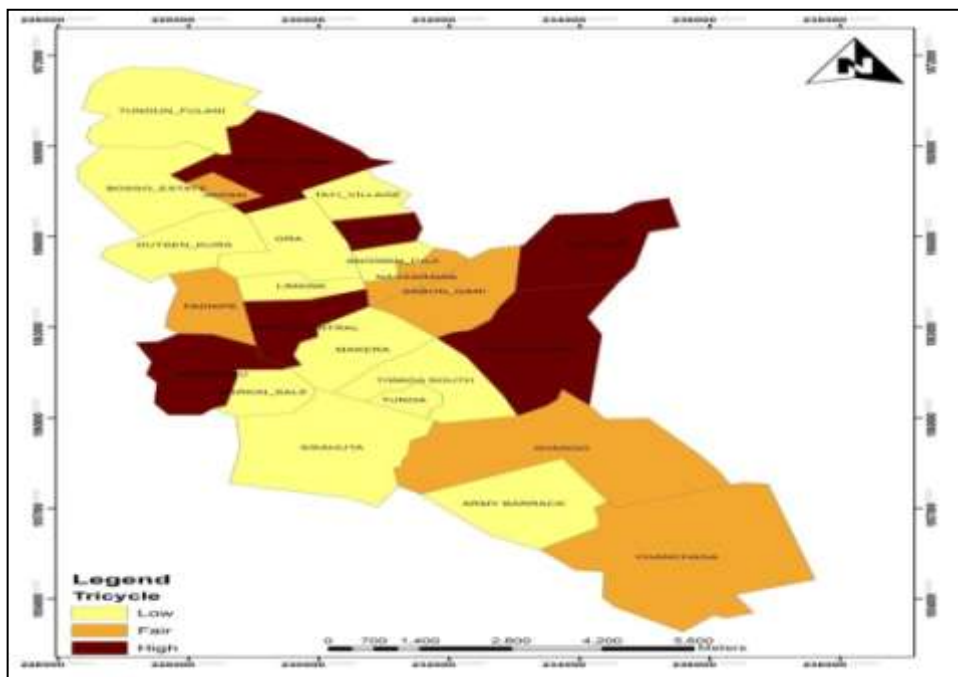


Figure 5: Neighborhood accident ranking of tricycle in Minna
 Source: Modified by Author 2016

Pedestrian accident was ranked fourth on accident type in Minna. A total of 17 respondents have pedestrian accident in Minna. The result reveals

that Bosso town, Kpakungu, Minna central, and Makera have the highest pedestrian accident among the 24 neighborhoods. These neighborhoods are centers of economic activities. The mapping for pedestrian accidents is shown in figure 6 below.

Bus accident was ranked fifth on accident type in Minna. A total of 16 respondents have bus accident in Minna according to the result. The result in table 7 also shows that, Minna central have the highest bus accident among the 24 neighborhoods, followed by Sabon Gari, Makera and Chanchaga, while Shango Sauka Kahuta, Barkin sale Tudun Fulani, Tayi village, Angwan Daji, Nassarawa, Fadikpe, GRA, Dustsen kura and Jikpen have low bus accident. The mapping for bus accident among the 24 neighborhoods is shown in figure 7 below.

Finally on accident type, truck accident was ranked sixth and last. The result shows that, a total of 8 respondents have truck accident and F-Layout have the highest truck accidents among the 24 neighborhoods in Minna. The mapping for truck accident among neighborhoods is shown in figure 8 below.

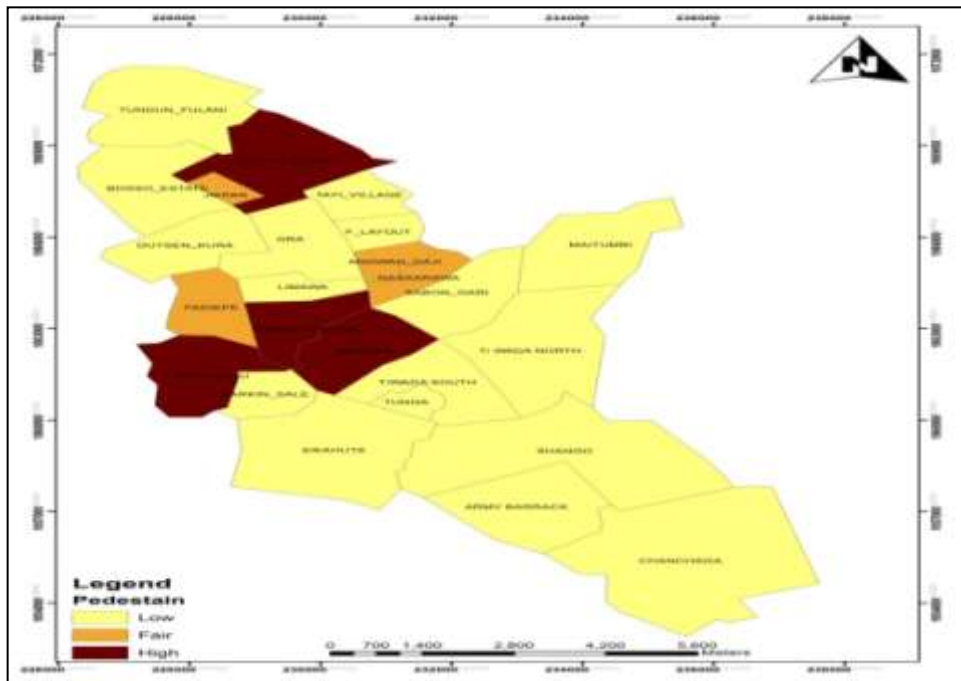


Figure 6: Neighborhood accident ranking of pedestrian in Minna
Source: Modified by Author 2016

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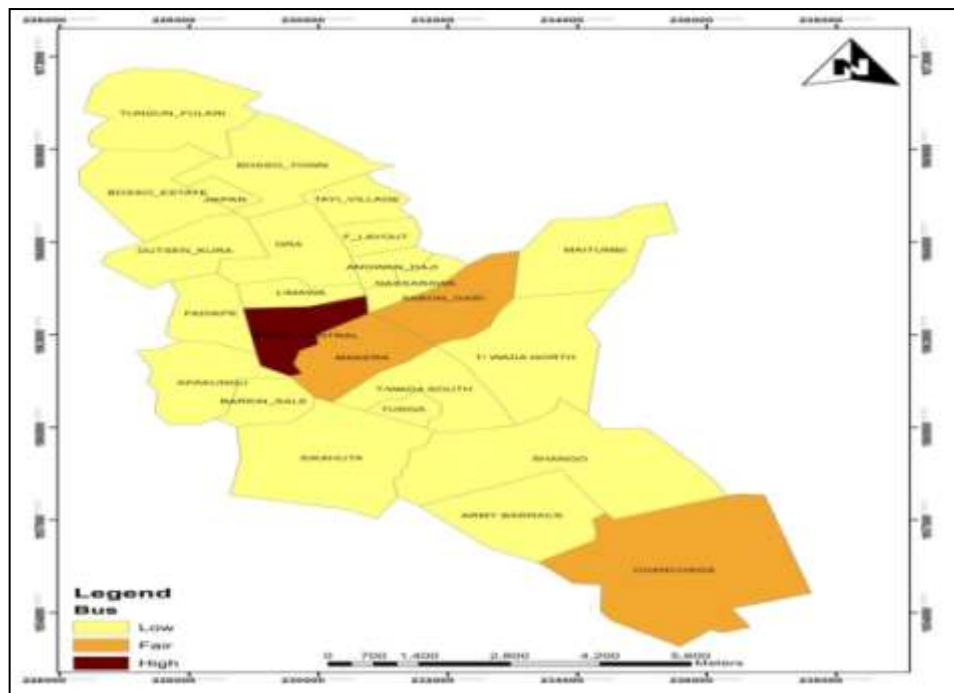


Figure 7: Neighborhood accident ranking of bus in Minna
Source: Modified by Author 2016

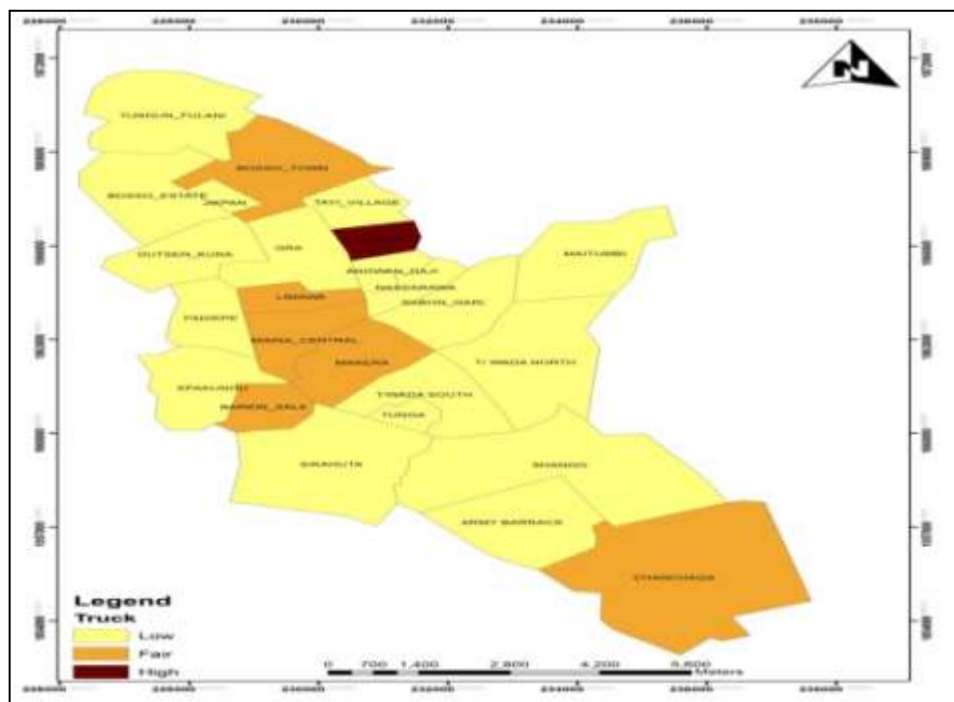


Figure 8: Neighborhood accident ranking of truck in Minna
Source: Modified by Author 2016

Table 3 Nature of Accident among Neighborhood

Neighborhood	Inside Vehicle	Outside Vehicle
Bosso town	27	14
Shango	2	0
Sauka kahuta	1	3
Barkin sale	2	1
Kpakungu	7	13
Minna central	14	5
Tudun Fulani	1	1
Chanchaga	10	2
Bosso Estate	3	2
Tayi village	0	0
Angwan Daji	2	4
Tunga	0	7
Tudun Wadan	2	3
Tudun Wadas	2	4
Makera	3	4
Sabon Gari	5	2
Maitumbi	8	5
Nassarawa	4	1
F-Layout	3	4
Limawa	2	2
Fadikpe	1	3
GRA	2	2
Dustsen kura	2	6
Jikpan	3	3
Total	106	91

Source: Author's field survey 2016

On nature of accident, table 3 shows that 27.9% nature of accident was inside vehicle and 24.1% nature of accident was outside vehicle (hit by a vehicle), this implies that 24.1% of accident victims in Minna are vulnerable road users that are hit by a vehicle on the road or by the road side. These victims depend on informal activities by the road side for a source of livelihood. And the neighborhood with the highest inside vehicle nature of accident is Bosso town, and the neighborhood with the highest outside vehicle (hit by a vehicle) is Bosso Town. The mapping for nature of accident is shown in figure 9 below.

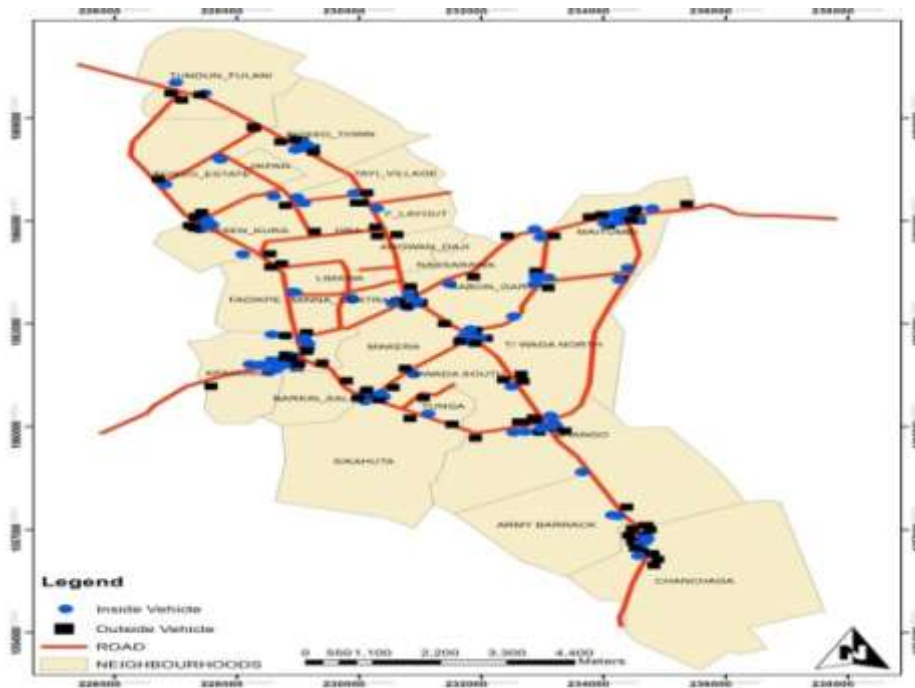


Figure 9: Nature of accident among Neighborhoods
Source: Modified by Author 2016.

Summary of finding and conclusion

1. 52.0 % of the sample size in Minna has accident.
2. On type of accident, motorcycle type of accident is rank 1st followed by car 2nd, tricycle 3rd, pedestrian 4th, bus 5th and truck type of accident rank 6th.
3. On accident nature, 27.9% nature of accident is inside vehicle and 24.1% nature of accident is hit by a moving vehicle on the road or by the road side.
4. On the black spot of accident among neighborhoods, Bosso town is rank 1st, Kpakungu rank 2nd, and Tunga rank 3rd.
5. Neighborhoods with highest rate of accidents are centers of economic activities in Minna.

The study shows that accident in Minna town is mostly cause by motorcycle which is rank 1st on type of accident in Minna town. This is because of the high level of unemployment in the town, which has resulted to high use of motorcycle by youths as a source of livelihood. The result also shows that 24.1% nature of accidents in Minna is hit by a vehicle; these percentages of victims are vulnerable road users who are mostly involved in

selling or hawking by the road side to earn a living. This is to say unemployment is one of the major causes of road traffic accident in Minna. On the black spots of road traffic accidents, the study shows that the centers of economic activities in Minna town are the black spots of road traffic accidents in the town with Bosso town, Kpakungu, and Tunga recording the highest neighborhoods with road traffic accidents in Minna.

The above information on road traffic accident source through field survey can help in reducing or preventing road traffic accident in Minna town through the following recommendations.

Recommendations

1. Urban governance should embark on sustainable economic programs that will take the people off the road to reduce road traffic accidents.
2. There is need for urban governance to decentralize centers of economic activities in Minna, by moving some schools, hospitals, Markets etc to the peri-urban areas to reduce congestion in central business districts (CBD) that bring about high rate of road traffic accidents in Minna.

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