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Evaluation of the Victims of Road Traffic Crashes Presenting in Hospitals in the Federal Capital Territory Abuja, Nigeria. A Prospective Pilot Study

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors made substantial contributions in the study design, implementation and write up. Both authors read and approved the final manuscript.

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ABSTRACT

Background: Road Traffic Crashes are indeed major contributor of disability and death globally. Accurate and reliable data on actual number of victims of road traffic crashes in various countries is required to understand the burden of road traffic crashes and to implement interventions to reduce crashes in any particular country. In Nigeria, there are often conflicting data from various agencies and sources on the actual number of road traffic crashes and the number of affected victims. This study therefore evaluates the victims of road traffic crashes presenting to the hospitals in the Federal Capital Territory Abuja, Nigeria and compares the findings with data arising from the Federal Road Safety Commission over the same period.
Methods: This was a prospective observational study of victims of road traffic crashes presenting in the hospitals in the Federal Capital Territory Abuja, Nigeria. Data of victims of road traffic collisions presenting to the hospitals in the FCT was collected from all identified hospitals, over a

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period of 3 months. Data was analysed and results presented as descriptive statistics.
Results: During the period under study, a total of 819 victims of RTC were recorded from the various hospitals across the FCT. The bulk of the patients were within (16 – 40) years (n=598{71.9%} with males constituting about 75.3% of the victims. One hundred and twenty seven (15.5%) of the injuries was fatal. About two-third of the victims were taken to the public hospitals (n = 543 {66.3%}). Majority of the victims of RTC were passengers in the motorized vehicles including motorcycle (n =410 {49%}) and pedestrians constituted 17.9% (147) of the victims.
Conclusion: This pilot study confirms the high incidence of RTC in the FCT Abuja Nigeria and the existing disparity between the data of victims of road traffic crashes emanating from the hospitals and data published by the Government agencies in Nigeria during the same period. There is the need to harmonise data from various stakeholders in an attempt to establishing a comprehensive and reliable database of victims of road traffic crashes in Nigeria.

Keywords: Road traffic crashes; road traffic injuries; injury demography; hospital-based data; Federal Capital Territory Abuja; Nigeria.

1. INTRODUCTION

Road Traffic Crashes (RTC) is a major contributor of disability and death across the globe with about 1.25 million persons killed annually and another 50 million injured from RTC across the globe [1-3]. The burden of this injury is worse in the low and middle income countries contributing about 90% of the injuries despite that less than 10% of the worlds registered vehicles are in low income counties [2,3]. Another worrisome aspect of the burden of RTC is the significant disproportionate contribution to the Disability Adjusted Life Years (DALYs) lost to injuries and death from RTC from the low and middle income countries which has been estimated to 34 million years of the Global DALYs [2,4-7].

The non availability of other efficient mass transport systems like rail transport, safe waterways transport and a reliable, affordable and safe air transport systems in Nigeria has led to the over reliance on the road transport. This therefore stretches the few existing road infrastructure in Nigeria and exposes the majority of the population in Nigeria to the hazards associated with road transportation including road traffic crashes [8,9].

The World Health Organization (WHO) in 2007 estimated that the number of deaths from RTC in Nigeria from modelled statistics was 47,865 [10] whereas the Federal Road Safety Corps (FRSC), an agency empowered to enforce road safety legislation and to regulate traffic in Nigeria reported the number of RTC in 2007 as 8141 with 4673 fatalities from the incidents [11,12]. The FRSC report of 2015 quotes the total recorded RTC and deaths in Nigeria as 12,077 and 3.18/100,000 respectively [13]. The reported low fatality rate from most African countries including Nigeria has been attributable to under reporting, missing data, and inappropriately reported data on the actual incidence of RTC in these countries [5,12,14].

The observed discrepancies in the figures estimated by WHO and that reported by FRSC in Nigeria over the years are quite significant. Currently, most of the data on RTC from Nigeria are those obtained from the records of the Nigerian Police and the FRSC with occasional input of data from some hospitals. It is believed that significant data of patients with traffic related injuries treated in the hospitals may not have been captured by in the records of the police and FRSC. This implies that the current data from Nigeria by these agencies of Government may not be comprehensive, as such may not reliability. In addition, the current data from Nigeria also often does not consider the morbidity arising from injuries from these RTCs. Morbidity from such injuries can be huge and often permanent [2-4] especially if the injuries are not properly treated. Injuries from RTC contribute significantly to the Disability Adjusted Life Years (DALYs) lost to injuries in most countries [4,7].

Data of incidents involving pedestrians, those from non-motorized vehicles and motor vehicles that occurred in the rural areas and those occurring outside the major highways are most often not captured by these enforcement agencies particularly the FRSC especially if they are not reported. The reason for this is partly due to the fact that the law setting up the FRSC restricts the agency's operations to the federal highways [15]. However, since some victims of RTC go to the hospitals and clinics on their own

for treatment of their injuries, collecting data from the various hospitals and clinics in a designated region using a uniform standardized data collection tool by all the various stakeholders including the Police and FRSC becomes imperative Combining such collected data from various groups would ensure that a more comprehensive, reliable and robust database of victims of road traffic collision in the region. Accurate and comprehensive data is required by countries, organizations and agencies for analyses, effective planning, distribution of resources and the implementation of appropriate interventional measures to reduce the incidence of RTC and to improve the outcome following RTC.

Before now, there has never been any attempt to produce a comprehensive database on RTC in Nigeria despite the huge burden of RTC in the country. This pilot study therefore represents the first attempt to collect data of deaths and injuries resulting from RTC from all hospitals in a defined region in Nigeria. It also hopes to test the usefulness of the data collection tool on RTC incidents with the aim of establishing a comprehensive database of victims of road traffic (RTC) in the Federal Capital Territory Abuja, Nigeria. The study serves as a prelude towards establishing a comprehensive National Database of RTC in Nigeria.

2. METHODS

This pilot study was designed as a prospective observational survey of all the victims of RTC presenting to the hospitals in the FCT over a period of three months from May 26, 2012 to August 25, 2012.

Following obtaining appropriate approvals from the Federal Ministry of Health and the FCT Department of Health to collect the data of victims of RTC treated in all the registered hospitals and the clinics in the FCT, identification of all the registered hospitals and clinics in the FCT data collection was undertaken.

Data of all victims of RTC presenting in all the identified hospitals in the Federal Capital Territory Abuja was collected and entered into a pre-designed WHO model of Hospital Injury Surveillance Form-Kenya by the attending medical personnel of the hospitals during the period of the study. Trained data collectors visited the hospitals for the data collation, in cases of defaulting patients, improperly completed form and or missing data as to complete the missing information from the record of the patients.

The treated patients were re-assessed at 30 days after the injury to ascertain the 30-day fatality of such RTCs. Defaulters were also followed up by telephone using the number provided by the victim or accompanying person at the time of presentation when available. The collated data from the various hospitals was filtered and analysed to produce the hospital-based data on the victims of RTC in the FCT for the 3 months period of the study. To produce a comprehensive RTC database in the FCT over the period of the survey, the obtained hospital based data was compared with the data of RTC obtained from the records of the FRSC and the Police to ensure non-duplication and data accuracy.

Appropriate approvals were obtained from the relevant Federal and Area Council Authorities to collect data of victims of RTC treated in the hospitals within their jurisdiction. Ethical approvals were also obtained from the authorities of the various identified hospitals to allow access to the records of the victims of RTC seen in their centres.

Since this study was designed as an observational survey without direct intervention or interaction with the patients, waiver for consent was obtained from the various hospitals' authorities. However, patients' identity remained confidential throughout the study.

3. RESULTS

During the period under survey, a total of 819 victims of RTC were seen in the various hospitals across the FCT.

Thirty seven (4.5%) of the victims were children under the age of 5 years while 107 (13.1%) of the victims were children below the age of 15 years. Five hundred and ninety eight (71.9%) of the patients were between 16 and 40 years, while 31 patients (3.8%) were above 50 years old as shown in Table 1.

3.1 Gender Distribution of Victims of RTC

Six hundred and seventeen (75.3%) of the victims were males and 202 (24.7%) were female giving a male to female ratio of 3:1.

3.2 Case Fatality of the Injuries

Six hundred and ninety two (84.5%) of the injuries were not fatal while 127 (15.5%) were fatal injuries.

Table 1. Age distribution of RTC victims

Age of victim (yrs)	Frequency (n)	Percentage (%)
0 – 4	37	4.5
5 – 10	34	4.2
11 -15	36	4.4
16-20	66	8.1
21-30	325	39.7
31-40	198	24.2
41 -50	70	8.5
Above 50	31	3.8
Unknown	22	2.6
Total	**819**	**100.0**

Table 2. Case mix of the injuries by location of event

Location	Non-Fatal (n, %)	Fatal (n, %)	Total
Within city municipality	444 (54.2)	40 (4.9)	484 (59.1)
Outside city municipality	248 (30.3)	87 (10.6)	335 (40.9)
Total	**692 (100.0)**	**127 (100.0)**	**819 (100.0)**

X^2= 47.36, P < 0.05

Four hundred and eighty four (59.1%) of the victims sustained their injuries within the city while 335 (48.9%) of the victims sustained their injuries outside the city as presented in Table 2. The results also showed that among the incidents that occurred within the city, 444 (54.2%) were non-fatal whereas 40 (4.9%) of the injuries were fatal. For the injuries that occurred outside the city municipality, 248 (30.3%) were non-fatal, while 87 (10.6%) of the incidents that occurred outside the city were fatal (Table 2).

Majority of the victims with either fatal or non-fatal injuries were taken to the public hospitals (n = 543 {66.3%}) while 276 (33.7%) of the casualties were taken to the private hospitals or clinics as shown in Fig. 1.

Table 3. Distribution of the vector in the RTC

Type of vector	Within city	Outside city	Total
4 or more wheeled	295 (61.0)	104 (31.0)	399 (48.7)
Tricycle	164 (33.9)	67 (20.0)	231 (28.2)
Motorcycle	12 (2.5)	151 (45.1)	163 (19.9)
Bicycle	8 (1.7)	10 (3.0)	18 (2.2)
Wheel barrow / carts	5 (1.0)	3 (0.9)	8 (1.0)
Total	**484 (100.0)**	**335 (100.0)**	**819 (100.0)**

X^2 = 185.21, P = 0.00001

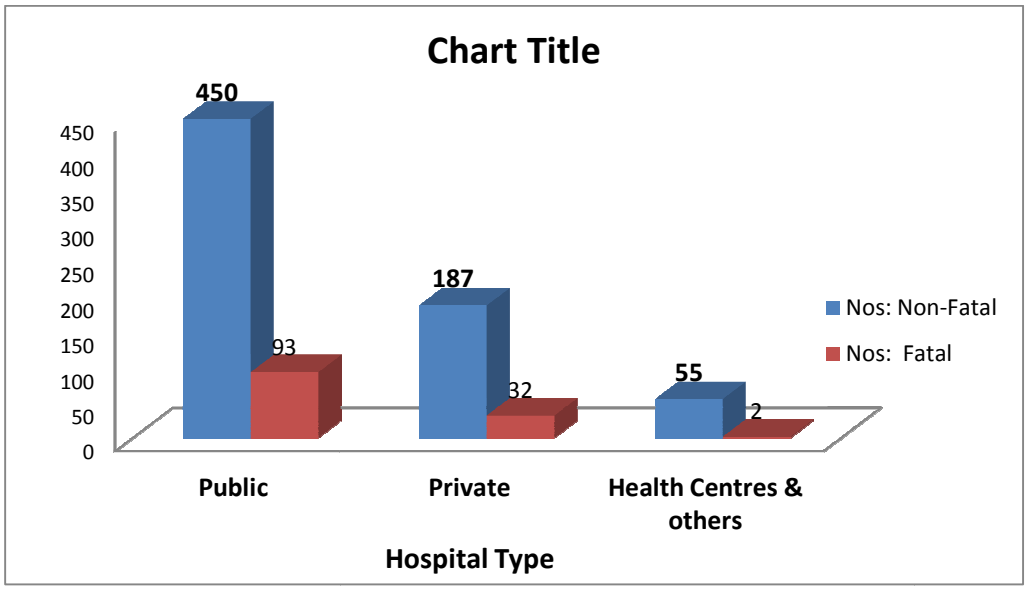

Fig. 1. Case presentations by hospital type
X^2 = 0.72 P = 0.40

Table 3 shows that three hundred and ninety nine victims (48.7%) sustained their injuries from RTC involving four or more wheeled vehicles while tricycles caused 231 (28.2%) of the injuries. Motorcycle collisions caused 163 (19.9%), 18 (2.2%) of the incidents involved bicycles and 8 (1.0%) were caused by wheel barrows and carts.

Fig. 2 shows the role each victim played in the incidents. There were 410 (49.0%) passengers, 147 (17.9%) pedestrians, 172 (21.0) motorcyclists and 99 (12.1%) drivers amongst the victims of RTC seen at the hospitals

Table 4 shows the RTC data from FRSC in the FCT over the corresponding period. The injured were 280 (85.11%) and the number killed were 49 (14.89%) as compared to the corresponding number of casualties recorded from this study over the same period.

Table 4. Comparative data of RTC in the FCT over same period from FRSC

RTC victims	FRSC frequency (n,%)	Current study frequency (n,%)
No. injured	280 (85.11)	692(84.50)
No. killed	49 (14.89)	127(15.5)
Total	**329 (100.0)**	**819 (100)**

$X^2 = 0.068$, $P = 0.79$

4. DISCUSSION

The Pilot study clearly showed that injuries resulting from road traffic collision in the Federal Capital Territory (FCT), Abuja are high, and this is being underestimated, going by records from government agencies like FRSC. With an estimated population of about 2 million persons in the FCT this gives an injury prevalence rate of 41/100,000 of the population during the three months of the survey. This is however a significant shift from the 41/1000 population earlier reported by Asogwa in Nigeria [16]. The recorded 127 of deaths from RTC in this study give a case fatality rate of about 28 deaths per 100,000 from RTC. The recorded fatality and injury from this study, contribute a significant portion of the 1.25 million global deaths and 50 million global injuries from RTC and annually [1,2,4].

The observed figure compares well with the estimated figure of 33/100,000 published by the WHO in 2009 [2,12] and the 2015 Global status report on road safety estimates of 26.6/100,000 for the road traffic mortality for Africa [2].

Some of the reasons identified for this high rate of traffic injuries include increase in vehicular population and traffic density in the FCT from relative improvement in the economy in the country following the era of oil boom of the eighties, and the increasing rural to urban migration which is common in many developing countries like Nigeria. In addition, the state of roads especially within the city and on the high ways around the FCT which are among the best in the country has been blamed as a factor in the aetiology of RTC [17]. Earlier studies in Nigeria have indicated that the provision of good quality and standardized roads have been accompanied by increased road crashes [18,19]. This is totally contrary to the trends observed in countries with better sophisticated road network and higher vehicular traffic volume [20].

It is well established that “good quality” road on its own does not cause crashes. However, good quality of the roads encourages over speeding among the reckless drivers especially where there is limited or non-enforcement of speed limits. It is worth noting that smooth surfaced road is not synonymous with good quality road. It is observed that there are few speed calming infrastructures such as breakers on the roads especially those within and around the FCT, inadequate and inappropriate road signage, limited number of overhead bridges, absence of speed cameras at strategic locations and inadequate enforcement of speed limits on these roads being described as good quality. These factors appear to contribute to the high number of RTC in the FCT. Since good quality roads cannot cause collisions on its own, it is rather the reckless attitude of the various road users that are the major contributors to the observed RTC [17]. As shown by this study, even the pedestrians are not exempted from this reckless behaviour on the roads as they contributed to 147 (17.9%) of the victims. Pedestrians often cross major highways without the use of pedestrian overhead bridges even when available without ensuring that the roads are free from vehicles on high speed.

This study clearly confirms that active young adults between the ages of 16 to 40 years who are the livewire of the economy constituted the majority (71.9%) of the RTC victims (Table 1). The impact of this on the national economy which is already struggling to achieve set indices can only be imagined. This corroborate the reports of WHO and the World Bank [1,2] on RTC which confirms road traffic injuries as a

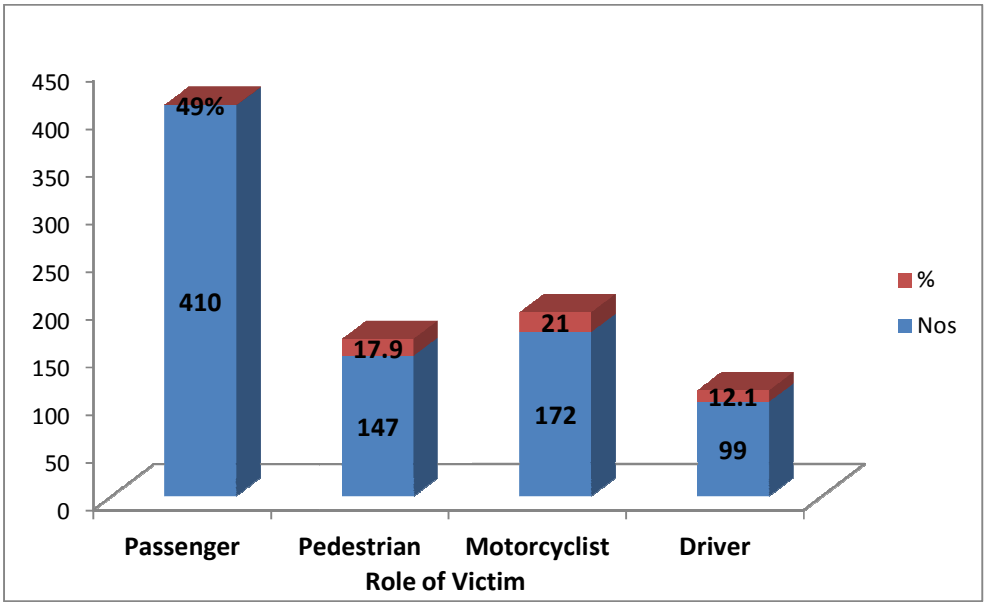

Fig. 2. Role of victims in RTC
X^2= 172.703, P < 0.00001

growing public health issue which affects the vulnerable groups of road users, including the poor. The observed pattern also confirms that more than half the people killed in traffic crashes are young adults aged between 15 and 44 years who often are the bread winners in their family [1,2]. This may be attributed to higher risk exposure of this particular age group. Even children below the age of 15 years are not spared of the menace as they constituted about 14% of the victims thus emphasizing the need for advocacy and implementation of child safety measures on Nigerian roads.

This study showed that passengers in the vehicles and pillion riders on motorcycles who are often the non-active role players were the more at risk (49%) when compared with vehicles drivers and motorcycles riders who are the active road users and all together constituted about 51% of the injured (Table 4). This finding is consistent with the observed global pattern [1,2]. This is not surprising as the recklessness of one commercial 18-seater bus driver can jeopardize the safety of his multiple passengers [21]. Report from the FRSC shows that the 18-20-seater passenger mini-vans used for commercial transportation is the highest contributor to injuries and deaths from RTC in Nigeria [13].

This study showed that RTC involving 4 wheeled vehicles was higher within the city municipality than outside the city (Table 3). This can be attributed to the ban on the use motorcycles for commercial purposes within the city municipality. One particular trend observed in this study is the low rate of injuries from collisions involving motorcycles within the city municipality. In the contrary, there is a rise in the number of injuries arising from tricycles called *Keke NAPEP* in the local parlance which appears to have replaced motorcycles as a means of commercial transportation in certain areas of the city municipality. This observation emphasizes the need to ensure that the drivers of these tricycles are properly trained on appropriate driving skills. This is more so as the majority of the drivers of tricycles for commercial transportation were the former riders of motorcycles for commercial purposes who just acquired tricycles as the means of livelihood without obtaining any form of training in the requisite driving skills following the ban on the use of motorcycles for commercial purposes within the city municipality [21]. In this study it was observed that a higher number of victims of RTC occurring within the city municipality where persons of higher socio-economic class are than that from RTC occurring in the sub-urban zones outside the city which inhabits more persons of lower socio economic class. This is at variance with reports from other parts of the world where the rates of RTC are higher amongst persons in the lower socio economic strata [22–25]. Abdalla, and colleagues observed that the road crash and injury rates are almost twice as high in the most deprived areas

as compared to the most affluent areas in the Lothian region of Scotland [22]. This in FCT, Nigeria would compare fairly to the sub-urban areas outside the city municipality and the areas within the city municipality respectively. Other studies in Sweden [23], Canada [24], and the United States of America [25] have found that low social status is associated with a higher rate of involvement in road traffic crashes. Reasons adduced for this pattern include the fact that low social status is associated with a higher risk exposure as such higher chance of becoming involved in road crashes than high social status. The difference in the injury incidence rates among different socio-economic status is particularly large with respect to pedestrian injury. In this study, the observed difference between the two zones of the city is also partly due to injuries resulting from tricycles (*Keke NAPEP*), motorcycles (*okada*), wheel barrows and carts which are more common outside the city. In addition, whereas the population density and risk exposure in the sub-urban areas are much higher when compared with that in the urban city municipality, the increased rural to urban migration for search of better livelihood especially in the FCT ensures higher traffic density in the city municipality especially during the working and rush hours of the day.

Another particular findings from this study is the number of injuries resulting from collisions involving non-motorised vehicles such as bicycles (n=18 {2.1%}), carts and wheel barrows (n=8 {1%}). The roles of both agents as vectors in the aetiology of RTC appear to have been neglected before now. To ensure a comprehensive data on RTC, data on injuries resulting from both agents of transportation should be captured especially as there is increasing call for the use of bicycles as means of improving healthy lifestyle [26–28].

The result of this pilot study showed a clear disparity between the figures reported by the Federal Road Safety Corps (FRSC) over the same period [21]. The observed fatality following road crashes in this study for a single city is a far cry from the figure of 4 deaths per 100,000 populations recorded for Nigeria in 2011 [11] and the 2 deaths per 100,000 population projected for Nigeria by the FRSC for the year 2015 [13]. Reports from other African countries quote less than 7.6/100,000 population confirming that FRSC is not alone in this under estimation of RTC incidents. In fact the FRSC report of 2015 reports the total RTC and deaths in Nigeria as 12,077 and 3.18/100,000 respectively [15] which is a far cry from the estimated values of 26/100,000 by the World Health Report 2015 [2]. Advanced western countries such as USA, UK and Germany have an average death rate of less than 10 per 100,000, with the UK having the death rate of 5.4 deaths per 100,000 [21]. The lower figures reported from African countries have been blamed on under reporting, inappropriate data collection on traffic collisions and injuries in the region [5].

Globally, official (police-reported) road accident statistics in most countries are incomplete, inaccurate and often biased. European Transport Safety Council evaluation of pattern of traffic related injuries in 15 member states showed that the reported number of injuries among all road users who sought medical treatment for an injury, including deaths, in 1995 was 1,580,000, whilst the estimated true number was 3,500,000 [29].

In the case of FRSC in Nigeria, reasons for this report gap may be that the FRSC only recorded the incidents and victims of RTC occurring on the major federal highways whereas those RTC that occurred outside the major highways and on the sub-urban roads may be missed especially if they are not reported. In addition, since the majority of the victims of RTC are often “walking wounded”, there is the possibility that a good number of this category of victims could have walked away from the crash sites before the arrival of the officers of FRSC.

Another worrisome aspect aside the under reporting of injuries and death from RTC by the law enforcement agencies is the misclassification of injuries. Such misclassification in official injury statistics can have profound implications in the understanding the overall incidence of injuries and their severity as well as for assessing the actual outcome, cost and consequence of road casualties. Simpson found that the police classified too few injuries as serious and too many as slight [30]. When Simpson adjusted both variables for misclassification and for incompleteness of the data, they observed that the effect of misclassification was even greater than that of underreporting. Misclassification and under reporting of the incidence and injuries from RTC is not only limited to the developing countries such as Nigeria, even the developed countries have a fair share of the problem. Morris et al. [13] in the UK showed the converse in terms of misclassification of injury severity. About one third of vehicular occupants classified as serious by the police had either no or minor injury according to the Abbreviated Injury Severity

scale [31]. Similar studies in Spain, showed that the number of serious victims in official road accident statistics represented only 68% of the victims admitted to hospitals, which was the term used by the police to define serious injuries [32,33]. Even in the US, 49% of the drivers coded by police as having incapacitating injuries actually had sustained just minor injuries [34].

The problems of under reporting and misclassification of injuries from RTC underscores the need to have a comprehensive and robust approach to data collection on the incidence RTC rather than relying only on the data from law enforcement agencies such as FRSC.

Such endeavour will entail combining the RTC data from various relevant stakeholders such as the FRSC, the traffic police, the hospitals, the mortuaries and the Insurance companies. Doing this effectively will require the use of a well designed data collection tool which should capture the victim's name, telephone numbers, time and location of incidents as part of Core Data set. Preferably the same collection tool should be used by all the various identified agencies responsible for data collection on RTC in the region. By this way the chances of double counting during data combination and harmonisation from various sources will be minimized [14]. This will improve the validity of the data from various agencies in Nigeria.

One drawback of this study is that this is a pilot evaluation over a limited period. Extension of the study over a longer period will show a clearer pattern of RTC variation over seasons of the year. In addition, the issue of incomplete data was encountered during data collection, which threatens the validity and reliability of the observations. This resulted from apathy and non-compliance of the staff of the hospitals receiving the victims of RTC. A good number of the hospitals that participated in the survey did not complete the data collection tool provided for victims of RTC treated in their hospital. Despite contact by telephone and the daily visits of the data collectors to each of the identified hospitals in the FCT, only few of the hospitals called to notify the Central Data Collection Office whenever they received victims of RTC. An essential revelation of this pilot study is the need to include the telephone numbers of all victims of RTC received in the hospitals on the data collection tool for such surveys or surveillance. The provided telephone numbers allowed follow-up of the victims even after discharge from the hospitals by telephone calls to complete the questionnaires in cases of incomplete data. This also allowed the determination of 30-day follow up of the victims who had been discharged from the various hospitals as to determine the 30-day fatality. The telephone follow up was made easier in this study as over 75% of persons in Nigeria including the FCT have access to telephones as at the time of the data collection [35].

Another important issue highlighted by the pilot study is the need to establish comprehensive surveillance system on RTC incidents and resulting burden of RTC in Nigeria, and the need to have the same standard data collection tool for the various relevant stakeholders such as the FRSC, traffic police, the hospitals and the mortuaries in the country. This will ensure that data from Nigeria on RTC is more comprehensive, more valid and more reliable.

5. CONCLUSION

This pilot study brought out the need to undertake a nationwide project to establish a comprehensive database of RTC and its burden in Nigeria. Prior to the commencement of such a nationwide survey, there will be the need for widespread advocacy on the project across the nation, appropriate training of the data collectors and sensitization of all the various stakeholders who should also contribute to the modification of the existing questionnaire if necessary. This will encourage ownership of such tool to be used for such program.

Various governments at the Federal, State and Local levels should be encouraged to contribute towards the funding for the establishment of such of RTC database in their annual budget. There should also be the need to involve international and national Non–Governmental Organizations (NGOs), and international donor agencies for their support in such programmes. Such Collaboration should also be extended to global agencies such as the United Nation (UN), WHO and the Academia for their expertise on the establishment of effective surveillance systems of RTC in the country. Such a project if properly executed will help in planning remediation strategies and interventions, policy promulgation and implementation to reduce the burdens of RTC in the country and certainly improve the reliability and acceptability of data on RTC published from Nigeria.

CONSENT

It is not applicable. Since there was no direct intervention on the patients or alteration of existing protocols of the participating hospitals, consent to participate in the study from the patients was waived.

ETHICAL APPROVAL

Study was approved by the Authorities and Ethical Review Committee of the Federal Ministry of Health Nigeria, the Health Administration Department of the Federal Capital Territory Abuja, Nigeria and the Management of various hospitals in the FCT Abuja Nigeria according to Helsinki Declaration 1975.

AVAILABILITY OF DATA AND MATERIAL

The data that support the findings of this study are available from the office of the UN Decade of Action on Road Safety and Injury Prevention Nigeria but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of the authority of UN Decade of Action on Road Safety and Injury Prevention Nigeria.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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