

# Road Traffic Crash as a Public Health Issue in Nigeria: *Review*

## *Article*

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### **Abstract**

Road Traffic Crashes continues to pose significant menace globally. The burden of road traffic crashes is worse in the middle and low income countries like Nigeria despite that the region has less than 10% of global vehicles. The situation in Nigeria is even more worrisome as the country continues to rank low in World Health Organization indices for road traffic safety. Despite efforts of various government agencies towards implementation of policies and regulations to reduce the incidence of RTC on Nigerian roads, the number of crashes witnessed on various roads in Nigeria remains high. There has been reported decrease in the number of road traffic crashes, injuries and deaths from RTC from the Federal Road Safety Commission in Nigeria over the years. This reported decrease in RTC and its consequences still require validation by reliable data which is yet to be available at the moment in Nigeria. The aim of this review is to appraise the current trends in the incidence of road traffic crashes and its consequences in Nigeria and efforts to reverse the persisting pattern in the country.

### **INTRODUCTION**

Transportation has liberated man and makes man more mobile, resulting in the increase on the reliance of more comfortable and faster vehicular movement. Unfortunately, this has also led to fatalities on man with associated disabilities [1]. The road is the most frequently used mode of transport, and as such presents the most disturbing repercussions from its use. The advent of motorised transportation by man came with the benefits of faster and more effortless means of movement as well as associated and occasionally devastating consequences such as road traffic crashes (RTC). The first death recorded due to a mechanical vehicle mishap in the USA was in 1899 [2]. Before this case, an earlier death of Mary Ward had been recorded in 1869 in the United Kingdom involving a steam engine powered vehicle [3]. In Africa, history of road traffic crashes has not been very encouraging when compared with those from developed countries [4]. Since the first crash recorded in Nigeria, crash rates remained low for half a century, due to the low vehicular density [5]. However, the improvement in the economy due to the oil boom in the 1970’s led to an increase in crash rates as vehicular ownership reportedly increased by about 183% between 1978 to 1987 [6]. The economic down turn of the later 1980s in Nigeria, led to decrease in the number of new roads constructed and poor maintenance of road infrastructure. Thus, there were fewer safe motorable roads for increasing number of vehicles. Presently the situation has been exacerbated by the lack of effective alternative modes of transportation; as such about 90% of passengers and freight rely on the road network in Nigeria. These have led to increase in the risk exposure and resultant increase in the rates of road traffic crashes [1]. Globally, road traffic crashes is an issue of great concern and is estimated to be one of the greatest single cause of death. Fatalities from automobile crashes are much lower in developed countries when compared to developing countries, which incidentally have far lower density of motorised vehicles in relation to the population [7]. Road Traffic Crashes (RTC) in developing countries has been estimated to cost from 1% to 5% of the Gross National Product (GNP) of most of the countries’ scarce resources [8]. Nigeria is the most populous country in Africa, with population currently estimated to be about 190 million persons. The vehicular population in Nigeria is estimated at nearly 7.6 million and an estimated total road length of about 194,000 kilometres making Nigeria the country with the second largest road network in Africa in 2011 [1] [9]. The country has a varying population density distributed in both urban and rural areas, translating to a population-road ratio of about 860 persons per kilometre. This indicates the intense traffic pressure on the existing road network, and contributes to the alarming rate of road traffic crashes in the country [9]. Nigeria unfortunately continually features low in the World Health Organization (WHO) country rankings of road safety. The country was ranked 149 out of 178 member states in 2009 [10] and 163 out of 172 member states in 2014 [11] on road

safety indicating the hazards associated with road transportation for a country that depends largely on its road network for nearly all its socio-economic activities.

The almost non existence of other efficient means of mass transport systems like rail transport, safe waterways transport (especially considering the large body of water in various parts of the country) and reliable, affordable and safe air transport systems encourages over reliance on the road transport thus stretching that mode of transport. This exposes the majority of the population in Nigeria to the hazards associated with road transportation including traffic crashes. [1][12].

The 2009 WHO estimate of road traffic mortality for African countries including Nigeria is 32.2 deaths per100,000 population [10] while the 2015 Global Report on Road Safety estimates the mortality from RTC for African countries as 26.6 deaths per100,000 population [13]. Most reports from African countries including Nigeria however quotes less than 7.6 deaths per100,000 populations [14]. In fact the Federal Road Safety Corps (FRSC) an agency of the Federal Government of Nigeria with the mandate to regulate and enforce road safety issues in Nigeria reported the total recorded RTC and deaths in Nigeria in 2015 as 12,077and 3.18deaths per100,000 population respectively [15]. This is a far cry from the estimated values of 26.6 deaths per 100,000 for African nations by WHO [13,14]. The fatality rate of highly populated countries in Asia such as China, India and Indonesia is about 50% less than that of Nigeria. The reported average death rate from RTC in more advanced western countries such as USA, UK and Germany are less than 10 per 100,000, with the UK having the death rate of about 5.4 deaths per 100,000 [9]. The lower figures reported by African countries have been blamed on under reporting, inappropriate data collection and missing data on traffic collisions and injuries in the region [13], [16].

The burden of RTC impacts hugely on the disability-adjusted life years (DALYs) which is the measure of years of life lost due to premature mortality or disability, and is used to assess the burden of disease or public health incidents. In 2013, there was about 15% increase in the number of deaths from 47.5 million to 54.9 million due to disease burden globally [17]. Whereas RTC is the 9<sup>th</sup> leading cause of death globally by the WHO 2004, published estimates in Nigeria show that RTC is the 11<sup>th</sup> leading cause of death [18]. This ranking of RTC as a cause of death in Nigeria is expected to change as the nations addresses the burden from childhood infectious diseases and malnutrition.

Approximately, 90% of all global road deaths and DALYs lost to road crashes occur in low and middle income countries [19]. Fifty per cent of these deaths are among young adults in the age range of (15-44) years. Road traffic injury is the second leading cause of deaths among persons between the ages of (5-29) years [20]. The risk of injury and death from road traffic crashes in Nigeria just as in other parts of the globe is not limited to vehicle drivers and cyclists, pedestrians and passengers who are often passive players on the road are also at risk. In about half of the cases the vehicle occupants and pillion riders on motorcycles are less vulnerable to injuries and death than the pedestrians, pedal cyclist and motor cyclist who have been described as vulnerable road users [21].

### **AETIOLOGY of RTC**

Of all the factors identified as contributory to the causation of road crashes globally and particularly in Nigeria, human factors are the most predominant. Identified human factors include reckless and wrong driving habits with some elements of selfishness, use of phones while driving, over speeding, wrongful overtaking, insufficient distance between cars, reversing faults, driving on the wrong lane, unqualified but licensed drivers, unlicensed drivers, illiterate drivers who cannot read road signs, and drunk driving [23, 24]. Ineffective enforcement of traffic rules, poor vision, and non use of appropriate motion and injury restrains are also identified factors [25]. The environmental causal factors may include defective roads either in the road design, poor construction or inadequate road infra-structures, fallen trees, illegal road blocks and sudden weather changes [24]. The identified mechanical factors may be in the form of aged and non-road worthy vehicles and worn out tyres. [23].

Rumar using British and American data showed that in the aetiology of RTC, 57% were solely due to driver errors, 27% were due to road and driver factors, 6% due to vehicle and driver errors, 3% were solely due to road factors, and 3% due to contribution of all factors combined[25]. This finding was also confirmed by Aaron and Strasser [26]. Up to 93% of RTC are attributable to driver error, intoxication and other human factors such as driver behaviour, poor visual and auditory acuity, poor decision making ability and slow reaction speed [27]. The re-orientation of human behaviour is a major challenge that must be considered in the bid to reducing road traffic crashes particularly in Nigeria, especially when one considers the level of aggression and frustrations exhibited by various road users on Nigerian roads.

A major contributor to traffic crashes particularly on the Nigerian roads include over speeding which again points to recklessness and often irresponsibility on the part of vehicle drivers [15]. It is a well established fact that even when RTC involving vehicles on low speed occurs, the resultant fatality and injuries from such incidents are much lower as compared to when the incidents involves vehicles on high speed [28]

Whereas the role of human factors in the aetiology of RTC particularly in Nigeria cannot be disputed, the quality of roads and road infrastructures also contribute to the carnage on the roads. Unfortunately, highways in Nigerian have been described as among the worst and most dangerous in the world [26]. To reduce crashes in Nigeria, the quality of roads and road infrastructures should be improved on the existing roads and the new roads being built, while vehicles should be better designed as to account for and tolerate errors when operating in daunting conditions and during crashes.

The quality of roads and road infrastructures that exist in any particular country may be directly linked to political decisions, budgetary constraints and influences. Since funds are required to provide good roads, appropriate road infrastructures and adequate advocacy campaigns on road safety issues, budgetary allocations for road and road infrastructures should be amongst priority for various government administrations, since this by intuition have direct association with the rate of collisions occurring on the roads. This certainly may be some of the reasons for the sharp difference in the rates of RTC between the high-income countries and middle and low income countries like Nigeria. Poor funding in Nigeria frustrate efforts of government ministries and parastatals in the attempts to improve the quality of roads and infrastructures which ultimately will reduce the number of RTC. Furthermore, bureaucracy in the award of government contracts, marred by irregularities and cost inflations has made the provision of quality infrastructure that could reduce the volume of road traffic crashes daunting. [15].

In Nigeria, particular vehicles have been identified as the most associated with higher number of collisions [15]. These vehicles include articulated vehicles used for movement of goods and services usually at night and the (18 to 20) seater commuter buses used commonly for commercial transportation during the day. What is more worrisome is that despite identifying these vehicles as the major contributors to RTC in Nigeria, little efforts have been made to regulate their usage on Nigeria roads as a way to check the increasing menace arising from their usage. Whereas the outright ban of these vehicles may not be the pragmatic option, policies on the appropriate use of these classes of vehicles will go a long way to ensure that the hazards they pose to road users in Nigeria are reduced to the barest minimum.

### **Socio-Economic Burden of Road Traffic Crashes (RTC)**

It has been shown that apart from the public health problems associated with RTC, the economic burden resulting from road traffic injuries (RTI) can be quite huge. The economic loss to RTC accounts for 1% to 5% of GNP of most countries. A global economic cost was estimated at \$518 Billion per year in 2003 with \$100 billion of that occurring in poor and developing countries including Nigeria [28]. It has been estimated that Nigeria loses about 80 billion Naira annually to road crashes [29] [30]. In the developing countries where the average national economic growth is often low, a drop in national GDP in the excess of 5% is capable of throwing the national economy into recession [31]. It has been shown that the cost of road traffic injury (RTI) is estimated to be about US \$65billion in low – income and middle – income countries, which is more than they receive in developing assistance [32].

Fortunately, since most of the causes of RTC and RTI are preventable and as such controllable, the occurrence and persisting rise in the rates of RTC on Nigerian roads can be directly or indirectly attributable to man's actions and inactions. Söderland and Zwi using a multiple regression analysis confirmed that GDP per capita is positively correlated with traffic-related deaths per 100,000 population, but negatively correlated with traffic deaths per 1,000 registered cars [33]. This implies that in per vehicle terms, income reduces road crash fatalities. They showed that GDP per capita and health expenditures as a share of the national GDP are associated with a declining rate of fatal injuries among road users. Anbarci and colleagues using a (unbalanced) cross country panel data set with in total 1,356 country-year observations for the period (1982-2000) in 23 countries from Africa, 12 from the Americas, 26 from Europe and 16 from Asia, interestingly found that corruption, as measured by the international country risk guide, significantly increases the occurrence of fatalities in relatively poor countries [34]. The authors speculate that corruption in this sense happens through forged driving licenses, bribery to escape punishment for traffic offences, low enforcement of rules and regulations, as well as low enforcement of optimal vehicle maintenance and security. Unfortunately, these vices are rife in Nigeria. The

persisting poor ranking of Nigeria on the global corruption index over the years would imply that the high rate of RTC recorded in the country may be partly attributable to corruption based on the observation of Anbarci et al [34]. .

### **Psycho-socioeconomic consequences of traffic crashes**

These huge financial losses from RTC articulated above are direct quantifiable cost of RTC. The indirect costs from psychological trauma, social disintegration and segregation among those disabled by RTC may be difficult to quantify especially in a developing country like Nigeria. A sizable proportion of persons involved in RTC develop psychological symptoms. The most severe form is post-traumatic stress disorder (PTSD) described in Diagnostic and statistical manual of mental disorders (DSM-IV) [35], which has been associated with high grade of impairment in everyday life for those affected. The occurrence of PTSD does not appear to be correlated with the severity of the actual injury, but rather with the perceived subjective threat to life. Post-traumatic stress disorder (PTSD), is characterised by intrusive thoughts and memories, avoidance and hyper arousal after exposure to a life-threatening situation or a severe life event. Ursano et al, [36] and Bryant et al [37] found a prevalence of 25% PTSD at three months and 18% at six months respectively after the traffic accident. The economic impact of PTSD following a traffic crash may be under estimated. Matthews found that persons with PTSD following RTC had significantly more problems to return to work than those without PTSD [38]. The victims had higher levels of depression, reduced time-management ability and an excessive concern or anxiety related to physical injuries. The author concluded that this can be an indication for the need for financial stability and therefore a potential for therapeutic value in return to work post-trauma. It has been observed that of persons that are involved in road traffic crashes in Nigeria, 29.1 per cent suffer disability and 13.5 per cent are unable to return to work following the incident [29]. The figures from Nigeria may be related to the quality of medical care the victims received following the incident as well as the level of socio-economic support provided to the victims from relevant government, societal and family groups especially with the extended family system practiced in Nigeria just like in most African countries.

Other socioeconomic costs to the victims include cost of hospitalisation, long-term care and rehabilitation for survivors, losses from material damage, police and rescue service, production loss, and welfare loss from investigation cost. The cost of care in Nigeria is often borne by the victims or their immediate family especially with the low implementation of the national health insurance in the country. This is one reason that justifies the need for the establishment of some form of insurance scheme for the vulnerable road users in Nigeria.

Møller Danø showed that traffic injuries are associated with significant differences in the labour-market outcomes between injured persons and matched controls; and that the effect of traffic injuries on disposable income varies by age [39]. The author however observed that after 6 years of RTC, young injured persons do not seem to have a lower disposable income than non-injured persons in contrast to older persons who have significantly lower earnings than older non-injured persons. The average employment rates and earnings decline sharply for men and women in the year of the road crash and remain lower for up to 6 year after the incident as compared to matched control without RTC.

Rodriguez, found that 3% of victims with an Injury Severity Score (ISS) greater than 25 never go back to work, another 6% need to be retrained to a different type of work, and 13.4% are partially disabled, but may be able to work reduced hours [40]. In the Nigerian situation, the prevailing high unemployment rate puts survivors with disability resulting from RTC at less advantageous position to compete with uninjured persons for the few available jobs slots. This contributes to the woes of victims of RTC in Nigeria.

### **Impact on families**

In Nigeria just like in most African countries, the burden of crashes is borne not only by those directly involved in traffic crashes but also by their families and the wider society. The European Federation of Road Victims in 1993 found that 90% of the families of dead victims and 85% of the families of disabled victims declared a significant, and in half the cases even dramatic, permanent decline in quality of life and or standard of living [41]. This situation is worsened if the victim is the bread winner of the wider extended family as is often the case in Nigeria [24].

The study from Europe [41] also observed that a large proportion of the relatives of dead and disabled victims, as well as the disabled themselves, suffer psychological disorders such as the PTSD already described, including anxiety attacks (46%) and suicidal feelings (37%) even up to and after 3 years of the RTC incidents. About 60%

of the relatives of dead victims, 80% of the relatives of disabled victims and 70% of the disabled themselves who changed occupation did so because they were forced to by the circumstances. Among those who lost their jobs, about 65%, and 33%, respectively, did so for psychological reasons and for physical reasons [42].

## **PUBLIC HEALTH ROLES IN RTC PREVENTION** in Nigeria

The traditional role of the health sector in RTC/ RTI had been in injury surveillance and in the post-crash phase as to avoid death and disability. Currently the health sector plays key role in advocacy, research and implementation of evidence based practices for trauma care and rehabilitation. The WHO advocates that effective preventive strategies exist and need to be adopted through multi-sectoral approaches with the health sector playing unique and vital roles [22]. It is now well established that the greatest negative consequence of RTC is its deleterious effect on lives and wellbeing of the victims, as the economic consequence of RTC resulting from damages to vehicles and other properties accounts for about 25% of its effects [43]. The economic strength of the economies of most developed countries is often greatly tied to the wellbeing and the quality of the available human resources. It is on this premise that governments and institutions of various governments including Nigeria should see the menace of RTC as a serious and challenging public health issue.

The WHO had outlined the roles of public Health sector in the prevention of RTC as follows:

Injury surveillance, research, advocacy and evaluation; others are services, prevention control and policy promulgation [44]

The most commonly used paradigm in the injury prevention field is the Haddon Matrix, developed in 1970 by William Haddon [45]. The matrix considers factors related to personal attributes, vector and the environment before, during and after an injury or death. The framework provides evaluation of the relative importance of different factors to enable appropriate intervention designs.

### **qsaInjury Prevention Strategies**

These following ten items are often called "Haddon's Strategies" clearly describes the possible ways of preventing injury during the various phases include:

#### **A typical Haddon Matrix [46]**

##### **Pre-event activities**

1. Preventing existence of the agent
2. Preventing release and availability of the vector agent.
3. Separation of the agent from the host/potential victim.
4. Provision of protection for the host/potential victim.

##### **Event**

1. Reduction of amount of agent present
2. Control of release pattern of the agent, minimizing damage.
3. Controlling the interaction between the agent and host to minimize damage.
4. Increasing host resilience to the agent.

##### **Post-event**

1. Provision of a rapid treatment response for host/victim.
2. Provision of treatment and rehabilitation for the host/victim.

Improving care before the injured victims reaches a hospital is also important. About 50% of deaths from RTC occur within minutes at crash sites or en-route to the hospitals, while 15% of the deaths from RTC occur in the hospitals within 4 hours of injury and 13% of the deaths from RTI occurring after 4 hours of the incident [46].

The import of this confirms that appropriate and efficient post crash response within the initial 4 hours of the incidents has the potential of reducing deaths from RTC and RTI by over 65%. It has been shown that efficient implementation of effective emergency medical and ambulance services globally has the potential of reducing deaths from RTC by up to half a million annually [43]. The risk of dying from RTC in any particular country is greatly a function of state of the pre- hospital response and care in that particular country. Unfortunately, in low and middle income countries including Nigeria, most deaths following RTC occur before the victims reach the hospitals. The risk of dying before reaching the hospital also correlates fairly with the socio-economic status of the victim in developing countries such as Nigeria [47]. The RTC victims who are of higher socio-economic status tend to get to the hospital earlier than the victims of lower socio economic status. This discriminatory selection of response to victims of RTC is primitive, should be discouraged and confirms poor state of the pre-hospital care that exists in the developing countries including Nigeria. Every victim should be entitled to optimal pre hospital care irrespective of their status.

Furthermore, the quality and intensity of trauma care in a country influences the survival of road crash victims. The improvement of emergency care services and post-crash response reduces the mortality and morbidity resulting from RTC. Grimm and Treibich, found that an increase by 1% in the number of nurses per 1,000 inhabitants led to a decrease by 0.23% of road related deaths per 100,000 population [48]. This implies that the addition of one more nurse per 1,000 population would lead to a 6% decline of road traffic fatalities, thus saving the life of one additional victim per 100,000 population per year. This is important in a country like Nigeria where nurses and available healthcare responders are very few.

The training of 1<sup>st</sup> responders at the site of crash also contributes to reduction in traffic related deaths. Since most of the conditions leading to death following RTC such as, airway control, massive external bleeding and transient apnoea are conditions that can be controlled with basic first aid methods [47]. Mock et al showed that a 6 hours training of commercial drivers in Ghana showed improved ability to provide basic first aid to the injured at the site of the crash such as improvements in the ability for crash site management from 7% to 35%; ability to provide basic airway management from 2% to 35%; ability to control external bleeding and splint injured limb from 4% to 45% and 1% to 16% before and after training respectively.

Part of the efforts to reducing RTC include efficient post crash activities in Nigeria should include appropriate post crash legislation, investigations, prosecution and punishment of identified traffic offenders. It is known that appropriate post crash investigation to identify the actual cause of the crashes, as well as the prosecution of identified traffic offenders and appropriate penalties for convicted offenders will serve as deterrent to other potential offenders thus contributing in the reduction of RTC in the country [43]. Incidentally, this aspect of post crash activity which has been shown to help in the prevention of RTC was not included in the matrix originally advocated by Haddon. In Nigeria as well as most developing countries, this aspect of RTC prevention should be effectively implemented with the provisions of relevant legislation and enforcement of such laws by the various relevant agencies. This shift in the existing paradigm confirms the continuous evolution of processes, policies and ideas as man continue to develop and climb the evolution ladder even in the development of faster and more pleasurable means of transportation on the roads.

## CONCLUSION

Road traffic crashes are among the greatest, perhaps the greatest of the nation's public health problems. There is the need to review the current approaches to safety management and to assess the various deficiencies resulting in the inability to properly manage the problem of road traffic collisions in the Nigeria. Recommendations to strengthening the current approaches to safety management should include initiatives that will lead to drastic reduction of the carnage from road traffic collisions on Nigerian roads. While emphasis should be focused on advocacy and other campaigns to prevent RTC incidents, efforts should also be made towards improvement on the quality of available roads and road infrastructures as well as improvements in the post crash responses including medical care such as pre-hospital care, efficient ambulance system and in-hospital emergency care in the various health facilities in Nigeria. In addition, effective post crash investigation, prosecution and punishment of identified traffic offenders will help to reduce the incidence of the global menace of RTC on Nigerian roads.

## RECOMMENDATIONS

Recommendations on reducing the volume of RTC in Nigeria include;

1. Intensive safety education and public awareness and behavioural changes of among road users, especially drivers.

2. Improvement in the annual budgetary provisions for the improvements on quality of roads and road infrastructures in Nigeria
3. Improvement of response time to scenes of crashes and activities to reduce mortality and morbidity from RTC.
4. Resource development of the FRSC and relevant stakeholders to better prevent and reduce the occurrence of RTC in Nigeria.
5. Provision of dedicated “funds” for the early treatment of victims’ of road crash in Nigeria. This can be included as part of the Road Funds Bill before the National Legislature.

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