ISSUES AND CHALLENGES OF ROAD TRAFFIC ACCIDENTS IN NIGERIA: A REVIEW

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Abstract

From the review of the developments in road traffic accidents, it shows that road traffic accident studies has experienced gradual but progressive growth from some what amorphous descriptive study to its present status of an academic field of study with much more innovations of new techniques. It is evident from the review that there are distinctions between road traffic accident developments in developed and developing nations due to differences in their socio-economic development. Given the huge burden of road traffic accidents and their public health importance and the general public outcry, there is need for more sustained intervention efforts that go beyond public pronouncements and ad-hoc activities such as setting road-blocks or short term crack down in vehicles not road worthy. Such efforts should address broader road safety policy issues on the various underlying causes. For this to happen, it is important to enlist political will and commitment for road traffic injury prevention.

Introduction

The historical development of the highway dates back to the period 3000B.C. when the Romans first constructed roads built of stones. These roads in some places were as thick as 3 feet. Modern roads as we know them today are however, more recent dating to the middle of the 19th century. In most nations, the impact of both the highways as well as the railways where applicable, have been most significant in transforming the spatial forms of settlements and economic activities from the second half of the 19th century to the first half of the 20th century (Bolade, 1991).

Road transport is a catalyst of urban, rural and national development. It is a catalyst by facilitating the movements associated with urban and national development and providing the means by which goods and services are made available to industry and consumers, creating opportunities for social and economic interaction and employment. Indeed, transport could be said to be the key means of giving expressions to policy initiatives in such areas as health, education, employment, etc. Without transport, access to these facilities would not be possible and the services they provide not consumable. Transport is what gives life to development (Oni, 2001; Atubi and Onokala, 2003). On the other hand, one of the unavoidable negative consequences of transport in Nigeria is the road traffic accidents. Transport is a major cause of death in Nigeria. According to Aderemo (2004), urban environment are the most prone to major traffic accidents because 75% of traffic accidents takes place in built-up areas or cities.

Odedokun (1991) also identified the various negative consequences of high accident rate on the urban environment. These include drainage of foreign exchange, loss of present and future manpower resources, inability to fulfill social obligation, creation of widows and orphans, among others. As long as urban areas continue to increase the level of the use of the

automobile, so shall the rate of accident continue to be on the increase. Roads in built-up areas display higher accident rate up to three times greater than other roads in other environment (Hoyle and Knowles, 1998).

CONCEPTUAL AND METHODOLOGICAL ADVANCES

The epidemiological model of road traffic accident

The concept was exposed by Dart and McKenzie (1982). It was developed and used in medical services, but was modified and used in accident study. Road traffic accident is a multifaceted phenomenon with diverse causal factors. The effectiveness of any road safety measures hinges squarely not only on the application of the complex nature and multi-dimensional aspects of road accident occurrence, but also on how the numerous causal factors can be manipulated to reduce traffic accidents on the roads.

Road Traffic Accidents as a transportation problem is complex because of the interactive nature of the system and components involved (Worthman, 1976; Atubi, 2009). Adamu and Iyaniwura (1981) holds that the road traffic system is made up of three components, viz:

1. The road user – human
2. The vehicle-mechanical
3. The road-environment

The collective action of these components is a system where each is functioning independently so as to complement the function of the others in order to realize a desired result. Any defect or malfunctioning in one of the three components may result in a defect in the entire system which may lead to a breakdown and could cause road traffic accident (see Fig.3.1).

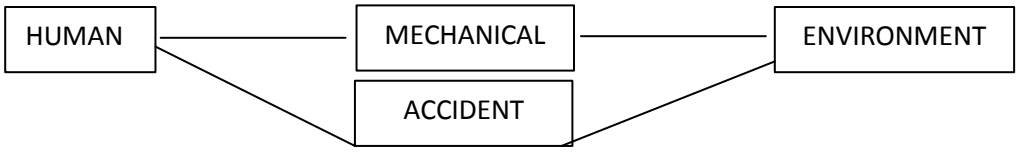

Fig.3.1: Epidemiological model of Road Traffic Accident
Source: Dart and McKenzie, 1982. p.118; Adapted from Jegede, 1989, p.68.

According to the epidemiological concept, the "HOST" is the person or persons involved in the road accident. The human factor is superimposed in other traffic accident causation factors because he is the one who designs, develops and maintains roads and vehicles, hence human factor is the prime mover of roads traffic accidents. The "Agent" or "Mechanical" is the motor vehicle, while the "Environment" is the sum of the physical and social conditions that contribute in one way or another to the occurrence of the traffic accident (Dart and McKenzie, 1982). In as much as these factors jointly or individually contribute to traffic accidents on the roads, attempt can be made within the framework of this concept to determine the relative contribution of each of the three factors.

Accident prediction models

Accident prediction models (APM) such as Accident risk and Transportation network safety analysis are extremely useful tools for safety analysis of transportation facilities, as

they have a wide range of application. The issues of using accident counts as a measure of accident risk has been investigated by Mahalel (1986). Similar flows could be attributed to different combination of density and speed, leading to different accident risk values. In essence, this method shows that road traffic accident risk should be estimated solely from accident prediction models, which describe the proper relationships between road traffic accidents and the traffic flow (Kennel, et al., 1992; Zang, et al., 1998).

As suggested by Jackett (1993), the prediction of collisions on links could be separated into two components: Mid-Block Component Models predict the number of accidents between minor intersections located in the physical network. The intersections component models estimated the number of accidents of these minor intersections (Lord, 2000; Lord and Persaud, 2002; Persuad, et al., 2002).

The Accident Prediction Models were applied on a hypothetical network that was built with the help of a computer software called EMME/2 (INRO, 2002). This software is a transportation planning computer program that is often used to assess traffic flows at a regional level. It is based on the traditional 4-stage transportation modeling process (trip generation, trip distribution, modal split and traffic assignment). It has been applied in various traffic safety studies (Chatterjee, et al., 2002; Hall and Pendleton, 2002; Zhou and Sisiopiku, 2002; Atubi, 2006).

DEVELOPMENTS IN ROAD TRAFFIC ACCIDENT STUDIES

With respect to Nigeria, the development of highways has a very profound effect on the spatial organization of her national economy. Simultaneously, accidents and the associated problems have equally accompanied these developments.

Accidents are classified into minor, serious and fatal. Fatal accidents are cases involving death; serious accidents are cases involving hospitalization, while minor accidents are cases not involving hospitalization.

In addition to the many environmental hazards that threaten transportation system, transportation itself presents hazards to people, property and the environment. Road traffic accidents are the most common example, and the majority of transportation casualties in most countries can be attributed to road accidents. The contributing factors for road accidents are typically classified into those associated with the driver which includes error, speeding, inexperienced and blood-alcohol-level. Factors associated with the vehicle include the type, condition, and centre of gravity. Environmental factors include the quality of the infrastructure, weather and obstacles. The majority of road traffic accidents are attributed to driver factors (Evans, 1991; Ogunsanya and Waziri, 1991; Atubi and Onokala, 2005; Atubi, 2007), and this holds for many other modes such as boats (Bob-Manuel, 2002), bicycles (Cherington, 2000), snow mobiles (Osterom and Erikson, 2002), and all terrain vehicles (Rogers,1993).

In the 1970's, road safety research began following a number of requests for help from developing countries. Initially, the research was directed at determining the magnitude and nature of the road accident problem. Subsequently, to meet the need to find practical solutions, emphasis was placed on Automobile safety regulations, where it was concluded that because of the lack of data on the benefits of road safety measures, improvements are introduced on a pilot basis and evaluated before being implemented nationwide (Griffeth, et al., 1976; Leob, 1975). Fouracre, et al., (1976); Jacobs, et al., (1975); Jacobs and Fouracre, (1977) reported on the rates and cost of road traffic accident, road

users-behavior and traffic accidents. It was concluded that, on the whole there are wide differences between developed and developing countries in the behavior, knowledge, attitude and culture of the road users, in the conditions of the roads and the vehicles, and in the characteristics of the traffic. Consequently, the effectiveness of transferring some developed country solutions to developing countries is uncertain and their appropriateness needs to be considered in relation to the problems and conditions prevailing in individual countries (Graham, et al., 1975; Naatanen and Summala, 1976; Hills, et al., 1977).

The issues of speed control and road traffic accidents in the developed nations emerged in the 1980's and 1990's. Although, the relationship between speed and road traffic accidents is a complex one; in general, the higher the speed of a vehicle, the higher the probability of becoming involved in an accident and the greater the likelihood of more severe injuries sustained. The energy dissipated during a collision of a vehicle is directly proportional to the vehicles weight and to the square of its speed. Therefore, increased speed results in more energy dissipation which translates into greater damage to the vehicle and more severe injuries to the occupants (Nilsson, 1981; Finch, et al., 1994). While the speed control and road traffic accidents issues were central in developed countries in the decades of the 1980's and 1990's, issues of pattern of road traffic accidents and accident reduction factors and causal inference in traffic safety were foci of research agenda of urban transportation in the developing countries. For instance, patterns of road traffic accidents received attention (see Bangdiwana, et al., 1985; Akpoghomeh, 1992; Asogwa, 1992; Baker, et al., 1987; Gbadamosi, 1999). Afukaar (1997), Odero (1995) investigated the trends in the analysis of road traffic accidents in developing countries, such as Nigeria, Malaysia, Ghana and Kenya respectively. Also, Afukaar (1995) examined the characteristics of pedestrian road traffic accidents in Ghana, and Onokala (1995) treated effects of landuse on road traffic accidents in Benin-City.

Some of the areas of research interest in the field of urban transport in the 1980's and 1990's are still being intensified in the decades of 2000s. For instance, speed control and road traffic accidents as well as patterns of road traffic accidents, especially in the developing countries and particularly in Africa and Asian countries which have considerably higher road accident fatality roles, often by more than 10 times, than European or North American countries (Afukaar, 2000; Nathens, et al., 2000; Arreola-risa, et al., 2000; Afukaar, 2001; Quansah, 2001; Higar, 2002; Nantulya and Rerch, 2002; Nantulya and Rerch, 2003; Atubi and Onokala, 2009; Atubi, 2010).

It has been estimated that over 300,000 persons die and 10-15 million persons are injured every single year in road accidents throughout the world (Afukaar, 2001). Detailed analysis of global accident statistics indicates that fatality rates per licensed vehicle in developing countries are very high in comparison with the industrialized countries. Moreover, road traffic accidents have been shown to cost around one percent of annual gross national product (GNP) resources of the developing countries which they can ill-afford to lose (Afukaar, 2003).

Road traffic injuries are major cause of mortality worldwide, but especially in low and middle income countries. The World Health Organization estimates that more than 3000 people are killed everyday in road traffic accident globally, with at least 30,000 others injured or disabled. This adds up to over 1 million people killed and between 20-50 million injured or crippled in road traffic accident each year (Krug, 2000). Low and middle income countries accounts for more than 85% of the deaths and up to 90% of disability globally (Murray *et al.*, 2001). At the

current rate, it is projected that road traffic disability adjusted life years lost will move from being the ninth cause of disability adjusted life years (DALYs) in 1990 to the third leading cause by 2020 (Krug, et al., 2000)(see table 1).

Table 3.1: The ranking of 10 leading causes of deaths in the world

	1999 (disease or injury)	2020 (disease or injury)
1	Lower respiratory infections	Ischaemic heart disease
2	HIV/Aids	Unipolar major depression
3	Perinatal conditions	Road traffic injuries
4	Diarrhoea diseases	Cerebrovascular disease
5	Unipolar major depression	Chronic obstructive pulmonary disease
6	Ischaemic heart disease	Lower respiratory infections
7	Cerebrovascular disease	Tuberculosis
8	Malaria	War
9	Road traffic injuries	Diarrhoea diseases
10	Chronic obstructive pulmonary disease	HIV/AIDs

Source: WHO, 2000, p.36

In another development, the rising trend in morbidity and mortality rates due to road traffic injuries in low and middle income countries has moved some to declare road traffic injuries an "epidemic" (Nantuyla and Rerch, 2002) describing it as a 'war' in the road. The global costs of road traffic accidents is about $518 billion annually is U.S. dollars and ranges in percentage of GNP from 0.3% in Vietnam to almost 5% of GNP in the U.S.A., Nigeria, Malawi and South Africa (Jacobs, et al., 2000).

Reducing road traffic accident is truly a global challenge and succeeding will require the involvement of multiple stakeholders at the global, national and community levels (Atubi, 2008).

Specific proven and promising interventions for developed and developing countries on road traffic accidents

Experience in developed countries shows that multiple program and policy initiative can produce a rapid decline in deaths associated with road traffic injuries. Interventions such as the use of seatbelts, child car seats, motorcycle helments, enhanced enforcement programs, alcohol control policies and traffic calming have all proved effective in reducing traffic injuries and preventing crashes in high income countries. Policies of the developed countries however, cannot simply be transferred to low and middle income countries because vulnerable groups at risk and the cultural, socio-economic and political contexts in low and middle income countries are different (Nantulya, et al., 2002; Nantuyla, et al., 2003). Furthermore, approaches shown to be effective in developed countries may not give similar results in the developing world (Evans and Brown, 2003; Atubi and Ugbomeh, 2009).

It is important to realize that the full benefits of most of these interventions and strategies may not be realized when they are applied alone and must, therefore, be complemented with others. For example, the mere presence of a seat belt in an automobile may not suffice for effective intervention unless complemented with public education and enforcement by law enforcement officers. Additionally, many specific interventions and strategies require some administrative infrastructure for implementation, epidemiology for planning and prioritizing and some fundamental programmatic requirements

(Trinca, et al., 1988; Atubi and Ewhrudjakpor, 2008).

Seat Belts

The seat belts is an example of an active intervention for occupants because it requires some action on the part of the user. Its effectiveness in preventing injury and death in motor vehicle collisions has been well established by many earlier research studies (Mueller et al., 1988; Federal Road Safety Commission Highway Code (1997) as well as recent ones (Rivara *et al*, 2000; The Guardian Newspaper, July 2nd , 2005. p.14). Seat belts are estimated to reduce motor vehicle fatalities by 50% and serious injury by 55%, seat belts are useful as an intervention for traffic injury intervention in low-income countries (LICs) because they are affordable and their implementation is feasible. In order to derive the maximum benefit from seat belt, however, several stringent strategies are required. Such strategies include mandatory seat belt laws, public education on the benefits of seat belts and legislation on the availability of functional seat belts in vehicles. A few studies in some low-income countries have reported some successes and failures with seat belt use (Jessie, et al., 2000; Hauswald, 2000).

Motorcycles Helmets

Just like seat belts have proven effective in motor vehicle crash related injury reduction, motorcycle helmets have proven effective in motorcycle crash related injury reduction making motorcycle helmet law a strategy with proven effectiveness (Watson, et al,, 1980; Mcswain, et al., 1985). In fact, recent research findings in settings other than the United States corroborate the evidence for effectiveness of mandatory motorcycle helmet laws (Tsai, et al., 2000; Conrad, et al., 2001). The acquisition of motorcycle helmets is well within the budgets of the people who can afford motorcycles in these countries. In addition, promulgating motorcycle helmet laws has been associated with significant decreases in mortality and injuries sustained from motorcycle crashes (Fasakin, 2000; Fasakin, 2002; Atubi and Ali, 2009). When a motorcycle is acquired, purchase of an approve helmet should be encouraged or even mandated in low-income countries (LICs) given the feasibility and potential sustainability of this intervention.

Speed limits and other traffic calming strategies

Speeding on highways is a major cause of traffic crashes. The effect of speed on causing traffic related crashes, injuries and deaths has been documented in many settings (Farmer, et al.,1999; Posada, et al., 2000). For example, the 1995 speed repeal of the Unites States National maximum speed limit, allowing states to raise interstate speed limits, resulted in a 15% increase in fatalities in 24 states that raised speed limits. In Adelaide, Australia, the risk of severe crash involvement was found to increase as vehicle speed increased (Moore, et al., 1995). A study in columbia attributed 34% of traffic related mortalities to speeding, alcohol consumption or both. Speed limits have shown proven effectiveness in reducing traffic injury and death and should be encouraged in low-income countries. In fact, the over 20% reduction in traffic crashes and deaths in Brazil has been partly attributed to speed limits, which have been posted on many roads since 1998 (Polidefigueiredo, 2001). Not surprising, both advisory and mandatory speed limits of 20mph in urban areas are being contemplated in Edinburgh, United Kingdom (Gorman, 2001).

Public education targeting motorists

Although, the findings from a 1999 study revealed the ineffectiveness of driver education for young drivers (Vernick, et al., 2001), there is some evidence that general public education along with some behavioural modification that targets motorist may have some impact on road safety. One area is education of motorists on posted traffic signs. A recent study in three countries i.e. United States, Sweden and United Kingdom, showed that comprehension of 28 posted traffic signs for drivers was related to years of driving experience (Al-Madani, 2008). Another area might be education about the need for vehicular testing and vision testing. A Nigerian study found a third of taxi drivers to have poor vision (Alakija, 2003).

Conclusion

Irrespective of numerous obstacles, researchers on road traffic accidents have made notable advances with a clear indication of bright prospects. Its analytical techniques are constantly being sharpened and its methodology is in consonance with current developments in the social sciences. The fact that there are still wide viable frontier and challenging problems which the current researchers are confronting evidently shows that the sub-discipline is alive and evolving.

Finally, in the light of the above, road traffic accident studies will in all probability continue to experience conceptual developments at the academic level and will at the same time demonstrate its relevance to the solution of practice problems.

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