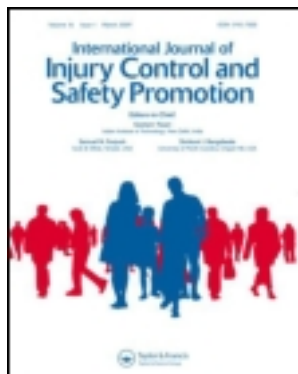


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### The rate of compliance to seat belt usage among automobile drivers on three categories of roads in Nigeria: an observational survey

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## ORIGINAL PAPERS

### The rate of compliance to seat belt usage among automobile drivers on three categories of roads in Nigeria: an observational survey

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Injuries to head, chest and abdomen are a major cause of death for unrestrained vehicle occupants, particularly the drivers. The use of seat belts therefore plays a significant role in reducing the severity of injuries. The study examined the compliance rate of seat belt use on different road hierarchies in Abeokuta (Nigeria) using an observational method. Findings indicated that there was 54%, 37.3% and 13.6% compliance rate on three categories of roads studied. Also, females complied more with the use of seat belts on each of the roads with compliance rates at 43.3%, 47.2% and 50% compared with males who had 32.6%, 38.6% and 39.6% seat belt compliance rates. Chi-square analysis showed significant variations in the use of seat belt on the roads ( $p < 0.05$ ). The paper suggests increased awareness and enforcement of traffic laws among others in order to ensure sustainable use of seat belts among motorists in Nigeria.

**Keywords:** roads; seat belt; compliance

#### 1. Introduction

Globally about 1.2 million lives are lost to road crashes annually (WHO, 2004). Most of these deaths results from poor-driving behaviour, deteriorating road infrastructure as well as weak enforcement of traffic laws, among others. In most developed countries, the majority of those killed in road crashes are drivers and passengers in cars. For instance, vehicle occupants accounted for as much as 80% of all traffic deaths in the United States (IRTAD, 2008). The most frequent and most serious injuries to frontal occupants unrestrained by seat belts are to the head, followed by, in order of importance, the chest and then to abdomen.

Since 1960s, studies conducted throughout the world have shown conclusively that seat belts save lives, when worn and fitted correctly. A review of research on the effectiveness of seat belts found that their use reduces the probability of being killed by 40–50% for drivers and front seat passengers and by about 25% for passengers in rear seats (Elvik & Vaa, 2004). While seat belts do not prevent a crash from taking place, they play an important role in reducing the severity of injury to vehicle occupants involved in a collision. An occupant's chances of survival increases dramatically when appropriately restrained.

Though extensive studies on transportation planning and safety have been conducted in Nigeria (Arosanyin, 1999; Ayeni, 1975; Fadare & Wojuade, 2007; Ipingbemi, 2008; Ogunjumo, 1986), few studies have examined the level of seat belts compliance among motorists in the country since the law mandating the use of seat belt began in 2004. This study, therefore, assessed the rate of compliance of seat belt use among drivers on three different categories of roads in Abeokuta, Nigeria. This introduction is followed by a literature review in Section 2. Section 3 is on the study area and methodology while data presentation and discussion are examined in Section 4. The way forward is in Section 5 and the last section is the conclusion.

#### 2. Literature review

Most of the deaths and injuries that occur in road crashes results from injuries to head, chest and abdomen. When a crash occurs, the unrestrained front occupants either hit (collide) their body against the dashboard or are ejected through the windscreen. FIA/WHO (2009) has identified three types of collisions that occur during a crash. First, there is the collision that involves vehicle and another object, while the

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second occurs between the unbelted occupants and the vehicle interiors (e.g. driver hits his chest on the steering wheel or head on the windscreen). The third type of collision occurs when the internal organs of the body hit themselves against the chest wall or the skeletal structure. It is the second collision that is mostly responsible for severe injuries. The driver of the vehicle is either catapulted forward to hit the interior of the vehicle (steering or window) or completely ejected from the vehicle. Ejection increases the probability of sustaining severe injuries or being killed (Elvik & Vaa, 2004). For instance, 75% of all vehicle occupants ejected from a vehicle in a crash die as a result (NHSTA, 2006).

The rates of seat belt use are governed to a large extent by the law requiring seat belt to be fitted and use as well as the level of enforcement. In many low-income countries, the rates of use are generally low compared to high-income countries. In most European countries and the United States, seat belt use rates are very high. For example, in 1995, about 70% of light-vehicle drivers used seat belts on urban roads in Norway and in the United Kingdom, seat belt use rate was 90% after making seat belt use compulsory in 1993 (Elvik & Vaa, 2004; Evans, 1991). National statistics from the United States and Ohio City also show that overall seat belt use rate was about 82% in 2006 (Corner, Xiang, & Smith, 2010). However, heavy commercial vehicles have a lower seat belt use rate of 64% (Cook, Hoggins, & Olson, 2008). Also, in most of these countries, the older population (up to 70 years) and women have a higher compliance rate (FIA/WHO, 2009). On the other hand, in developing countries, the rate of compliance to seat belts use is generally low. For instance, in Ghana, the compliance rate was 41% in 2005, whereas in Namibia, in 2007, wearing rates varied across the country from 14% in rural areas to 73% in the country's capital city (GRSP, 2007). In Saudi Arabia, the overall compliance rate is 27.8%, while in the two cities of Bam and Juroft in Iran, the rates of seat belts use are 21% and 31%, respectively (Bendak, 2007; Mohammadi, 2009). Furthermore, Sangowawa et al. (2010) in their study of seat belt-wearing rate in Ibadan Metropolis (Nigeria) found that only 31% of drivers used a seat belt; with more females using their seat belts compared to men. Findings from earlier study in Kosofe Local government in Lagos State on the use of seat belts also showed that more females used seat belts compared to males (Fadare, 2009). The study also indicated that the use of seat belts was minimal at night and early in the morning when the law enforcement agencies were not on duty. The reasons for wearing seat belts include, among others, fearing penalty and safety precautions, while those who do not use it identified feeling trapped,

discomfort and situational conditions as their reasons (Cook, Hoggins, & Olson, 2008; Simsekoglu & Lajunen, 2008). The major drawback of these studies is that assessment of seat belt wearing was done only on single road type. It is therefore difficult to assess the spatial variation in compliance rate on different road hierarchies.

Seat belt use is approximately 50% effective in preventing fatalities in crashes in which motorists would otherwise die. It is estimated that seat belt use prevented about 15,200 deaths in the United States in 2004 (NHSTA, 2005). Between 1975 and 2000, the United States saved US\$588 billion in casualty costs due to seat belt use (ACEP, 2002). For instance, the annual economic savings due to seat belt usage increased from US\$1.5 million in 1975 to US\$49.9 million in 2000. Also, if 90% of motorists in the United States used seat belts, it will save \$5.2 billion a year in legal, medical and productivity costs (CDC, 2010). Presently, in the European Union, seat belts reduce driver fatalities by 40% (ETSC, 2007). If all the European Union countries were to achieve a 99% wearing rates for drivers, 2400 lives would be saved each year. Furthermore, seat belt use is associated with significant decrease in mortality rate, hospital charges, length of stay and ventilator requirements among others (Rutledge et al., 1993). In spite of the usefulness of seat belts, its continuous use has been found to be associated with a medical disease known as Seat Belt Syndrome<sup>1</sup> (Hefny, Al-Ashaal, Bani-Hashem, & Abu-Zidan, 2010).

On the other hand, failure to use a seat belt is a serious traffic risk. Aside from human suffering, the financial burden of increased deaths and injuries can have a major impact on the finances of victims' families who will be responsible for the resources that are required to manage road crash victims during and in the aftermath of a crash. This has a lot of implications for the national economy. For instance, road deaths and injuries from non-use of seat belts costs American society an estimated US\$26 billion annually in medical care, lost productivity and other injury related costs (ACEP, 2002).

### 3. Methodology and the study area

Both primary and secondary data were utilised for the study. The primary data were collected through an observatory survey. Both published and unpublished works were used for secondary data. The researcher also worked closely with Ogun State Traffic Enforcement Agency (TRACE). This organisation was established by Ogun State government in March, 2005, with the purpose of ensuring effective administration of road traffic laws in the state. Section 15(1) of the law that established TRACE also made provision for the setting up of Mobile Traffic Courts that are expected to

facilitate speedy trials of traffic offenders. The courts are to be presided over by magistrates who shall sit at places to be determined from time to time for the purpose of imposing fines or terms of imprisonments as the case may be. The TRACE is also expected to complement the efforts of the Federal Road Safety Commission (FRSC) and the Nigerian Police.

In this study, three categories of roads were used, classified as Trunk A road (Abeokuta–Ibadan road), Collector road (Lafenwa–Itoku road) and Access road (Aderupoko road). A 7-day volumetric count of cars was carried out on each category of roads to determine the traffic volume and level of compliance of seat belts usage. All observations were made during the daylight between 8.00 am and 6.00 pm to ensure the visibility of seat belt use. A team comprising two members took the volumetric count while the second team of two members observed the drivers of the passing cars to record their compliance with seat belt use as well as their sex. The team recording seat belt compliance had their location very close to a road bump on both Lafenwa and Aderupoko roads, while on Ibadan–Abeokuta road, the location was where there is large pothole (road failure) across the road. Both locations slow down the speed of vehicles so as to provide the traffic surveyors the opportunity to assess drivers that comply with the use of seat belt.

Abeokuta, the study area which is also the capital city of Ogun State of Nigeria, lies between *latitude* 7° 6' 00' N–7° 12' 00' and *longitude* 3° 16' 00'–3° 25' 30' E. The city is about 81 km south-west of Ibadan, capital of Oyo State and 106 km North of Lagos. Abeokuta is predominantly inhabited by the Yorubas (Egbas). The city has been growing due to the political, economic and social structure in the country. The tempo of the growth was further reinforced by systematic concentration of state and federal government projects and institutions within the town. The demographic consequence of these processes is the growth in population of the city from 187,292 in 1963 to 376,884 in 1991 and 235,389 in 2006 (NPC, 2006; Onakomaiya & Gbadamosi, 1999).

Agriculture has been the traditional mainstay of the economy of the people with cassava, yam, maize, kola nuts and palm produce as the dominant crops grown. Secondary and tertiary activities like stone quarrying, construction, trading and transportation services have however attracted a substantial percentage of the population away from agriculture. Abel (2009) reported that the first of the industries was the agro quarrying that opened in 1904, since then other industries such as saw milling, asbestos and ceramic manufacturing industries have been established.

The construction of the rail line in Nigeria, which started in 1889, reached Abeokuta in 1898 resulting in

the construction of a railway station at Lafenwa. The railway as a mode of transportation has played a catalyst role in the socio-economic development of the city. Besides, the city is also linked by trunk 'A' roads with important settlements within and outside Ogun State. Examples of such roads are the Lagos–Abeokuta expressway and Abeokuta–Ibadan road. The city in its entirety is linked with a network of roads. The major roads are primary roads that link the city with other regions or large settlements within or outside the state. The minor roads provide the link between the major and access roads. The city public transport system is dominated by road transport mode with the taxicab being the most effective urban transport mode. The use of motorcycles is very recent and its flexibility has made it second to none in the urban transportation system in Abeokuta, resulting in over 100% growth between 2005 and 2009 (Ogun State Internal Revenue Board, 2009). However, few buses ply interstate routes; speed boats and canoes are also used extensively in the riverine areas of the state.

#### 4. Presentation of results and discussion

This section presents findings from the observational survey of seat belts use among motorists (car drivers) in Abeokuta.

##### 4.1. Volume of cars traffic and the use of seat belt on Abeokuta–Ibadan road

Table 1 presents daily variation in traffic volume and the level of compliance to seat belt use throughout the week. The highest level of traffic was recorded on Friday with 16,158 private cars, while the least traffic was on Sunday with 12,934 cars resulting in average daily traffic (ADT) of 15,040 private cars for the 7-day period. The high level of traffic on Friday may be as a

Table 1. Volume of traffic of cars and seat belt compliance along Ibadan–Abeokuta road.

Days of the week	Traffic volume	Percentage of seat belt use		Percentage of seat belt use by gender	
		Use	Not use	Male	Female
Monday	15,589	60	40	37	42
Tuesday	15,732	62	38	36	41
Wednesday	15,053	57	43	33	40
Thursday	15,664	49	51	35	38
Friday	16,158	58	42	27	46
Saturday	14,152	47	53	27	48
Sunday	12,934	45	55	28	51
Average	15,040	54	46	31.8	43.7

Note: Source: Author's field survey, 2009.

result of the need of families working outside Abeokuta to return home and spend the weekend with members of their families. The lower traffic volumes on Saturday and Sunday are expected because these are work free days that typically restrict the movement of people.

With respect to seat belt compliance, 54% of the drivers on average complied with the use of seat belt throughout the period of analysis. The highest rate of compliance was recorded on Tuesday with 62% closely followed by Monday with 60%, and the least compliance rate was on Sunday, which recorded 45%. The high level of compliance in the early part of the week is associated with the belief that most traffic agencies are more effective at the beginning of the week. Therefore, most drivers wear their seat belt during this period. Further observation by the researcher showed that most drivers now comply more with seat belt use also on Friday because some traffic officers penalise drivers who do not wear a seat belt by probably extorting money from them. Such money according to some drivers is used for 'celebrating weekend' and in local parlance it is called 'Owo Weekend'. Any erring driver who refuses to give such money to the traffic officers are likely to be apprehended and penalised.

Furthermore, gender analysis indicated that on the average 7.8% of the drivers who plied the road throughout the week were females, out of which 43.7% of them on average use a seat belt compared to men who had an average of 31.8%. The extremely low level of female drivers is expected because most of them out of fear do not like driving on the expressway due to the poor safety and insecurity associated with highways in Nigeria. It is not surprising that more females complied with seat belt usage than males because generally females respect laws more than men. Various studies on the use of seat belt have shown a similar pattern (Fadare, 2009; FIA/WHO, 2009; Sangowawa et al., 2010).

#### 4.2. Volume of cars traffic and the use of seat belt on Lafenwa–Enugada road

The Lafenwa–Enugada is a corridor or arterial road within the Abeokuta township. Table 2 showed that 7867 cars used the road on Monday, which also is the highest for the week. Wednesday accounted for the second highest level of volumetric count for the week with 7721 private cars plying the road for the day. Expectedly, Saturdays and Sundays recorded a low level of traffic throughout the week. There was an ADT of 7136 cars in the 7-day volumetric count. The pattern of seat belt compliance as shown in the table indicated that a higher percentage of seat belt use was recorded in the earlier part of the week with 55%

compliance on Monday to 29% on Thursday. On the average, 37.3% of the motorists wore a seat belt throughout the week. The reason for the lower level of compliance compared to the Abeokuta–Ibadan road is not clear but may not be unconnected with poor enforcement of traffic law and low awareness. Both Saturday and Sunday recorded a very poor compliance to the use of seat belt. Most drivers believe that on these two days, traffic agencies do not show the same level of aggressiveness they show during week days in enforcing traffic laws.

Further analysis showed that out of the total number of drivers that used the road throughout the week, 17.8% of them were females. On the average, 43.6% of the females put on their seat belt compared to 32.7% for males. Also, more females used the Lafenwa–Enugada road compared to the Abeokuta–Ibadan road. The reason is not far fetched; this category of road presents less safety and security risk. Furthermore, as shown earlier, females are noted to have more respect for traffic laws than men and this is evident in the rate of compliance to seat belt use.

Table 2. Volume of traffic of cars and seat belt compliance along Lafenwa–Enugada road.

Days of the week	Traffic volume	Percentage of seat belt use		Percentage of seat belt use by gender	
		Use	Not use	Male	Female
Monday	7867	55	45	35	48
Tuesday	7532	38	62	36	50
Wednesday	7721	31	69	32	38
Thursday	7625	29	71	34	44
Friday	7233	34	66	33	42
Saturday	6621	19	81	32	43
Sunday	5359	23	77	27	40
Average	7136	37.3	62.7	32.7	43.6

Note: Source: Author's field survey, 2009.

Table 3. Volume of traffic of cars and seat belt compliance along Aderupoko road.

Days of the week	Traffic volume	Percentage of seat belt use		Percentage of seat belt use by gender	
		Use	Not use	Male	Female
Monday	8560	24	76	50	64
Tuesday	8763	17	83	47	60
Wednesday	8336	12	88	43	50
Thursday	8395	9	91	37	45
Friday	9098	15	85	38	44
Saturday	7453	9	91	32	50
Sunday	5235	7	93	30	41
Average	7977	13.2	86.8	39.6	50.6

Note: Source: Author's field survey, 2009.

#### 4.3. Volume of cars traffic and the use of seat belt on Aderupoko road

The volume of traffic on the Aderupoko road, as indicated in Table 3, showed that Friday accounted for the highest level of traffic with 9098 cars plying the road on that day. Tuesday accounted for about 16.3% of the total traffic of cars. Both Saturday and Sunday recorded lower level of traffic compared with other days of the week. As noted earlier, these two days are usually work-free days implying that traffic enforcement will expectedly be low. The ADT for the week was put at 7977 cars. With respect to the level of seat belt compliance, the pattern of daily compliance is not too different from the two roads considered earlier. The low level of compliance is not surprising because the level of enforcement of traffic laws on such a hierarchy of road is usually very low. Also, most vehicles on this road travel for short distances and usually at a low speed; therefore, drivers may not see the need to fasten their seat belts.

Furthermore, females accounted for 23.9% of the car drivers for the week. Out of this figure, more than 50% of female drivers used a seat belt compared with 39.6% for males. The higher percentage of females on this road is expected because females use this category of road to test their driving capability before they move to the other higher order road. In other words, females use this in their learning driving process because it presents lesser safety risk compared to other roads.

The compliance rate to seat belt usage on three categories of roads was further investigated using chi-square statistics to determine whether the variation in the use of seat belt on the road types was significant. The result indicated significant difference in the use of seat belt on the three categories of roads. This is presented in Table 4. This implies that the variation in the use of seat belts on the three roads may not have occurred by chance. Factors such as the nature of the road and the level of enforcement may be responsible for the differential use of seat belts on these roads.

#### 5. Recommendations and conclusion

The results of this study showed that there was low level of compliance to the use of seat belt on the three road types. Therefore, the following recommendations

are proposed in order to improve and sustain the use of seat belt in the study area.

There is need for further education and awareness on the use of seat belts. Traffic agencies especially the FRSC must pursue this with vigour. It is suggested that the Commission should employ ad hoc staff whose major responsibility is to advise drivers to wear their seat belt. These ad hoc staff will be provided with handbills containing messages on the benefits of a seat belt and the dangers associated with not wearing it. Similarly, the government must actively involve both the print and electronic media in the awareness programme. This could be achieved through jingles and advertisement on newspapers, radio and television. Furthermore, since driving is part of the culture and in one's lifetime there is the likelihood that an individual will drive, it is suggested that road safety initiatives such as the benefits of seat belt use should be incorporated into the primary and secondary schools curricula.

Furthermore, there is need for the relevant traffic agencies to properly enforce traffic laws especially law on the use of seat belt. Any driver caught violating the use of seat belt should be first warned and subsequently penalised for not using it. Such penalties should range from payment to delay in travelling. This has become necessary because of the low level of compliance to seat belt in the study area (especially on Aderupoko road) compared to what is obtainable in developed countries such as Canada, the United Kingdom and the United States.

The FRSC must have a computerised data base containing information on all licenced drivers with details about their vehicles. Such a system must also be linked together (interoperationability) to provide exchange of information between locations/offices of the commission. This will enable the commission to know the number of licenced drivers warned or penalised all over the country. Also, with the computerised data base in place, the government can give incentives such as percentage reduction in the cost of driver's licence to drivers who have not been caught violating the use of a seat belt throughout the year. Unlicenced drivers should be made to face the full wrath of the law. Furthermore, there is need to give attention to gender inequality in the use of seat belts. Male drivers should be further sensitised on the need to wear their seat belt always.

In conclusion, the use of a seat belt is very useful in reducing the scale of injuries and saving lives of vehicle occupants especially the drivers. It is therefore imperative that the government among other things should increase awareness on the use of seat belts and enforce relevant traffic laws in order to ensure sustainable use of seat belts among motorists in Nigeria.

Table 4. Summary of Pearson Chi-square statistics in the use of seat belt on the three road types.

$X^2$ value	Df	Significance level	Remark
0.212	2	0.045	Sig.

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### Note

1. Seat belt syndrome is a seat belt sign associated with a lumbar spine fracture and bowel perforation. It causes lower abdominal pain and back pain. The mark is seen transversely across the lower abdomen.

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