

Rate of Compliance with Crash Helmets Use by Powered Two-Wheelers (PTW)¹ in Nigeria

*O. Ipingbemi¹ and A.T. Ajala²

¹Department of Urban and Regional Planning, Faculty of the Social Sciences, University of Ibadan, Ibadan, Nigeria.

²Department of Research and Statistics, Ogun State Traffic Compliance and Enforcement Corps (TRACE), Abeokuta, Ogun State.

Head injuries remain the main cause of deaths among users of Powered Two- Wheelers (PTW). Therefore, helmet use represents the major measure for reducing the severity of head injuries. However, in most developing countries especially in Nigeria, compliance to the use of crash helmets is extremely poor. Using observational survey, the study evaluated the level of compliance of motorcycle riders to the use of crash helmets on three categories of roads in Abeokuta, Nigeria. In addition, 250 powered two-wheelers (motorcyclists) were served with 250 copies of questionnaire each using systematic sampling. Findings indicated that more than 75% of them were less than 40 years in age and about 68% had no more than secondary education. In terms of helmet wearing, 29%, 15% and 62% compliance rates were recorded on Trunk 'A', collector and access roads respectively. Also, 34.2% and 27.6% identified heat and cost of the crash helmets as main reasons for poor use of crash helmets. One Way ANOVA showed a significant difference ($p < 0.05$) in the use of crash helmets on the three categories of roads. The paper calls for effective enforcement of crash helmet law, more enlightenment programme and the need to subsidize the cost of crash helmets in order to improve the wearing rate in the country.

Keywords: Compliance, Helmet, Injuries, Safety, Severity

Introduction

Safety remains the most important and un-compromised quality of any means of transportation. In fact, it is a vital factor in measuring the efficiency of any transport system. The role of motorcycle as a means of transportation is increasingly being recognized. When travelling on congested city streets or on remote rural roads, the quickest and most cost effective way of getting from one point to another is on two-wheels. In these locations, motorcycles provide vital and relatively affordable mobility, giving families a way to get to school, commute to work or visit relatives.

In recent times, however, many countries especially developing nations are concerned with rapidly growing number of motorcycles in their countries. In Vietnam in 2007, for example, the number of motorcycles outnumbered cars by a factor of 9 to 1 (GRSP, 2008). Every day about 9,000 new motorcycles

were sold. In Cambodia, the annual number of registered motorbike increased by 46% between 2001 and 2007 while road crashes also increased by 50% (GRSP, 2007). In Nigeria, newly registered motorcycles in the country stood at about 4,000 in 1990, rose to 25,000 in 1996, 70,339 in 2001 and 88,076 in 2003 (Oyesiku, 2002; NBS, 2007).

The growing number of this means of transport as well as its peculiar characteristics makes it to be at risk most. For instance, motorcycle riders share the road space with fast-moving cars, buses, and trucks which make them to be less visible (Kalilu, 2008). In addition, their lack of physical protection makes them particularly vulnerable to being injured when they are involved in collision. To this end, the number of people killed or injured while riding powered two-wheelers (PTW) is on the increase. For instance, 27% of road

deaths in India were among users of motorized two-wheelers while the percentages in Thailand and Malaysia were between 70-90% and 60% respectively (Mohan, 2002; Suriyawngpaisal, 2003 and Umar 2002). Injuries to head and neck are the main cause of death, severe injury and disability among users of motorcycles. Riders of motorcycles who do not wear helmets are at a greater risk of sustaining head injuries, and dying from these injuries. NHTSA (2004) found that an unhelmeted motorcyclist is 40% more likely to suffer a fatal head injury and 15% more likely to suffer a non-fatal injury than a helmeted motorcyclist when involved in a crash. Helmets use, therefore, represents the major measure for reducing the severity of head injuries.

Consequently, several countries have thus enacted laws which mandate the wearing of helmets. Although, helmet law was first promulgated in Nigeria in 1976 but was not adopted by all states of the federation and it was later repealed in some states (Asogwa, 1999). The new drive towards compulsory use of crash helmets started in January 2009 and was preceded by 6 months of enlightenment by the Federal Road Safety Commission (FRSC). However, several months after road safety agencies embarked on serious campaign and enforcement on the use of crash helmets, roadside observations indicated that motorcycle riders are yet to fully comply with the legislation. This study, therefore, examined this problem and the factors responsible for it in Abeokuta city in Nigeria. This introduction is followed by brief literature review in section two. Methodology and analysis of findings are presented in sections three and four while the way forward is in section five and the last section is the conclusion.

Literature Review

Motorcycle riders often sustain multiple injuries in a crash (Rogers et al, 1991). Head injuries are the most frequent in fatal motorcycle crashes, contributing to about one-half of all motorcycle deaths (Kraus, 1989; Umar, 2002). In European countries, head injuries contribute to around 75% of deaths among motorized two-wheeler users where as in United States 53% of motorcycle deaths were as a result of head injuries between 1979 and 1986 (Sosin et al, 1990). However, in some low and middle income countries, head injuries

are estimated to account for as high as 88% of such fatalities (CEC, 2001).

The effectiveness of helmets in preventing and mitigating head injuries have been studied extensively and published in the literature (Deutermann, 2004; Lawrence et al, 2002). Helmets use reduces the incidence and severity of head injuries in motorcycle riders. For instance, a systematic review of 53 studies on helmet usage indicated that wearing of motorcycle helmets decreases the risk and severity of injuries by about 72% and the likelihood of death by up to 39% depending on the speed of the motorcycle involved (WHO, 2006). An unhelmeted motorcyclist is 40% more likely to suffer a fatal head injury and 15% more likely to suffer a non-fatal injury than a helmeted motorcyclist when involved in a crash. Using per mile travelled as a measurement, motorcycle riders have a 34-fold higher risk of death in a crash than people driving other types of motor vehicles, and they also are eight times more likely to be injured (NHTSA, 2007). The higher risks of injury and death for motorcycle riders have been reported to be associated with a younger age, lack of protection, and poor visibility of the rider to other road users (Hurt et al, 1981).

Furthermore, motorcycle helmets reduce the likelihood of a crash fatality by 37% (NHTSA, 2004). Quoting the Crash Outcome data Evaluation System, NHTSA(2004) found that motorcycle helmets are 67% effective in preventing brain injuries and that unhelmeted motorcyclists involved in crashes were three times more likely to suffer brain injuries than those wearing helmets. Head injuries also result in much higher medical costs than any type of injury because they frequently require specialized or long term care (Blincoe, 2002). This type of injury therefore exerts a high toll on a country's health care costs and its economy.

Studies have also evaluated the impact of legislation on motorcycle helmets wearing rates, head injuries and deaths. When mandatory helmet laws are enforced, helmet wearing rates have been found to increase between 40 to 90% or higher (Kraus et al, 1995). For instance, the helmet wearing rate in Cambodia after mandatory laws increased from 8% in 2004 to over 50% in 2009 (GRSP, 2009). However, in many jurisdictions where crash helmet law had been promulgated, wearing rates are still very low. For

instance, in Iowa (USA) only 27% of riders who were involved in road crashes between 2001 and 2006 wore crash helmets (Iowa Dept of Public Health, 2007). Data from roadside observational survey between 2000 and 2006 in Iowa showed a modest increase in motorcycle rider crash helmet use, 36% (Gkritza, 2009). Using a population based observational survey in Vietnam, only 29.9% of motorcycle riders used helmet with males more likely to use than females (Hung et al, 2006). Furthermore, in the southern china cities of Chaozhou and Shantou, crash helmet wearing rates among motorcycle riders were found to be 36.4% and 30.2% respectively (Li et al, 2008). They also found that there was higher use of crash helmet on main roads, during the day and during weekends. However, in the developed region of china (Zhongshan and Guangdong province) the overall rate of crash helmet use was 72.6% for motorcycle riders and 34.1% for pillion passengers (Xuequn et al, 2011).

In many African countries with mandatory crash helmet law, wearing rate is still low. Observational studies in two cities of Thika and Naivasha (Kenya) indicated that only 30.37% and 21.29% of motorcycle riders respectively put on crash helmets (Bachani et al, 2012). The corresponding percentages for passengers were about 4% in Thika and 3% in Naivasha. In Temale (Ghana), the overall helmet use rate was 34.2% for riders and 1.9% for pillion passengers (Ackaah and Afukaar, 2010). They also found that riders' helmet use was highest among elderly and lowest among young people. Hospital surveys in Uganda and Tanzania indicated that only 22% and 22.7% motorcycle riders respectively, wore crash helmet at the time of crash (Galukande et al, 2009; Chalya, et al 2010). None of the motorcycle riders presented over a 12-month period in a University hospital in Nigeria was wearing a crash helmet (Solagberu et al, 2006).

In terms of lives saved and benefits to the economy, NHTSA (2004) found in United States that between 1984 and 2002, helmet use saved the lives of 13, 774 motorcyclists and saved \$19.5 billion in economic costs between 1984 and 2002 (NHTSA, 2004). In summary, results of researches in developed countries especially in United States on motorcycle helmets use consistently indicated that non-helmeted riders are more likely to have head injuries, die, require longer hospitalization, and have higher medical costs

compared to helmeted riders (Bried, 1987; Karlson, 1994; Goslar 2008; Gkritza, 2009; Lin and Kraus, 2009).

Research Methods and the Study Area

The study adopted observatory survey, interview and questionnaire administration. The researchers also worked closely with Ogun State Traffic Enforcement Agency (TRACE). This organization 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 Ogun State Traffic Enforcement Agency (TRACE) is also expected to complement the efforts of the Federal Road Safety Commission 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 motorcycles was carried out on each category of roads to determine the level of compliance of motorcycle riders to helmet usage. All observations were made during the day light between 7.00am to 7.00pm to ensure the visibility of helmet use. Observations of helmet use were made at locations where traffic generally slowed down such as locations where there are speed breakers or potholes. A team comprising two traffic surveyors took the volumetric count while the second team of two surveyors observed motorcycle riders to record their helmet use. This information was collected in all days of the week. Also, two hundred and fifty (250) motorcyclists representing 0.013% of the average motorcycle daily traffic were served with questionnaire. The sampled riders were interviewed using systematic sampling with the assistance Ogun State Traffic Compliance and Enforcement Agency (TRACE). The questionnaire contained information on the socio-economic characteristics of the riders, riding experience, licensing and reasons for use/non use of helmet usage. The questions were short, simple and concise because

most of the riders were on commercial activities, who would not want their time to be wasted or delayed.

Abeokuta, the study area which is also the capital city of Ogun State of Nigeria, lies on latitude 7° 6" 00' N - 7° 12" 00' and longitude 3° 16" 00' - 3° 25" 30' E. The city is about 81km South -West of Ibadan, capital of Oyo State and 106km North of Lagos, (formerly Federal Capital Territory of Nigeria). Abeokuta is predominantly inhabited by the Yorubas (Egbas) with a population of 235,389 in 2006 (NPC, 2006).

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 industries was

motorcycle traffic and the use of crash helmets on Abeokuta – Ibadan road for seven days are presented in table 1. The table indicated that the highest level of traffic was recorded on Wednesday with 3,463 number of motorcycle while the least traffic volume was on Friday. The average daily traffic (ADT) for the seven days period is 3,100 motorcycles. It can be observed from the table that traffic variation throughout the period of survey was minimal.

the agro quarrying opened in 1904, since then other industries such as saw milling, asbestos and ceramic manufacturing industries have been established. The city is linked by trunk 'A' roads with important settlements within and outside Ogun State. Primary and minor roads criss-cross the city. The city public transport system is dominated by road transport mode with the taxicab being the most effective urban transport mode. The use of motorcycle is very recent and its flexibility has made it second to none in urban transportation system in Abeokuta, resulting in over 100% growth between 2005 and 2009 (Ogun State Internal Revenue, 2009).

4.0 Presentation of Results (Observational Survey)

The observational survey was carried out to determine the level of compliance of motorcycle riders to the use of crash helmets. The level of

Table 1: Volume of Traffic and use of Helmet on Abeokuta – Ibadan Road

DAYS	TRAFFIC VOLUME	HELMET USAGE			
		USE	%	NOT USE	%
MONDAY	3372	1761	53	1611	47
TUESDAY	3258	864	27	2394	73
WEDNESDAY	3463	953	28	2510	72
THURSDAY	3199	512	17	2687	83
FRIDAY	2941	874	30	2067	70
SATURDAY	3107	792	26	2315	74
SUNDAY	3029	837	28	2192	72

Source: Authors field survey 2010

With respect to the use of crash helmets, 53% of the motorcyclist riders that plied the road on Monday wore helmets. The use of helmet by motorcyclists decrease suddenly to 27% on Tuesday, 17% on Thursday but went up to 30% on Friday. On the average only 29% of the motorcyclists used helmet throughout the 7-day period. The high percentage of compliance on Monday may not be unconnected with

the belief that most traffic agencies usually go out early part of the week to ensure that road users comply with traffic laws. However, the low level of compliance on Saturday and Sunday may be due to the fact that these days are work- free days which may affect the optimal functioning of the operations of some traffic agencies.

On Lafenwa – Enugada road otherwise known as Fajuyi road (Collector road), the highest traffic of motorcycles was recorded on Friday with 16,548 riders and the least traffic was on Sunday with 11,352 two powered wheelers as shown in table 2. Hence, average daily traffic was computed to be 14,747 per day. The high level of motorcycle traffic on Friday and Saturday is not clear but may not be unconnected with both traditional (wedding, burial etc) and religious activities (Friday Jumat service & church programmes on Saturday) that usually take place during the weekend.

Table 2: Volume of Traffic and use of Helmet on Lafenwa- Enugada Road

DAYS	TRAFFIC VOLUME	HELMET USAGE			
		USE	%	NOT USE	%
MONDAY	11352	2776	25	8576	75
TUESDAY	15218	864	6	14354	94
WEDNESDAY	14668	2014	14	12654	86
THURSDAY	15290	982	7	14308	93
FRIDAY	16548	3903	24	12645	76
SATURDAY	15237	2114	14	13123	86
SUNDAY	14917	1824	13	13093	87

Source: Authors field survey 2010

Regarding the use of crash helmet by the motorcyclists, the highest percentage of compliance was recorded on Monday with 25% while the least use of crash helmet was on Tuesday with only 6% of the riders complying with crash helmet regulations. The average percentage of crash helmet use was 15%. By implication, only about one out of seven motorcyclists that ply the road uses helmet. It must be noted from the table that the attitude of powered two-investigations through interview revealed that all manner of traffic agencies that have no facilities to carry out their activities on either expressway or distributor roads, operate on access roads that may not be too far away from their offices. Therefore, the riders are forced to comply with crash helmet regulation in such area. In addition, anyone who fails to comply will be prosecuted or may have to bribe some traffic officials which the motorcyclists were vehemently against.

wheelers to the use of crash helmet on the link road is generally poor.

The Aderupoko road (access road), one of the roads for survey revealed much difference in terms of level of compliance with the use of crash helmets. For instance, crash helmet compliance rate was 75% on Monday but decreased to 49% on Saturday as shown in table 3. It was surprising to have recorded such level of compliance on access roads. However, further

Table 3: Volume of Traffic and use of Helmet on Aderupoko Road

DAYS	TRAFFIC VOLUME	HELMET USAGE			
		USE	%	NOT USE	%
MONDAY	1784	1324	75	460	25
TUESDAY	1463	945	65	518	35
WEDNESDAY	1799	1171	66	628	34
THURSDAY	1964	1307	67	657	33
FRIDAY	1789	1143	64	646	36
SATURDAY	1409	680	49	729	51
SUNDAY	1788	982	55	806	45

Source: Authors field survey 2010

It can be inferred from the foregoing that the road categories that the average level of compliance for riders of motorcycles with respect to the use of

crash helmet is highest on Aderupoko road (62%) which is Local government road, followed by Abeokuta-Ibadan road (29%) a Federal government road and extremely poor on Lafenwa – Enugada road (15%), a State road.

4.1 Presentation of Results (Socio-economic and other Riders’ characteristics)

This section is on demographic and socio-economic characteristics of the riders as well as other issues relating to the use of crash helmets. The socio-economic characteristics of the riders as shown in table 4 indicated that there was no female rider which is a peculiar characteristic of motorcycle operation in Nigeria.

Table 4: Demographic and Socio-economic Characteristics of Motorcycle Riders

Variables	Frequency	Percentage
Sex		
Male	250	100
Female	0	0
Age (Years)		
0-18	33	13.2
19-25	62	24.8
26-40	94	37.6
Above 40	61	24.4
Marital Status		
Single	73	29.2
Married	149	47.6
Divorced	45	18.0
Widowed(er)	13	5.2
Education Attainment		
No formal education	25	10.0
Primary education	60	24.0
Secondary education	11	44.0
OND/NCE	02	10.8
HND/BSc	72	9.6
Post Graduate	44	1.6
Daily Income		
Less than N500	24	9.6
N500-1000	60	24.0
N1001-1500	108	43.2
N1501-2000	51	20.4
Above N2000	7	2.8
Household Size		
0-2	78	31.2
3-5	145	58.0
6-8	27	10.8

Source: Authors field survey 2010

More than 75% of the riders could be considered as youths because they were less than 40 years, while about half of the sampled respondents were married. Also, 68% of them had no more than secondary education which could constitute an obstacle to effective road safety education. Just about 23% of them had a daily income of over N1,500 while 9.6% earned less than N500 daily. With respect to household size, 58% of the riders had a household size of between 3-5, 31.2% between 0-2 and 10.8% between 6 and 8.

Furthermore, the reason for poor compliance to helmet usage indicated that 34.2% of motorcycle riders identified excessive heat as the major reason for poor compliance as shown in Fig 1. The hot sun which is typical of the tropics during the day is responsible for this. Similarly, those who complained about the cost of crash helmet accounted for 27.6%. They noted that the price of crash helmet has been on the increase since the time crash helmet was made compulsory for every motorcycle rider by the government. Also, physical discomfort which is expressed in terms of weight of the helmet and limited maneuvering of neck was responsible for 13.2% of the total. Surprisingly, in spite of the awareness that preceded the introduction of the legislation making crash helmet use compulsory for all motorcyclists, some riders still do not have crash helmet.

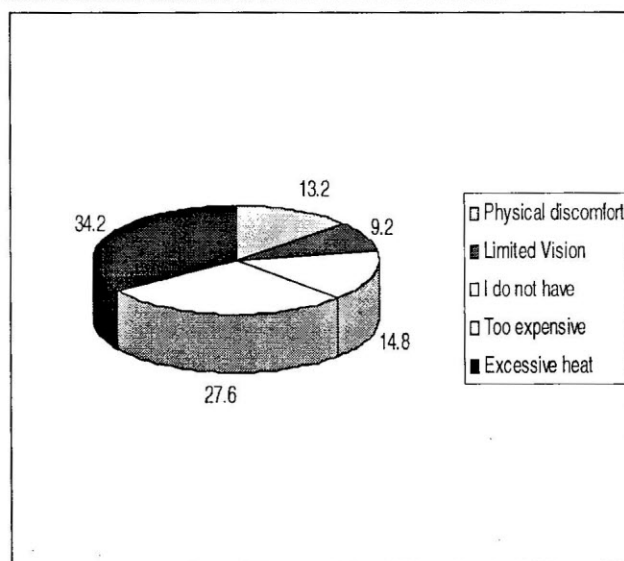


Fig 1: Reasons for not using Crash Helmets
Source: Authors field survey 2010

Fig 2 revealed the opinion of the respondents on how to enhance the use of helmet. 46.6% of the respondents were in support of increasing public

awareness. This could be done through jingles, posters, workshops, seminars among others for motorcyclists. Also, 37% of the riders called on the government to give helmet free to motorcyclists. In order to reach a large number of the riders, government can go through the national Union of commercial motorcyclists known as Amalgamated Commercial Motorcycle Riders Association of Nigeria (ACOMORAN). This strategy was adopted in Cambodia with dramatic success (GRSP, 2009). Those who suggested reduction of traffic officers on the road accounted for 12.3%. Motorcyclists complained of unnecessary road blocks and frequent crack down on riders by some traffic agencies with a view to extorting money from them. Only few riders suggested effective enforcement and punitive measures for non-compliance of motorcyclists to the use of helmets.

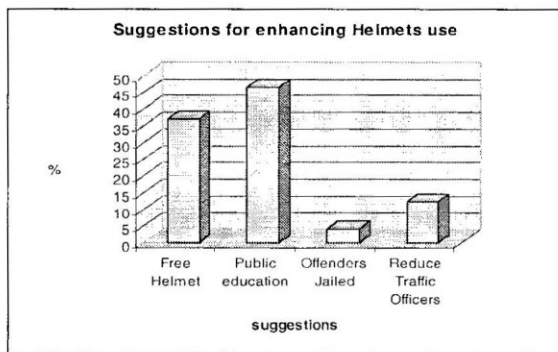


Fig 2: Suggestions for enhancing Helmets use
Source: Authors field survey 2010

Further analysis through the use of cross tabulation indicated that educational attainment had little or no influence on the use of crash helmets. This is depicted in table 5. 8.4% of those with Primary/Junior Secondary School uses helmet while 25.2% do not use helmet when riding. For the Senior Secondary School level, 25.6% do not use while 26.8% do not use. The holder of National Diploma had 4.8% who use helmet and 7.6% do not use helmet when riding while those without any formal education had 0.8% each for use and non-usage of helmet. The table shows that there is little or no influence of education on the use of crash helmet.

Table 5: Level of Education of Riders * Use of Helmet

Level of Education	Helmet Usage		
	Use	Not Use	
No formal Education	2 0.8%	2 0.8%	4 1.6
Primary Education	21 8.4%	63 25.2%	33 6%84
Secondary Education	64 25.6%	67 26.8%	131 52.4%
Post Secondary Education	12 4.8%	19 7.6%	31 12.4%
Total	99 36.6%	151 63.4%	250 100%

Further analysis through the use One-Way ANOVA was adopted to test whether there is significant difference in the level of compliance in the use of crash helmets on the three categories of roads as shown in table 6. The result of the analysis indicated that the rate of crash helmet use showed a significant difference on the three categories of roads studied (0.000), $p < 0.05$, which implies that the level of compliance in the use of crash helmets on the three categories roads differs and this could be attributed to the level of enforcement on these roads.

Table 6: One Way ANOVA on the use of crash helmet on the three categories of roads

Descriptives

Percentage of Helmet Usage

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Abeok-Ibadan Road	7	29.8571	11.03674	4.17149	19.6499	40.0644	17.00	53.00
Lafenwa-Enugada Road	7	14.7143	7.43223	2.80912	7.8406	21.5880	6.00	25.00
Aderupk Road	7	63.0000	8.50490	3.21455	55.1343	70.8657	49.00	75.00
Total	21	35.8571	22.39930	4.88793	25.6611	46.0532	6.00	75.00

ANOVA

Percentage of Helmet Usage

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8538.286	2	4269.143	51.357	.000
Within Groups	1496.286	18	83.127		
Total	10034.571	20			

Discussion of Results

The variation in the use of crash helmets on the three categories of roads could be due to differences in road width, geometry and its ancillaries as well as level of enforcement among others. The high compliance rate of 62% helmet use on Aderupoko (access or township) road compared to other road categories is at variance with similar studies in United States where findings indicated lowest proportion of riders wearing crash helmet on city roads (local roads) compared to primary and secondary roads (Gkritza, 2009). The variations in the findings of these two studies could be as a result of different level of enforcement and traffic regulation structure. Similarly, the average crash helmet wearing rate of 35.3% on three categories of roads is low compared to helmet use of between 70-90% in developed countries where mandatory helmet law is in operation (Kruas and Lin, 2008). However, the low level of crash helmet usage in this study is consistent with findings of other studies in developing countries especially in Africa (Odelowo, 1994; Oluwadiya et al., 2004; Galukande et al., 2009; Chalya, et al 2010). For example, both Galukande et al, 2009 and Chalya et al, 2010 reported 22% and 22.7% helmet use in Uganda and Tanzania respectively. The higher percentage of compliance in the present study could be as a result of the fact that it is an observatory survey which relied on direct observation on the field compared to the other studies that sourced their data from hospital records; which have been found to be unreliable because of missing data (Lawrence et al, 2007; Langley et al, 2007; Lin and Kraus, 2008). Similar observatory study in Ghana also showed a modest compliance rate of 34.2% (Ackaah and Afukaar, 2010). In some other studies, cases of non use of crash helmet have been reported in Benin City and Lagos in Nigeria as well as Kampala, Uganda (Nzegwu et al. 2008; Solagberu et al 2006; Falope, 1991; Andrews et al., 1999).

In terms of the socio-economic characteristics of the respondents, male youths accounted for majority of the respondents. Over 75% of the respondents were less than 40 years. The young male preponderance in the present study agrees with other studies in Nigeria and elsewhere (Naddumba, 2004; Andrews et al, 1999; Okeniyi et al, 2005; Solagrebu et al, 2006; Galukande et al, 2009). Males are often more involved in road crashes because they take higher risk than female counterparts and also travel longer distances. Also, motorcycle riding in the study area is almost exclusively men, most of whom do it for commercial purposes. The level of education of riders indicated that majority of them do not possess more than secondary education. This is in line with other reported findings of motorcycle riders' level of education (Ogunsanya and Galtima, 1993; Fasakin, 1995; Chalya, 2010). Most of them are primary and secondary dropouts who may not be gainfully employed with their level of education.

Various factors hindering the use of crash helmets were identified. Excessive heat was the most important constraining the use of crash helmet in this study. This is understandable because of the hot daily sun in the tropical region. This also agrees with Zargar et al (2006) findings in Tehran where they observed that the low level of helmet use was as a result of the fact that the helmets were uncomfortable for use in hot tropical environments. Furthermore, the influence of a helmet use on the riders' vision was also raised in this study. Although helmets have a small effect on the lateral vision of motorcycle riders but this is compensated by increasing head rotation when making turns and thus hearing and visual acuity are not overly restricted by helmet use (McKnight and McKnight, 1995). In the same vein, some riders complained about the weight of the helmets which made the manoeuvring of neck very difficult but a prospective cohort study

found no increased risk to motorcycle riders as a result of the weight of the crash helmet (Lin et al, 2003).

Strategies for Enhancing Helmets Use among Motorcyclists in Abeokuta

Findings from this study indicated poor use of helmet among motorcyclists in the Abeokuta. It is therefore imperative to identify and discuss strategies for enhancing the use of crash helmet in the city.

There is need for increasing public education and enlightenment for the motorcycle riders by traffic agencies especially the Federal Road Safety Commission. Though the mandatory use of crash helmet was preceded by public enlightenment, however, this should be a continuous exercise. This should be complemented with effective enforcement of law mandating the use of crash helmet. Appropriate prescriptive punitive measures should be meted against erring motorcyclists. In fact, most countries that have achieved high level of crash helmet wearing rate have done so due to effective enforcement.

Also, motorcyclists suggested free distribution of crash helmets to riders. Where this is not possible because of its cost, the state government (or federal) should subsidize the cost of crash helmets for the riders. This will encourage those who do not have to buy and subsequently improve wearing rate. This strategy was adopted in Cambodia with huge level of success.

Furthermore, some of the motorcycle riders complained about the excessive heat generated by the crash helmet. It is therefore imperative that the government makes sure that helmets are specially designed for use in the tropics and be made available at an affordable price to motorcycle riders. In addition, the government can also provide enabling environment for the establishment of crash helmets production plants in the country. Their products will be specifically designed to meet the needs of helmet users in the country (or region of operations).

Both men and officers of the traffic agencies must show high level of integrity in the discharge of their duties. Complaints by some motorcyclists about the corrupt tendencies of some traffic agencies especially in extorting money from the riders do not augur well for the traffic agencies involved. Therefore,

any traffic officers caught in such act should be decisively dealt with.

Conclusion

Poor use of crash helmets is a major cause of deaths and disabilities among users of motorcycles. Therefore, the use of helmets helps in reducing the severity of crash and disability. However, because of excessive heat and the cost of the crash helmets among others, the level of compliance on the three categories of roads (federal, state and access) selected in the study area was found to be extremely low. For instance, there were 29%, 15% and 62% compliance rates (on the average) on the three roads. The paper suggests proper enforcement of crash helmet law, further public enlightenment on the benefits of crash helmets and the need to subsidize the cost of crash helmet in order to improve its wearing rates in Abeokuta in particular and in Nigeria in general.

Endnote: 1= Power Two-Wheelers also means Motorcycles.

References

- Abel A (2009) Land Use Analysis of Abeokuta South Local Government, A Dissertation Submitted to the Department of Town and Regional Planning, Moshood Abiola Polytechnic, Abeokuta
- Ackaah, W., and F.A. Afukaar (2010) "Prevalence of Helmet use among motorcycle users in Temale Metropolis, Ghana: An Observational Study" *Traffic Injury Prevention*, 11(5), 522-525.
- Andrews, C.N., Kobusingye, O.C. and Lett, R. (1999) 'Road traffic accident injuries in Kampala' *East African Medical Journal* 76,189-194.
- Asogwa, S.E. (1999) Road Traffic Accidents in Nigeria: A Handbook for All Road Users. Enugu: Snaap Press Ltd.
- Bachani, M.A, Koradia, P., Herbert, H.K., Mogere, S., Akungah, D., Nyamari, J., Osoro, E., Maina, W. and Stevens (2012) 'Road Traffic Injuries in Kenya: The Health Burden and Risk Factors in Two Districts' *Traffic Injury Prevention* 13(S1) pp24-30.
- Blincoe, L et al (2002) The Economic Impacts of Motor Vehicle Crashes, 2000. Washington DC: National Highway Traffic Safety Administration (NHTSA).

- Breid, J.M., Cordasco, F.A. and R.G. Volz (1987) "Medical and economic parameters of motorcycle-induced trauma" *Clinical Orthopedic Relation Research* 233, 252-256.
- Chalya, L.P., Mabula, J.B., Nyayomela I.H., et al (2010) 'Motorcycle injuries as an emerging health problem in Mwanza City, North-western Tanzania' *Tanzania Journal of Health Research* Vol 12(4): 214-221.
- Commission of the European Communities (CEC)(2001) *Motorcycle Safety Helmets. COST 327*. Brussels: CEC.
- Deutermann, W (2004) *Motorcycle helmet effectiveness revisited. Report DOT HS 809715*, National Highway Traffic safety Administration, US Department of Transportation, Washington DC.
- Falope, I.A. (1991) "Motorcycle accidents in Nigeria a new group at risk" *West African Journal of Medicine* 10, 187-189.
- Galukande, M., Jombwe, J., Fualal, J. and Gakwaya, A. (2009) 'Boda-boda injuries a health problem and a Burden of Disease in Uganda: A tertiary Hospital survey' *East and Central African Journal of Surgery* 14, 33-37.
- Gkritza, K. (2009) "Modelling Motorcycle helmet use in Iowa: Evidence from six roadside observational surveys" *Accident Analysis and Prevention*, 41, 579-484
- Goslar, P.W., Crawford, N.R., Petersen, S.R., Wilson, J.R., and J. Harrington (2008) "Helmet use and associated spinal fracture in motorcycle crash victims" *Journal of Trauma*, 64, 190-196.
- GRSP (2007) *News: GRSP Action Plan in Cambodia* pg 5. Geneva: GRSP
- GRSP (2008) *Annual Reports: Helmets*. Geneva: GRSP
- GRSP (2009) *Helmets Programme, Cambodia*. Geneva: GRSP
- Hung, D.V, Stevenson, M.R. and Ivers, R.Q (2006) 'Prevalence of Helmet use among motorcycle riders in Vietnam' *Injury Prevention*, 12, 409-413.
- Hurt, H.H., Quillet, J.V. and Thom, D.R. (1981) *Motorcycle Accident Cause factors and Identification of countermeasures. Volume I. Technical Reports*, USDOT, Washington DC: NHTSA
- Iowa Department of Public Health (2007) *CODES (The Crash Outcome Data Evaluation System) Motorcycle Quick Facts in Iowa, 2001-2005*.
- Kalilu, R.O.R (2008). 'Dysfunctional Integrated Transport System and the Challenges of Road Safety in Nigeria' Paper presented at the 20th Anniversary of FRSC/ International Conference on Road Safety in Africa in Abuja. 18th -21st February, 2008.
- Karlson, T.A and C.A., Quade (1994) "Head injuries associated with motorcycle use- Wisconsin, 1991," *Morbidity and Mortality Weekly Report* 43, 423-431.
- Kraus, J.F (1989) "Epidemiology of head injuries" In Cooper, P.R. (ed) *Head Injury*, 2nd Edition, Williams and Wikkins, Baltimore, PP 1-9.
- Kraus, J.F, C. Peak, and A. Williams (1995) "Compliance with 1992 California Motorcycle Helmets Use Law" *American Journal of Public Health* 85:96-98.
- Kraus, J.F and Lin, M-R (2008) "Methodological issues in motorcycle injury epidemiology" *Accident Analysis and Prevention*, 40, 1653-1660
- Lawrence, B.A, Max, W., and T.R. Miller (2002) *Costs of Injuries resulting from motorcycle crashes: a literature review. Report DOT HS 809242*, US Dept. of Transportation, Washington DC.
- Lawrence, B.A, Miller, T.R, Weiss, H.B and Spices, R.S (2007) "Issues in using state hospital discharge data in injury control research and surveillance" *Accident Analysis and Prevention*, 39, 319-325.
- Li, G., Li, L. and Cai, Q. (2008) 'Motorcycle Helmet use in Southern China: An Observational study' *Traffic Injury Prevention*, 9(2) 125-128
- Lin, M.R., Chang, S.H., Pai, L. and P.M. Keyi (2003) "A longitudinal study of risk factors for motorcycle crashes among junior college students in Taiwan" *Accident Analysis and Prevention*, 32 (21), 251-260.
- Lin Mau-Roung and J.F. Kraus (2009) "A review of risk factors and patterns of motorcycle injuries" *Accident Analysis and Prevention*, 41, 710-722.
- McKnight, A.J. and A.C., McKnight (1995) "The effects of motorcycle helmets upon seeing and hearing" *Accident Analysis and Prevention*, 27, 493-501.
- Mohan, D (2002) 'Traffic safety and Health in India' *Journal of Transport and Infrastructure* 9:79-94.
- Naddumba, E.K. (2004) "A cross sectional retrospective study of boda boda injuries at Mulago Hospital in Kampala, Uganda" *East and Central African Journal of Surgery*, 9, 44-47.
- National Bureau of Statistics (NBS) (2007) *Social Statistics in Nigeria*. Abuja: NBS
- NHTSA (2007) *National Highway Traffic Safety Administration Traffic Safety Facts 2005: Motorcycle*, NHTSA, Washington DC: NHTSA
- NHTSA (2004) *National Highway Traffic Safety Administration: Motorcycle Helmets Use Laws*. Washington DC: NHTSA

- National Population Commission (NPC) (2006) 2006 Population Census. Abuja: NPC.
- Nzegwu, M.A., Aligbe, J.U., Banju, A.A.F., Akhiwn, W. & Nzegwu, C.O. (2008) "Patterns of morbidity and mortality amongst motorcycle riders and their passenger in Benin – City, Nigeria" *Annals of African Medicine* 7, 82–85.
- Odelowo, E.O.O. (1994) "Pattern of trauma resulting from motorcycle accidents in Nigerians: a two-year prospective study" *African Journal of Medicine and Medical Sciences* 23, 109–112.
- Ogun State Internal Revenue Board (2009) Vehicle Registration in Ogun State. Abeokuta: Internal Revenue Board.
- Ogunsanya, A.A and M. Galtima (1993) "Motorcycle in Public Passenger Transport Services in Nigeria: Case Study of Yola Town" S.G. Ikye (ed). *Urban Passenger Transportation in Nigeria* Ibadan: Heinemann Educational Books: pp 190-207.
- Okeniyi, J.A., Oluwadiya, K.S., Ogunlesi, T.A., Oyedeji, O.A., Oyelami, O.A., Oyedeji, G.A. & Oginni, L.M. (2005) Motorcycle injury: an emerging menace to child health in Nigeria. *The Internet Journal of Paediatrics and Neonatology* 5 (1).
- Oluwadiya, K.S., Oginni, I.M., Olasinde, A.A., Odu, O.O., Olakulehin, O.A. & Olatoke, S.A. (2004) "Motorcycle limb injuries in a developing country" *West African Journal of Medicine* 23, 42–46.
- Oluwadiya, K.S., Kolawole, I.K., Adegbehingbe, O.O., Olasinde, A.A., Agodirin, O., and S.C. Uwaezuoke (2009). 'Motorcycle characteristics in Nigeria: Implications for control' *Accident Analysis and Prevention*, Vol 41: 294-298.
- Oyesiku O.O. (2002) from "Womb to Tomb" 24th Inaugural Lecture at Olabisi Onabanjo University, Ago-Iwoye, Ogun State 24th August 2002.
- Rogers, C.D, Pagliarello, G., Mclellan, B.A and W.R. Nelson (1991) "Mechanism of Injury Influences on the pattern of injuries sustained by patients involved in vehicular trauma" *Journal of Surgery*, 34 (3) 283-286.
- Solagberu, B.A., Ofoegbu, C.K.P., Nasir, A.A., Ogundipe, O.K., Adekanye, A.O. & Abdur-Rahman, L.O. (2006) Motorcycle injuries in a developing country and the vulnerability of riders, passengers, and pedestrians. *Injury Prevention* 12, 266-268.
- Sosin, D.M., Sacks, J.J. and P. Holmgreen (1990) "Head injury associated deaths from motorcycle crashes- relationship to helmet laws" *JAMA* 264(18), 2395-2399.
- Suriyawongpaisal, P. and S. Kanchamisut (2003) "Road Traffic Injuries in Thailand: Trends, Selected underlying determinants and status intervention" *Injury Control and Safety Promotion* 10:95-104
- Umar, R. (2002) Helmet Initiative in Malaysia. In: Proceedings of the 2nd World Engineering Congress. Kuching, Sarawak, Malaysia; Institute of Engineers
- WHO (2006) Helmets: A road safety manual for decision-makers and practitioners. Geneva: WHO.
- Xuegun, Y., Ke, L., Ivers, R., Du, W. and Senserrick, T. (2011) 'Prevalence rates of helmet use among motorcycle riders in a developed region in China' *Accident Analysis and Prevention*, 43(1) 214-219.
- Zargar, M, Khaji, A and M, Karbakhsh (2006) " Pattern of motorcycle related injuries in Tehran, 1999-2000, a study in 6 hospitals" *Eastern Mediterranean Health Journal*, 12, 81-87.

Biographical Note

Olusiye Ipingbemi (Ph.D) is an expert in transportation. he obtained his B.Sc. Degree in Geography from University of Ilorin in 1995. he bagged his M.Sc. and Ph.D degrees from Obafemi Awolowo University, Ile-Ife in 2001 and 2006 respectively. His area of specialization is transport planning and safety. Dr. Ipingbaemi is a Chartered Member of Chartered Institute of Logistics and Transport (CILT) in the United Kingdom. He has published extensively in both local and International Journals, contributed chapters in well-reviewed books and attended seminars and conferences. He is currently a lecturer in the Department of Urban and Regional Planning, University of Ibadan, Ibadan.

Abdulrahman Taiwo Ajala is a graduate of Moshood Abiola Polytechnic, Abeokuta. he holds a Masters of Science in Transportation Studies and Master in Urban and Regional Planning from Olabisi Onabanjo University and University of Ibadan respectively. Cdr Ajala is a Chartered Member of Chartered Institute of Logistics and Transport (CILT) in the United Kingdom, a Corporate Member of Nigerian Institute of Town Planners and a registered Town Planners. He is currently the Education Officer of the Ogun State Traffic Compliance and Enforcement Corps (TRACE).