The Motorcycle Crash Characteristics in Lagos State, Nigeria

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ABSTRACT

Motorcycles contribute significantly to the number of automobiles on the roads in Lagos State, Nigeria. This development is attributable to poor public transport supply, urban sprawl and bad roads. The use of motorcycles in Lagos State is associated with high accident rate both on the side of the riders and the passengers. This paper examined motorcycle trends, ownership and accidents in Lagos State. Furthermore, the paper examined empirically riders' and passengers' perception on the use of motorcycles with the administration of 1,400 questionnaires on riders and 1,550 questionnaires on passengers. The paper revealed that a great percentage of the riders are male graduates (married) who earn above thirty naira a day and their activities are characterized by overloading, overspeeding and the non-use of crash helmets. Passengers, both the rich and the poor, use motorcycles purposely to beat traffic congestion, save time and enhance accessibility. The paper recommended proper accident reporting, planning, effective enforcement measures and training of motorcycle riders in Lagos State, Nigeria.

Keywords: ***Motorcycle Accident, Motorcycle Ownership, Motorcycle Trend, Passengers and Riders.***

Introduction

Mobility refers to the speed of travel and the manner in which travel is undertaken. It is a reflection of people's individual personalities and their status. Different modes of transport offer different levels of mobility and accessibility under different circumstance (WBCSD, 2001). By and large, people seek to increase their mobility to improve accessibility which is the ease with which desired social and economic activities can be undertaken from a specific point in space (USDOT, 1997a).

In the Lagos Megacity (which has a population of 13.4million in 2000 and a projected population of 23.2 million in 2015 according to the United Nations), vehicles provide the highest level of mobility. Lagos state is known to have the highest density of vehicles per square kilometre in Nigeria, 224 vehicles per km^2, compared to an average of 15vehicles per km^2 in other states of the Federation. (*The Sun Newspaper*, March 17, 2008). This causes a huge disparity between available road capacity of the existing road network and traffic flow at any given time in Lagos.

The government's inability to provide conventional mode of transport has necessitated use of motorcycles (two-wheeled automobiles) and tricycles (three-wheeled automobiles) to move people, goods and services from one point to another under conditions considered to be unsafe and accident-prone. This paper examined the motorcycle trend and accident rate and the level of involvement of riders and passengers in the state.

Theoretical Framework

Two concepts are addressed in this study. They are the Epidemiological model and the Haddon Matrix. The Epidemiological Model explains the causes of motorcycle crashes, while the Haddon Matrix focuses on casual and mitigating factors of accidents in the pre-crash, crash and post-crash stages, Olagunju, 2009).

The Epidemiological Model:

This model is based on the principle of system theory (Olagunju, 2009). Gbadamosi (2004) identified the various components of the road traffic system as the road (environment), the vehicle including motorcycles (mechanical) and road users (human) and indicated that they are operationally interrelated. Thus, any defect in any of the three main components consequently leads to a breakdown of the system which in turn could result in accidents (Figure 1).

The "Agent" and "Environment" are rather passive factors of mobility while the "Host", human beings (highway engineers, drivers, riders and passengers) are the active contributors (Olagunju, 2009).

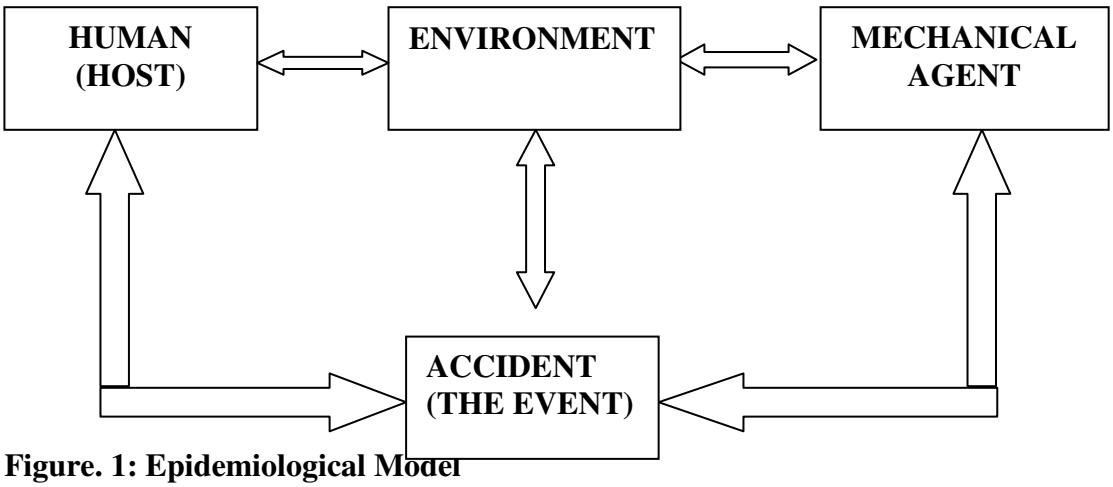

Figure. 1: Epidemiological Model
Source: Cited in Gbadamosi (2002).

The Haddon Matrix: An outcrop of the system theory is the classical accident matrix enunciated by Haddon in the early sixties. The Haddon Matrix illustrates an interaction of three factors: humans, vehicles and the environment during the three phases of a crash event i.e. Pre-crash, crash and post crash. The resulting nine-cell Haddon Matrix Model produced a dynamic system with each cell of the matrix allowing opportunities for intervention to rescue crash injury (Olagunju, 2009). In the pre-crash phase, there are elements that cause people and property to move into the undesirable interactions and finally into the crash-phase. The crash-phase is that in which accidents occur and the post-crash phase entails salvage, the clean up period, the emergency medical care, etc. What happens in the three phases determine the end result of the process (Olagunju, 2009).

Table 1: The Haddon Matrix

FACTORS				
PHASE		HUMAN	VEHICLE & EQUIPMENT	ENVIRONMENT
Pre-crash	Crash prevention	Information Attitude Impairment Police Enforcement	Road worthiness Lighting Braking Handling Speed Management	Road design and road layout Speed limits Pedestrian facilities
Crash	Injury prevention during the Crash	Use of restraints Impairment	Occupant restraints Other safety devices Crash-protective design	Crash-protective road side objects.
Post-crash	Life Sustaining	First-Aid-Skill Access Medicals	Ease of access Fire to risk	Rescue facilities congestion

Source: ***WHO and World Bank (2004) – World report on road traffic prevention – summary.***

Figure 2: A dead rider, (without helmet) at an accident scene in Lagos
Source: Cited in Olagunju (2009).

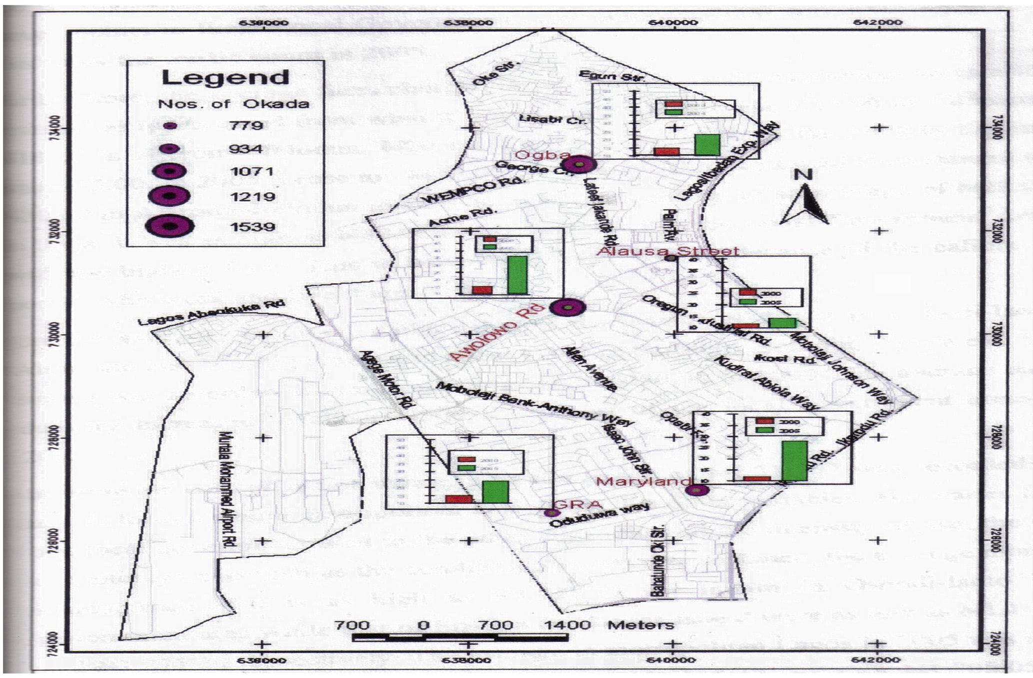

Figure 3: Spatio-temporal distribution of commercial motorcyclists in Ikeja LGA (2000-2005)
Source: Olatunji (2008)

Geographical Description and Population of Lagos State

Lagos State lies approximately between longitude 20°42'E and 30°42'E and latitude 6°22'N. The Southern boundary of the state is formed by a 180km long Atlantic coastline while its northern and eastern boundaries are shared with Ogun State. On the western side, the boundary is bordered by the Republic of Benin (Olaseni, 2010).

Lagos is one of the 36 states in Nigeria. In terms of size, Lagos is the smallest, occupying a total of 3,577 square kilometres of which 787 square kilometres or 22% is water. Averages of 10,000 people arrive in Lagos daily to find some means of livelihood. Lagos has 80% of the total value of import and accommodates the largest and busiest port in the country (LAMATA, 2007). Lagos State has a total of 20 Local Government Areas and 37 Local Council Development Areas. The population density of Lagos is the highest in Nigeria. It was put at 400 persons per hectare in 1978 but over 4000 persons per hectare in 2004, a ten-fold increase over the 1978 population density figure (LASG, 2004). According to United Nations (UN, 2001), the population of Lagos has increased to 13.4 million in 2000 and by 2015, Lagos population is projected to have 23.2 million (making it the third largest city in the world after Tokyo and Mumbai).

The Road Situation in Lagos State

The inter-state and intra-state transport services in Nigeria rely on road transport. Nigeria's road network system was estimated at about 200,000km in year 2000 with a value of about ₦1.85 trillion (Idowu, 2000). Lagos State had a total of 548km of road in 2000; the Federal, State and Local Governments own 287.1km, 217.6km and 43.3km respectively (LESG, 2003). A sum of ₦79 billion is required per annum for the next 10 years to develop the roads and $50 million is required for urban transport needs of 100 blighted areas in Lagos state (LSMP&B, 2004).

Motorcycle Trend and Ownership in Lagos State

Historically, according to Olagunju (2008), the use of commercial motorcycles in Lagos State started in 1980 by a group of 5 old men at Alakuko area in Agege Local Government Area. These men used their motorcycles for carrying passengers after returning from their daily work. Their main focus then was meeting commuters' demand mostly in the pre-journey and post journey trips from their homes to bus-stops and vice-versa. They were mainly limited to feeder roads. The success achieved by these men made others to join them and commercial motorcycles started to spread to other areas in Agege. Now they are found everywhere in metropolitan Lagos and the urban mobility (transport) problem in Lagos necessitates the use of motorcycles as a means of transport. This can be appreciated by a more in depth evaluation of commercial motorcycle terminals and population for the Ikeja Local Government Area (Figure 2).

Table 1 shows the number of plates produced for motorcycles and other motorised vehicles in Lagos from 1999 – 2005. In 1999, a total of 95,088 plates were produced; 12,070 were motorcycle plate numbers (13%). In 2000 and 2001, 994,572 plates were produced and 161,310 plates were motorcycle plate numbers (16%). In 2002, 1,213,051 plates were produced; 100,235 plates were motorcycle plate numbers (9%); in 2003, 136,015 plates were produced and 32,563 plates were motorcycle plate numbers (24%). In 2004, 82,683 plates were produced and 15,373 plates were motorcycle plate numbers; and in 2005, 38,360 were produced and 5,325 plates were motorcycle plate numbers (14%).

Table 2: Plate Number Registration in Lagos from 1999 – 2005.

Year	Total Plate Numbers Produced	Total Motorcycle Plate Numbers Produced	% of Motorcycle Plate Numbers Produced
1999	95,088	12,070	13%
2000	994,572	161,310	16%
2001	994,572	161,310	16%
2002	1,213,051	100,235	8%
2003	136,015	32,563	24%
2004	82,683	15,373	19%
2005	38,360	5,325	14%

Source: Lagos State Licensing Office of Statistics (MEPB) Ikeja and FRSC (2006).

The megacity status of Lagos has caused urban mobility problems which have necessitated the use of motorcycle as a means of road transport, this as a result of congestion in Lagos. Motorcycles (Para-transit) provide direct longer distance services on routes where the formal sector supply is slower or infrequent. In Africa, it is the dominant mode of transport for the poor, (World Bank, 2002). 65% of the people in Lagos are classified as poor (LSMP&B, 2004). In 1999, Lagos experienced a 13% increase in motorcycle registration as a result of urban mobility problems and high poverty level, while 16% motorcycle registration was recorded in 2000 and 2001 respectively; implying that high commuting time on journeys to work forces people to use motorcycles. It takes about 80 minutes (1hr 20mins) to travel from Ikorodu Road to CMS. The decrease to 8% recorded in 2002 was due to high taxes placed on motorcycle registration by the Lagos State Government and Officials of the 20 Local Government Areas and 37 Local Council Development Areas while the increase to 24% in motorcycle registration for 2003 was as a result of the establishment of the National Poverty Alleviation Programme (NAPEP) in the State which facilitated the distribution of motorcycles (two-wheel) and tricycles (three-wheel) to the poor people at the ward level to reduce poverty in Lagos State. The decrease to 19% and 14% of motorcycle registration in 2004 and 2005 respectively was as a result of safety enforcement measures placed on motorcycle riders and passengers by Federal Road Safety Commission (FRSC) and Nigeria Police Force (NPF) in Lagos State.

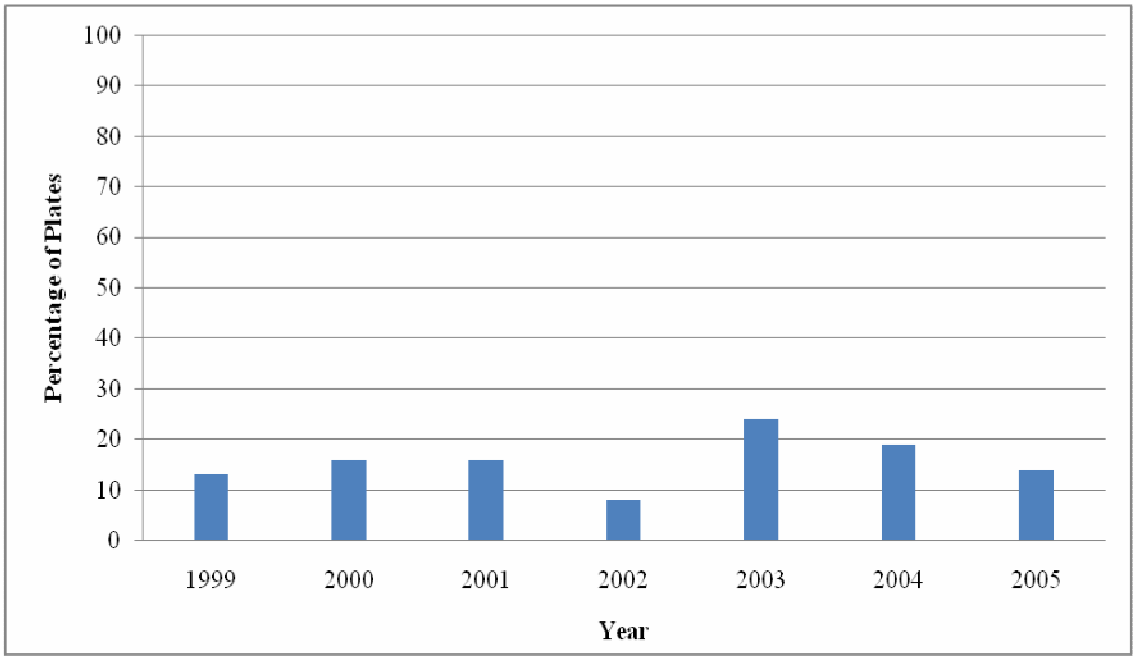

Figure 4: Percentage of motorcycle plates produced in Lagos State from 1999 – 2005 (in %)

Source: Authors' analysis.(2006)

Motorcycle ownership is increasing and competes with vehicle ownership in Lagos State due high poverty and low income levels, bad roads and time loss during intra-urban travel. Table 2 shows types of motorcycle ownership in Lagos in 2005. Out of a total of 8,022 motorcycles registered in Lagos, 6,166 (76.86%) are private, 1,422 (17.6%) are commercial, 3 (0.04%) are government; 4 (0.05%) are mission/school and 427 (5.32%) are corporation. The implication is that majority of the people using motorcycles in Lagos are private owners with a minimum wage of ₦7, 500 for Federal Civil Servants and less than ₦7, 500 for Lagos State Civil Servants; who cannot afford to buy cars based on their salary. This set of people collect loans from cooperative and thrift societies in their various places of work which they can easily pay back to buy motorcycles which are used as a means of road transport. This set of people prefer to buy motorcycles to reduce commuting time on the road during morning and afternoon peak periods which is directly proportional to transport cost in Lagos. At the close of the working day, the motorcycles are used for commercial purpose to get money to buy fuel.

Table 3: Motorcycle Ownership in Lagos State in 2005.

TYPE OF OWNERSHIP					
Private	Commercial	Government	Mission/School	Corporation	**TOTAL**
6166	1422	3	4	427	**8022**

Source: Lagos State Licensing Office and Lagos State Central Office of Statistics (MEPB), Ikeja (2006).

As at today, commercial Okada operations have increased in Lagos. Retrenchment exercises that took place in the civil service in the recent years (between 2006 & 2007) forced officers between grade level 01 – 06 who are private motorcycle owners to use their motorcycles for commercial operations to make ends meet. The erratic power supply in Lagos has forced many artisans that depended on electricity out of work and they have swelled the number of commercial motorcyclist who transport people to make ends meet.

Motorcycle Accidents in Lagos State

Motorcycle crashes account for around 1.2 million deaths and 50 million injuries every year (WHO, 2004). Almost half of those who died in road traffic crashes globally were pedestrians, cyclists or users of two-wheelers – collectively known as vulnerable (WHO, 2009). Drivers and passengers of motorcycles and three-wheel motor vehicles account for fewer than 10% of those injured in developing countries and the economic cost of the accidents in the developing world has been estimated at $65 billion. Road accident fatalities and serious injuries have been known to be substantially under-reported in official police statistics in developing countries (TRL, 1985). Figure 2 shows a dead commercial motorcycle rider, by the roadside unattended to, at an accident scene in Lagos. Figure 5 shows the number of victims that sustained injuries from motorcycle accidents in Lagos between 2000 and 2007. It reveals that males patronize commercial motor cycle riders than do females. Thus they are more involved in motorcycle accident cases.

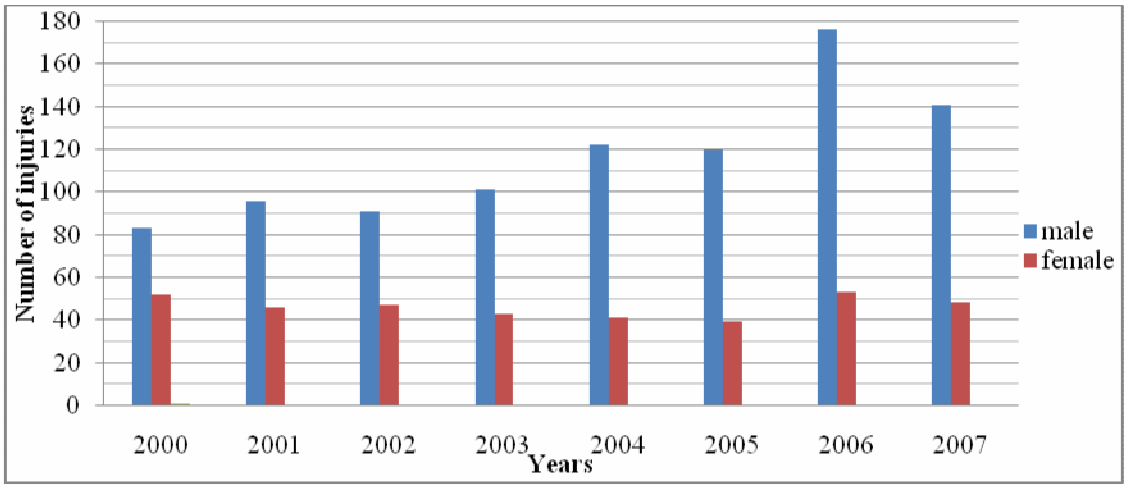

Figure 5: Motorcycle Injuries in Lagos State (2000-2007).
Source: National Orthopaedic Hospital, Igbobi, Lagos.(2006)

RESEARCH METHODOLOGY

Table 4: Distribution of Questionnaires.

Administered (Riders)	Considered in the Analysis	Administered (Passengers)	Considered in the Analysis
1,400	1,250	1,550	1,432

Source: Authors' analysis.

Data Source and Characteristics

The study covers Lagos State. Primary data sources include a survey of motorcycle operators and users (passengers) of motorcycles.

Sampling Technique

Stratified sampling method was adopted and all the Local Government Headquarters in Lagos State were considered. The choice of Local Government Headquarters was premised on the highest population concentrations and those of the riders who were at the Local Government Headquarters. This means the trip generation will also be concentrated at the local government headquarters. Since motorcycle movement take place on these roads, the choice of Local Government Headquarters is also justified.

Trip generation and attraction points such as markets, schools, hospitals, government offices, barracks and major road junctions were identified in collaboration with the local units of the riders' / operators' associations in Lagos. Every 20th counted rider (who was willing) was included in the survey. In a case of a decline, the next rider was chosen. The fact that these attractions points were their loading points assisted in getting the interview conducted. Passenger questionnaires were also considered at the identified trip generation and attracting centres with every tenth passenger included in the survey.

A Survey of Motorcycles Operators and Users/Passengers

Separate questionnaire schedules were administered. The first was on the operators of motorcycles, while the second set of questionnaires was administered on the users in Lagos State. A total of 1,400 questionnaires were considered good for Riders. Out of the 1,550 questionnaires administered for passengers, 1,432 were considered suitable for analysis. Table 3 shows the distribution of the questionnaires (Table 4).

Regression Analysis

Riders Involvement in Accidents

The number of times involved in accident (dependent variable) is first regressed against a set of independent variables X_1 – Bikes capacity, X_2 – Age, X_3 – Possession of driving / riding licence, X_4 – Full or part time riding, X_5 – Numbers of rides to a bike, X_6 – Age of motorbikes, X_7 –Training, X_8 – Educational Qualifications, X_9 – Riding Experience, X_{10} – Ownership of bikes, X_{11} – Operational Hours and X_{12} – Marital Status. This resulted in an R-value of 555a and R^2 of 308 with 1.028 standard error. The R^2 of .308 indicated that the independent variable listed above explained 30.8% of the dependent variable (number of times involved in accident. The significant variables at 95% level (<0.05) are riding experience, sex, number of riders on a bike, ownership of motorbikes, and possession of riding licence. These are significant factors of motorcycle accidents on the state (Table 5).

Table 5: Multiple regression (mood summaries for riders/involvement in accidents).

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.555a	.308	.287	1.018

Source: Authors' analysis. (2006)

Predictors: (constant). What is the capacity of your motorcycle? What class of driving licence do you have? Do you engaged in motorcycle business or part-time basis? How many of you ride this bike? How old is your motorcycle? How were you trained to ride the motorcycle? Educational qualification. How

long have you been riding motorcycle? Who is the owner of this commercial motorcycle? On the average how many hours do you operate in a day? Marital status.

Table 6: Summary Statistics of Independent Variables on Motorcycle Riders (Drivers) in Lagos State.

Independent variable	**Options in Numbers and Percentage (%)**							**Total Number and Percentage**
Educational Qualification	No Formal Education 196 (15.7%)	Primary School 228 (18.3%)	Secondary School 559 (44.8%)	OND/NCE HSC 248 (19.9%)	PGD/MSC 6 (0.5%)	BA/BSC 4 (0.3%)	Others (0.6%)	1,249 100%
Marital Status	Single 550 (44.2%)	Married 655 (52.7%)	Divorced 29 (2.3%)	Widowed 10 (0.89%)	-	-	-	1,244 100%
Income Level	Less than ₦200 4 (0.3%)	₦500-₦1,000 546 (43.8%)	₦1,000-₦1,500 568 (45.5%)	Above ₦1,500 130 (10.48%)				1,248 100%
Riding Experience before commencement of Operation	Less than 1 year 263 (21.1%)	1-2years 525 (42.2%)	2-3years 365 (29.3%)	Above 3years 92 (7.4%)				1,245 100%
Riding experience in the Operation	Less than 1 year 290 (23.3%)	2-5years 745 (59.7%)	6-9years 159 (12.8%)	Over 9years 53 (4.3%)				1,247 100%
Operational Hours	Less than 2hrs 34 (2.7%)	2-4hrs 332 (26.6%)	5-6hrs 547(43.9%)	6-8hrs 235 (18.8%)	Above 8hrs 99 (7.9%)			1,247 100%
Motorcycle Capacity	Below 80cc 8(0.5%)	Below 100cc 658 (53.2%)	Below 120cc 533(43.1%)	Below 200cc 8 (0.6%)	No Answer 31 (2.5%)			1,238 100%
Age of Motorcycle	Less than 1 yr 626 (53.1%)	2-4years 542 (45.9%)	5-7 years 2 (0.2%)	Above 7years 10 (0.8%)				1,180 100%
Reasons for engaging in Okada	Unemplo-yed 519 (42.1%)	Retrenched 48 (3.9%)	Interest/just like it 68 (5.5%)	Earn a living 562 (45.5%)	Others 37 (3.0%)			1,234 100%
Causes of Accident	Over-speeding 9 (12.5%)	Overloading 13 (18.1%)	Bad roads 41 (41.7%)	Reckless-ness by others 15 (20.8%)	Inexperience 4 (5.5%)	Passenger faults 1 (1.4%)		72 100%
Use of Helmet	Yes 155 (12.4%)	No 1,093(87.6 %)						1,248 100%

Source: Field Survey, (2008).

Educational Qualification(s)

In Lagos, motorcycles operation has been the work of the males between 18years and 45years. This type of economic activity was particularly common amongst an uneducated group of people. Presently, people with formal education have begun to engage in motorcycle transportation business due to unemployment, the economic situation and high levels of poverty. From table 6, 15.7% of the respondents have no formal education while 18.3% had primary school education. The bulk of the riders (44.8%) passed through secondary level of education. It was observed that, 19.9% of the riders possessed OND/NCE/HSE certificates, 0.5% possessed PGD/M.Sc and 0.4% had BA/B.Sc degrees. The involvement of a great number of people with higher formal education is as a result of the government policy on poverty reduction and job creation through the National Poverty Alleviation and Employment Programme which allows for the procurement of motorcycles which are made them available to beneficiaries who happen to be unemployed graduates.

Marital Status

The need to meet the family demand has made majority of men who are married but unemployed or retrenched from government services to be involved in commercial motorcycle operations. The table

shows that, 44.2% of the riders were single, 52.7% were married while 2.3% and 0.8% were divorced and widowed respectively. Married men who have vocational training and highly skilled workers in welding and fabrication electronics have been forced out of jobs as result of irregular electricity supply and the inability to buy generators. Most of them are now motorcycle riders on the streets of Lagos. The additional responsibility given to the Kick Against Indiscipline (KAI) Brigade, by Lagos State Government through the Lagos State Ministry of Environment in 2008, to clear and demolish illegal structures along the major roads and railway lines in Lagos Metropolis has forced the affected people in places like Oshodi, Oyingbo, Yaba, Ijora, Ikeja, Agege and so on to become motorcycle riders so as to make ends meet (Table 6).

Income Level

In relative terms, 65%of the people in Lagos live below the poverty level (less than 2 dollars per day). Table 6 shows that, 89% of the riders earn between ₦500 and ₦1, 500 Naira ($3.333 to $6.666) per day. Virtually all the motorcycle riders in Lagos live above the poverty level going by international standards.

Riding Experience before and during Operations

Experience they say, is the best teacher, but this does not count in the case of motorcycle operations in Lagos State. The table shows that, Out of the 1,245 respondents, 21.1% had been riders of commercial motorcycles for less than one year. 42.2% had ridden for 2 years, while about 7.4% had ridden motorcycles for 3 years or more. The table also shows that, 21.1% of the riders had operated motorcycles for a maximum of five years. 12.8% and 4.3% had operated for 9years and above 9 years respectively. The attractive daily earning from motorcycle operations has created an avenue for young men who are jobless to make money by riding motorcycle without undergoing training and having enough years of experience. This has caused accidents to occur in many cases (Table 6).

Operational Hours

Hours of operation of commercial motorcycle riders vary from one area to another in Lagos and depend on the activity of the people in a particular area. In table 6, 2.7% of the riders were found to be operating less than 2 hours daily, 26.6% operated between 2 and 4 hours daily, 52.7% operated between 5 and 8 hours daily and 7.9% operated above 8 hours daily. The more the hours a rider operates in Lagos, the higher the income he gets especially during morning and afternoon peak periods and even in off peak hours. They are occasionally used by robbers at night and this necessitated restrictions being placed on motorcycle operation in Lagos State, by Nigeria Police Force (NPF).

Capacity and Age of Motorcycle

The capacity of a motorcycle determines it price. The table revealed that, 54.1% of the bikes were below 100CC and 43.1% of the motorcycles were between 100CC and 120CC. All of these motorcycles in the state were mandated to carry one passenger at a time without carrying goods. Lack of enforcement on the part of the government and the urge to make more money by the riders induce the riders to carry more than one passenger and sometime with load without considering safety.

Regarding the age of commercial motorcycles on the road in the State, 53.1% of the bikes were less than 1 year old, while 45.9% were between 2 and 4 years. 0.2% of the bikes were between 5 and 7 years and 0.8% above 7 years. More than 50% of the motorcycles in Lagos were purchased brand new through the National Poverty Alleviation Employment Programme (NAPEP) and on hire purchase from private individuals for a certain period of time. The others were fairly used machines imported from Asian countries. The riders preferred these because they are cheaper and affordable compared to the new motorcycles (Table 6).

The Reasons for Engaging in Commercial Motorcycle (Okada) Transportation

Many of the riders are formally engaged in this business as a result frustration that stem from the harsh economic environment, unemployment and retrenchment. From table 6, 42.1% of the riders got engaged because they were unemployed, 3.9% were retrenched, 5.9% were driven by interests, 45.5% wanted to earn a living while 3.0% had no other reasons. The traffic situation in Lagos especially during morning and afternoon peak periods has paved way for the commercial motorcycle (Okada) business to thrive.

Causes of Motorcycle Accidents

The accidents are caused by human and mechanical factors. In Lagos State, 16.0% of the accidents are caused by over-speeding, 22.1% caused by over-loading, 49.8% caused by bad roads, 3.2% caused by the recklessness of others, 7.1% caused by inexperience of the riders and 1.8% caused by passengers. The bad condition of roads in Lagos has caused urban mobility problems and has necessitated the use of motorcycles which are also prone to accidents. The lack of enforcement has paved way for riders in Lagos to engage in over speeding, over loading and reckless driving (Table 6).

Safety Devices

Helmets as a safety protective device should be used by motorcycle riders and passengers. It was observed that only 12.4% of the riders used crash helmets and 87.6% did not use crash helmets while riding on the road. Virtually all motorcycle riders in Lagos are highly exposed to severe head injuries which can result in death because of the non use of crash helmets. Crash helmet enforcement was placed on motorcycle riders and passengers in Lagos by Federal Road Safety Corps (FRSC). In 2008 it compelled riders and passengers to use helmets. Presently, laxity in enforcement has allowed motorcyclist riders on the streets of Lagos without using helmets (Table 6).

Passenger Involvement in Motorcycle Accidents

A numbers of times, passengers involved in accident (dependent variable) is regressed as a set of independent variables. Z_1- Average expenditure on transport per day, Z_2- Occupation, Z_3-Annual income, Z_4-Sex, Z_5-Mode of public transport use, Z_6-Total weekly trips, Z_7-Reasons for the choice of motorcycle, Z_8- Marital status, Z_9- Educational Qualification, and Z_{10}-Age. The result revealed in R a value of .601 and R^2 of .361 (table), only marital status, mode of transport and total weekly trips were significant. This means that, the major causes of motorcycle accidents has to do with the riders and other factors rather than the passengers (Table 7).

Table 7: Model Summary.

Model	R	R Square	Adjusted R Square	STD. Error of the Estimate
1	.601a	.361	.336	.302

Source: Authors' analysis. (2008)

Predictors: (constant), average expenditure on transport per day, occupation, annual income, sex, mode of public transport used by respondents, total weekly trips, reasons for regular patronage of motorcycle, marital status, educational qualification, age.

Table 8: Summary Statistics of Independent Variables on Choice of Motorcycle by Passengers in Lagos State

Independent variable	Options in Numbers and Percentage (%)							Total number and percentage
Educational Qualification	No Formal Education 196 (15.7%)	Primary school 228 (18.3%)	Secondary school 559 (44.8%)	OND/NCE HSC 248 (19.6%)	PGD/MSC 6 (0.5%)	BA/BSC 4 (0.3%)	Others (0.6%)	1,249 100%
Martial Status	Single 748 (52.6%)	Married 560 (39.4%)	Divorced 70 (4.9%)	Widowed 45 (3.2%)	-	-	-	1,421 100%
Sex	Male 812 (56.7%)	Female 620 (43.3%)						1,432 100%
Age Distribution	1-10yrs 42 (3.18%)	11-20yrs 234 (17.7%)	21-30yrs 648 (49.1%)	31-40yrs 200 (15.2%)	41-50yrs 186(14.1%)	Above 50yrs 10 (0.75%)		1,320 100%
Annual income	Less than ₦25,000 511 (36.2%)	₦25,000-₦5,000 245 (17.7%)	₦50,001-₦75,000 168 (11.9%)	₦75,001-₦100,000 129 (9.1%)	₦100,001-₦125,000 144(10.2%)	Above ₦125,000 215(15.2%)		1,412 100%
Occupational structure	Student 443 (32.1%)	Trading 162 (11.7%)	Civil Servant 480(34.8%)	Unemployed 162 (11.7%)	Farming 51 (3.7%)	Artisan 23 (2.0%)	House wife 58 (4.2%)	1,379 100%
Choice of motorcycle	Faster 345 (29.7%)	Accessi-bility 294 (25.3%)	Comfort and convinces 54 (4.6%)	Safety 6 (0.5%)	Cheaper 63 (5.4%)	Beat traffic congestion 382(32.9%)	Others 18 (1.5%)	1,162 100%

Source: Field Survey (2008).

Educational Qualification(s)

The traffic congestion in Lagos state has compelled people to use motorcycles as a means of transportation, despite high accident rates during morning and afternoon peak periods. This was done in an attempt to get to their various destinations on time. 15.7% of the respondents, had no formal education, 18.3% passed through primary school while 44.8% had secondary school education. Twenty one percentage of the users were always late to their places of work or businesses and this necessitated the use of motorcycles when embarking on journeys to work. This helps to circumvent the traffic congestion on the road on daily basis (Table 8).

Sex

The males are the bread winners of the family and this makes them to be regular user of motorcycle than females and even more prone to motorcycle accidents on daily basis. Fifty six percentage of the passengers were males and 43.3% were females. More men use motorcycles than women and they are more exposed to motorcycle accident risks than females and consequently reduces life expectancy of men in Lagos State (Table 8)

Age Distribution

The various age groups of Okada users determine the set of people that are prone to motorcycle accidents on the road. The bulk of passengers (49.1%) were within 21-30 years bracket. 17.7% were in the 11-20 years bracket, 15.2% were within 31-40 years, 14.1% were within 41-50 years, 3.18% were within 1-10 years and 0.75% of them were above 50 years. The independent working class group within age 18-50 years are the major users of motorcycles because they make up the highest number of people who commutes to work weekly during the course of trying to make ends meet. This consequently reduces the life expectancy of these working age groups (Table 8).

Annual Income

Income levels determine the number of weekly trips and mode of transport, but the use of motorbikes in Lagos State cuts across the various income groups. Thirty six percentage of the users earn less than ₦25,000 per year, 17.4% earned between ₦25,000-₦50,000, 11.9% earned between ₦50,001-₦75,000, 9.1% earned between ₦75,001 to ₦100,000, 10.2% earned between ₦100,001 to ₦125,000 and 15.2% earned above ₦125,000 (Table 8).

Occupation Structure

High rent on housing has caused a significant number of Lagos residents to reside far from their various places of work and this has necessitated the use of commercial motorcycles (okada) to get to work on time. From Table 8, 32.1% of the users were students, 11.7% were traders, 34.8% were civil servant, 11.7% were employed, 3.7% were farmers, 2.0% were artisans, and 4.2% were housewives. The most prominent group of people using motorcycles for public transportation are civil servants, the high rent has forced many of them to stay far from their places of work and this has necessitated the use of motorcycles to beat traffic congestion.

Choice of Motorcycle

The choice of motorcycle varies from one user to another depending on order of preference. In table 8, about 32.9% of the respondents felt the need to beat traffic congestion as their first choice, the speed of the motorcycle with 29.9%, accessibility with 25.3%, cheapness with 5.4%, comfort and convenience with 4.6% and safety 0.5%.

Conclusion

The use of motorcycles for public transportation in Lagos as a means of urban mobility has attracted a high rate of accidents on the roads. The underreporting of accident cases by the Federal Road Safety Corps (FRSC) and Nigeria Police Force (NPF) is not assisting in the adequate appreciation of the problems, dept and consequent reduction plans on motorcycle crashes in Lagos. Efforts should be made by government to rehabilitate bad roads and encourage the use of taxis, thus reducing the influx of commercial motorcycles. Training and retraining of motorcycle riders must be emphasised; and the creation of proper enforcement measures through the Federal Road Safety Corps (FRSC) and Nigeria Police Force (NPF) should be undertaken at all times. In addition, an accurate data base should also be establish and regularly updated to help facilitate effective monitoring of commercial motorcycle activities for sustainable urban transport planning.

References

Gbadamosi, K.T (2004): "Traffic Regulations and Road Traffic Accidents – A Spatial Analysis". An Unpublished PhD. *Thesis* submitted to the Department of Geography, University of Ibadan.

Idowu, Y.A (2000): "Road Vision in the New Millennium," ACSE, Nigerian International Group *Monthly Technical Paper*, Ikeja.

Lagos Economic Summit Group (LESG, 2003): 3rd *Lagos State Economic Summit*, Ikeja; Ministry of Economic Planning and Budget.

Lagos State Metropolitan Transport Authority (LAMATA, 2010): BRT Lite Newsletter Volume 2. No 1, March 2010.

Lagos State Ministry of Economic Planning Budget (LSME&B, 2004): *Perspective on Lagos Economy*, Ikeja: Lagos State Ministry of Economic Planning Budget.

Olagunju, Y. K. (2009): "Safety Challenges of Commercial Motorcycle Operations in Nigeria. Case Studies: Lagos, Adamawa and Enugu States," An Unpublished PhD. Thesis submitted to Department of Geography, University of Lagos.

Olaseni, A.M. (2010): "Locational Analysis of Inter-city Road Passenger Terminals in Lagos," An Unpublished PhD. Thesis submitted to Department of Geography and Planning, Olabisi Onabanjo University, Ago-Iwoye, Ogun State.

Olatunji, V. O. (2008): "An Assessment of the Spatio-Temporal Impact of the Two-Wheeled Public Transport Operations in Metropolitan Lagos," An Unpublished PhD. Thesis submitted to Department of Geography, University of Lagos.

The Sun Newspaper (2008): Lagos Marks the Official Commencement of the Bus Rapid Transit (BRT) Scheme in Lagos," *The Sun Newspaper*, March 17, 2008

Time Magazine (1996): "Livability rating of 114 cities of the world," *Time Magazine*, December 10, 1996.

Transportation Research Board (TRB, 1985): *The Demand for Bus Transport* Crowthrone: Transportation Research Board.

United Nations Center for Human Settlement (UNCHS, 1998): *Global Urban_Indicators Database*, Nairobi. Urban Indicator Programmes.

United States Department of Transportation; Bureau of Transportation Statistics (USDOT, 1997): Transportation Statistics Annual Report, 1997. Mobility and Access BTS97S-01 Washington D.C. USDOT BTS.

World Bank (2002): *Cities on the Move: A World Bank Urban Transport Strategy Review*; Washington D.C. World Bank.

World Business Sustainable Development (WBCSD, 2001): *Monthly 2001 World Mobility at the end of the Twentieth Century and its Sustainability.* Massachusetts: Massachusetts Institute of Technology

World Health Organization (WHO, 2004): *Road Safety is No Accident*: Brochure for World Health day, 2004, Geneva; World Health Organization.

World Health Organization (WHO, 2009): *Time for Action*. Global Status Report on Road Safety of the World Health Organization, Geneva.