

Role of Risk Perception and Other Risk Related Judgement in Road Transportation: Ado-Ekiti as Case Study

Grace Ata, Olufikayo Aderinlewo*

Department of Civil Engineering, Federal University of Technology, Akure, Nigeria

*Corresponding author's Email: faderin2010@yahoo.com

ABSTRACT: The role of risk perception and other risk related judgement of the user of commercial vehicles, bicycle, buses, private cars, tankers and road haulage trucks as means of road transportation in Ado-Ekiti, Ekiti State, Nigeria were examined in this paper. In addition, the spatial dimensions of the level of commuter risk awareness in Ado-Ekiti, Nigeria were explored. The respondent's perceptions/views on each of the risks that could be experienced by vehicle drivers as well as their relative possibilities of causing accidents in each of the locations examined in Ado-Ekiti namely Old Garage, Basiri, Odo-Ado, Ilawe, Ajilosun and Opopogbooro roads have been evaluated. The factors capable of causing road accidents in the six locations considered were identified and assessed through questionnaires. Based on the results, the risk factors appeared to be site specific while 'tailgating' seemed to be the most dominant factor responsible for causing road accidents with up to 40% occurring along Opopogboro road.

Keywords: Risk perception, spatial dimensions, commuter risk, risk factors, tailgating

ORIGINAL ARTICLE

1. INTRODUCTION

The role of risk perception and other risk related judgement in road transportation cannot be explored without an understanding of risk and how it is perceived with regards to road transportation. Risk may be defined as the systematic ways of dealing with hazards and insecurities introduced by modernization itself [1]. Risk doesn't just happen, it is brought about by human activities, sometimes unwittingly but frequently by someone somewhere along the line estimating rightly or wrongly with a course of action.

Risk perception is the process of identifying, evaluating, managing and communicating hazards [1]. In Ado-Ekiti, most people travel from one place to the other by road in both private and commercial vehicles. A road can be defined as a pathway established over land for the passage of vehicles, people and animals from one place to another. Road infrastructures are large consumers of space with the lowest level of physical constraints among transportation modes. However, physiographical constraints are significant in road construction with substantial additional costs to overcome features such as rivers or rugged terrain.

Motorcycles have constituted a significant proportion of modal choice of commuters in many cities in Nigeria. Motorcycle transport possesses several unique features such as narrow width, small size, high power-to-weight ratio and intuitive steering. These features provide freedom in a traffic stream and cause some characteristic behavior patterns in mixed traffic flow [2]. Studies show that motorcycles generally present more complex behavior than passenger cars do; they exhibit more erratic and chaotic trajectories when making progress and do not always follow the lane disciplines strictly [3].

Although the use of motorcycles for urban transportation is not a new phenomenon in Nigeria, it has been used as intra-city, inter-urban and rural transport service in some areas of the country for over three decades. It has also served as the common mode of inter-rural and rural-urban transport in the dispersed settlements of the eastern states of Nigeria and areas where the conventional public transport system services were not available [4,5,6].

The number of registered motorcycles has increased from 6,786 in 1990 to 30,036 in 1994 [7]. In the same vein, the number of registered motorcycles increased sharply from 218,802 in 2001 to 288,474 in 2004 [3]. The reason for this rise has been associated with the poor economic situation in Nigeria [8]. It was also observed that commuters now prefer motorcycle transportation because it is more flexible and cheaper than other means of motorized road transport.

Despite the increasing preference for motorcycle transportation in the country, the level of danger associated with it is quite massive. For instance, between 2000 and 2005, motorcycles accounted for 21,876 (31%) of accidents in the country. With the growing rate of motorcycle accidents and the increasing commuters' demand for commercial motorcycles, there is a major concern to investigate this mode of transport and the user's perception of the danger associated with the mode.

In light of the indifferent attitude of commuters to the dangers inherent in commercial motorcycle operation, this study attempts to examine the role of risk perception and other risk related judgement of the user of commercial vehicles, bicycle, taxi, buses, private cars, tankers and road haulage trucks as means of road transportation in Ado-Ekiti, Nigeria. It will also explore

the spatial dimensions of the level of commuter risk awareness in Ado-Ekiti, Nigeria.

1.1 Problem statement.

The problem of road safety is of great magnitude. In terms of number of crashes, fatalities and injuries, the dominant mode of transportation in Nigeria is the roadway. An analysis of the traffic crash data recorded over a five year period between 2000-2006 shows that 98,494 cases of traffic crashes were recorded out of which 28,366 were fatal and resulted into 47,092 deaths [9]. The data shows Nigeria experiencing the highest rate of road tragedies in the world.

The condition of roads can be described as a major factor contributing to crashes. Although the attitude of road users is also a significant factor, the impact of road signs and the availability of road markings on drivers cannot be ignored. The need to investigate road accidents/crashes in Ado-Ekiti has become necessary in order to create public awareness as regards their occurrence on state roads. Lack of regular road maintenance such as the provision of traffic lights, lined drains, median kerbs, side kerbs, bridges and pavement shoulders, roundabouts also contribute to accidents. Other essential road furniture such as guard rails, towing vehicles, parking facilities, junctions/intersections, pedestrian facilities (walkways), bicycling facilities, motorcycling/tricycling facilities, street lights and road markings are also missing on Ado-Ekiti State roads.

1.2. Aim and Objectives

This paper assesses the role of risk perception and other risk related judgement in road transportation with Ado Ekiti as a case study. Furthermore, it identifies and analyses the causes of road accidents, identifies and assesses risk indicators in road transportation and how they can be measured, assesses risk perception with regard to road transportation and establishes a process by which risk can be handled by individuals as well as the transportation authorities concerned in Ado-Ekiti.

1.3 Contribution to knowledge

This study provides a process of identifying risk, evaluating risk, managing risk, communicating risk perceptions and other risk related judgement in road transportation. It achieves this by shedding better light on the impacts of vehicle and motorcycle operations on the age range of their operators, their educational background and perception of people about the use of vehicles.

It provides a better understanding of the environmental impacts of vehicle operations in Ado-Ekiti such as the trend of vehicle registration, flexibility of traffic rules on the highway, impacts of motorcycle operations on the human health, fatality rate from traditional healers and state specialist hospital as well as causes of vehicle and motorcycle crashes. It provides measures by which risk in road transportation can be perceived and quantified.

2. BACKGROUND LITERATURE

2.1. Identification of Risk

Risk assessment is defined as the scientific process of identifying unwanted consequences and their causes and calculating their probabilities and magnitude

[10]. Some of the risks and their causes that affect road transportation include; impatience of drivers, impatience of road users, fatigue, poor vehicle condition, children playing on the road, over speeding, taking drugs and driving, poorly maintained road, poor health condition, climatic change, traffic congestion, drinking and driving, use of mobile phones (hand-held) while driving, use of mobile phones (hands-free) while driving and over speeding.

A road accident occurs when a vehicle collides with another vehicle, motor cycle, pedestrian or animal. This can result in injury, property damage, death and permanent disabilities. A "factor" is a circumstance contributing to a result. Conditions and events are closely interrelated when considering accident factors. Some may be obvious and others difficult to determine.

2.1.1 Traffic Crashes

The term "cause" refers to an at-fault determinant of a crash or a determinant that increases crash risk or severity. Investigating causes of traffic crashes is complicated by the fact that a given crash seldom has a single unambiguous cause. Crash causes are often a sequence of causes. Crashes are caused by many factors, sometimes singly but more frequently in combination. Traffic crashes are caused due to interaction of vehicle, driver, roadway and environmental factors or characteristics.

- Driver characteristics

The major contributing factor for many crashes is the performance of driver in both single vehicle and multivehicle crashes. The pre-crash driver behavior and attitude is very important in judging the driver's actions. These include inattention, cigarette smoking, medical conditions, alcohol and drug abuse, inattention to the roadway and surrounding traffic, speeding and disregard of traffic laws and/or traffic control devices. Human factors are without doubt the most complex and difficult to isolate as they are almost all very temporary in nature. Drivers today are faced with many problems when driving in congested and overcrowded cities, specifically by having the senses overloaded by the vast amount of information that needs to be continuously processed, a condition also known as information overload [11]. The types of information a typical city driver may encounter and need to react upon are numerous.

- Vehicle characteristics

A small percentage of crashes are caused by mechanical failure of a vehicle such as some form of tire failure, brake failure, or steering failure. The vehicle and roadway interaction play a major role in stopping the vehicle from encroaching the off road features like wheelbase, median and other traffic signages. Other vehicle characteristics like wheelbase and height of centre of gravity play an important role in rollover crashes. Improvements have been made in the manufacture of tires and vehicle design, however, defects can still occur during use or if the product is poorly maintained.

- Road way characteristics

The roadway conditions like the quality of pavements, shoulders, traffic control devices and intersections can be a factor in the crash. Fewer traffic control devices and complex intersections with excessive signage lead to confusion. Highways must be designed for

adequate sight distances for the design speed. The traffic signals should provide enough time to make a decision when the signal changes from green to red. The superelevation on highways and especially ramps should be carefully laid with correct radius and appropriate transition zones for the vehicles to negotiate curves between the pavement and tires. If the tires lose contact with the pavement then the vehicle starts fishtailing.

Road factors include, but are not limited to view obstruction, surface characteristics, dimensions, signs and signals and protective devices. All factors are subject to modification by outside influences such as the road surface that becomes slick from rainfall. Some roads were not built to serve the current high-volume and/or high-speed traffic needs. The safety of these roads is limited by hazards such as sharp curves, poor signs and pavement marking, and lack of medians to separate oncoming traffic.

- Environmental characteristics

The climatic and environmental conditions can also be a factor in transportation crashes. Wet pavement reduces friction and flowing or standing water can cause the vehicle to hydroplane. Many severe crashes have occurred during conditions of smoke or fog which can greatly reduce visibility. Vehicle travelling at high rate of speed are unable to see the slowing and or stopped vehicles in front of them which can lead to multiple-vehicle pile-up. Glare can reduce driver's visibility, especially during the hours of sunrise and sunset. Wind gusts can affect vehicle stability, especially of large trucks and light weight vehicles such as bicycles and motorcycles.

2.1.2 Causes of Road Accidents directly related to the User

There are several factors which are directly related to the user and which have been considered in this study namely:

- Distracted Driving

Distracted driving is one of the major causes of road accidents in our society today. A distracted driver is a motorist whose attention or focus is shifted from the road while driving. It is an offence for drivers to use hand-held mobile phones or any other similar devices while driving.

- Over speeding

Over speeding has long been recognized as a major factor in many road crashes. In Australia, excessive speeding has been noted as a contributing factor in up to 30 percent of fatal crashes. Much is already known about the consequences of excessive speed in a crash. The faster the impact speed, the greater the likelihood of severe injury or death in a collision as predicted by physics. The faster a vehicle is driven, the slower the driver's reaction time will be.

- Drunk Driving

A driver loses his ability to focus and function properly on the wheels under the influence of alcohol. Driving under the influence (DUI) causes car accidents on a daily basis.

- Reckless Driving

Reckless driving causes needless car accidents and such behaviour is marked by over speeding and sudden change of lanes and tailgating.

- Rain and fog

If there is heavy rainfall, car accidents can occur because water creates slippery and dangerous surfaces for vehicles causing automobiles to spin out of control or skid while braking. On the other hand, fog makes it extremely difficult to see sometimes more than a car length in front of you. Headlights can be used to prevent such accidents especially when driving at night.

- Night Driving

Daylight driving can be hazardous, but the risk of a car accident occurring is doubled at night. It is difficult to anticipate the prevailing situation ahead when there is poor visibility, hence, the driver's awareness of his surroundings must increase as darkness begins to fall.

- Design Defects

No product is ever made perfectly and cars are no different. Automobiles have hundreds of parts and any of those parts could be defective resulting in serious car accidents.

- Unsafe Lane Changes and Improper Turns

There will always come a time where you need to get over to another lane. To prevent accidents in such situations, the driver should use his turn signal, check for blind spots and always proceed carefully into the next lane.

- Tailgating

Many road users, in their impatience, drive so closely to other vehicles such that they find it difficult to react in time if the vehicle in front of them suddenly comes to a halt. Many fatal car accidents have occurred when motorists dangerously tailgate other vehicles at high speeds. Such accidents can be prevented by always leaving the car ahead a one-car-length buffer for every 10 mph driven.

- Driving Under the Influence of Drugs

Drugs, both legal and illegal, can impair a driver's ability to properly manoeuvre a vehicle. Getting behind the wheel can lead to serious accidents if the driver's mind is not clear and he does not have complete control over his body.

- Road Rage

There is the possibility for drivers to be angry with one another for a number of reasons related to their driving behaviour. However, allowing such anger to overcome them could result in accidents. An example of such is when a driver tailgates, speeds past and suddenly pulls up and brakes in front of another driver in anger.

- Potholes

Drivers run the risk of losing control of their vehicles or experiencing a "blowout" when they drive over these potholes. Accidents can be prevented in such instances by avoiding such potholes.

- Drowsy Driving

Driver fatigue is one of the several causes of road accidents which usually occurs at night. A driver who may be having trouble staying awake will definitely not be in full control of the vehicle which may result in accidents.

- Deadly Curves

Great care should be exercised when approaching a curve. Many motorists lose control of their vehicles and consequently, their lives along a dangerous curve. It is therefore imperative to take heed of the posted speed limit/signs and to drive cautiously when approaching such curves.

- Car seats and seatbelts

The value of seat belts is indisputable. It is the driver's responsibility to ensure that all the passengers in his vehicle are properly restrained.

- Motorcyclists and cyclists

Despite forming only 1% of road traffic, motorcyclists are extremely vulnerable to accidents. They account for 20% (one in five) of road deaths and serious injuries. Hence, they are required to wear their helmets all the time in order to avoid serious injuries.

2.2 Categories of Road Users

The road users can be categorized as follows: motorists, pedestrians (including children and hawkers), cyclists and animals.

- Motorists (and passengers)

This class of road user is generally enclosed in motor vehicles. Because of this enclosure they feel protected and often assume immunity from accidents. The driver of a vehicle has only the protection guaranteed by his strict obedience to traffic rules and also by the use of the seat belt which if properly used reduces the severity of injuries by at least 50% in the event of accidents.

Drivers and cyclist are urged to be careful near schools, churches, mosques, markets, snacks shop, ice-cream stalls, parks, fruit trees or street hawkers because children are always found in such places. Children between ages 0-12 month should not be allowed to ride in the front seat of a vehicle. The child restraints should be attached, such that the child will face the rear of the seat.

- Pedestrians

The pedestrian is a person who walks on the road especially in an area also used by vehicles. Drivers share the road with many other road users among who are pedestrians who are part of the exposed road users. Generally, there are three types of pedestrians most often involved in road traffic crashes namely children, the elderly and adults under the influence of alcohol and drugs. In order to ensure pedestrian safety, the following should be observed:

- Use pavement or suitable foot paths where provided.
- Face on-coming traffic when walking on the road sides where footpaths are not provided.
- Wear white, bright coloured or reflective clothing when walking in the dark. This allows the driver to easily see the pedestrian.
- Do not cross the road between or in front of parked vehicles because other drivers may not see you.
- Before you cross the road, stop, look to the left, right and left again. When the road is clear, walk directly and quickly but keep looking out for fast on-coming vehicles. Do not run because you may trip over and fall.

While crossing the road, children should use overhead/foot bridges where provided, use bicycle paths where provided (or ride towards the kerbs facing traffic where a cycle path is not provided) and not play on the roads.

- Cyclists

A cyclist is a person that rides a bicycle, motorcycle or tricycle or other such vehicles. A bicyclist is a person who rides a bicycle by pushing

the pedal with his feet. Bicycles are considered vehicles and have the same right of way as motor vehicles. Bicyclists are expected to obey the same traffic rules and regulations as other vehicles. For cyclists to ensure their protection the following should be observed:

- Ensure your cycle is in good condition before riding and pay attention to the brakes, tires, lamps and rear reflectors.
- Ensure that you glance behind before starting off, making turns or pulling up.
- Ensure that you don't ride side by side with other cyclists.
- Ensure that you always hold on to the handlebar firmly, keep your feet on the pedal and don't carry a passenger (or loads) unless your cycle has been built for that purpose.
- Ensure that you don't ride too closely behind another vehicle.

- Animals

The following precautions should be observed when crossing animals on the road:

- Animal in the vehicles should be kept under control so that the driver's concentration is not adversely affected.
- Do not let your pet animal out on its own
- While leading an animal on a road that has no foot path, walk on the left hand side of the road and keep it close to the edge of the road.
- When riding a horse, keep to the right side of the road
- When herding animals along or across the road, someone should be sent ahead to warn drivers at such places like bends and brows of hills where motorists may not be able to see the animals in good time.
- Always lead herds of animals in the direction of traffic flow.

2.2.1 Road Signs, Marks and Signals

A thorough knowledge of traffic signs, signal, road and pavement markings is required of all drivers. Road signs and markings together with signals are to ensure smooth and safe traffic flow. Drivers must know them, be able to recognize them immediately and obey them without hesitation.

- Road Signs

Road signs provide information which includes traffic regulations, special hazards and other conditions, construction areas and speed limits. Road users should be familiar with each of the signs as well as their special shapes and colours.

- Road Markings

Road markings usually indicate the number of road lanes, points at which drivers can overtake other vehicles, the lanes to use for making turns and where stops can be made. There are four major types namely centre line, edge lines, cross walks and pavement messages.

- Centre Lines

These are lines introduced in the centre of the road to separate traffic proceeding in opposite directions. Broken lines are used in area where there are no restrictions on overtaking. In areas where there are

restrictions on overtaking, a solid line is painted alongside the broken line; drivers may not overtake if the solid line is on his side of the centre line. Overtaking in a situation where traffic proceeds in both directions and where the centre is marked by double solid lines is strictly forbidden.

➤ **Edge Lines**

These are solid lines along the side of the road. They indicate where the edges are and where they can be used as traffic guidance. An edge line which slants towards the centre of the road forewarns that the road narrows ahead. An edge line may be crossed only by traffic moving to and from the shoulder of the road.

➤ **Cross Walk**

White solid lines across the road are usually used to denote pedestrian crosswalks commonly at intersections. Drivers are required to stop for pedestrians at cross walks.

➤ **Pavement Messages**

These are messages or symbols which are lettered or painted on the road pavement to warn of conditions ahead.

- **Diagonal Lines**

Diagonal lines are painted on the road for protection, to separate traffic or prevent traffic from turning left and are not to be driven over.

- **Zebra Lines**

They are used to indicate where pedestrians can cross the roads. Drivers must stop for pedestrians that have stepped on the lines. They must also be left clear in queues.

- **Road Signals**

Road signals involve regulatory signs, prohibitive signs, mandatory sign and informative signs. Regulatory Signs are mostly circular in shape and can be classified into two groups namely prohibitive and mandatory signs. Those with red and yellow circles are prohibitive signs such as stop signs while those with blue circles but no red borders are mandatory signs. Informative signs are usually rectangular in shape and provide guidance information.

2.12. Speed Limits

A speed limit can be described as the pace of a moving vehicle in a given time frame which is established according to laid down traffic laws. It is the maximum legal speed a driver can travel on a road under ideal conditions. Speed limits depend on the types of roads, vehicles and the environment.

- **Speed Limit for Different Vehicle**

Different vehicles are required by law to keep within specified speed limits on different roads. For example, in Nigeria, the law imposes maximum speed limit of 100km/hr for cars on any highway. Taxis and buses are expected to maintain a maximum speed limit of 50km/hr within built-up areas like streets in towns, villages and cities. Vehicles like tankers and trailers are expected to maintain a maximum speed limit of 50km/hr on the highways and 60km/hr on express ways. In bad weather conditions or in cases where the road is defective, vehicle speeds should be regulated to prevent accidents. Speed limits for different vehicles on different road are indicated in Table 1 below.

Table 1. Speed Limits for different Vehicles on different Roads (in km/hr) [9]

Types Of Vehicles	Town And Cities	Highways	Expressways
Motorcycles	50	50	60
Private cars	50	80	100
Taxis and buses	50	80	90
Tankers/trailers	45	50	60
Tow vehicle (while towing)	45	45	45
Tow vehicle (while not towing)	50	60	70

2.2.2 Accident Prevention

Accidents are a major cause of death and disability. Hence, accident prevention can be regarded as an important part of health promotion.

There are three levels at which accident prevention occurs namely:

- Primary prevention which involves removal of circumstances causing injury such as traffic speed reduction, fitting stair gates for young children and reducing alcohol consumption.
- Secondary prevention which involves reducing the severity of injury should an accident occur such as use child safety car seats, bicycle helmets and smoke alarms.
- Tertiary prevention which involves optimal treatment and rehabilitation following injuries such as effective first aid, appropriate hospital care.

3.0 MATERIAL AND METHOD

3.1 Data Sources

Data for this study was obtained through data retrieval, use of questionnaires, personal interviews and

from articles in various media well as from the internet. The database above can be categorized into two major sources of data namely primary sources and secondary sources. Primary sources involve the use of questionnaire and direct personal interviews of the road users while secondary sources involved sourcing information from literature texts and the internet.

3.1.1 Data Retrieval

Extensive study of literature on the subject matter were undertaken, this actually includes the global description of Vehicle operation and the impacts on road Transportation.

3.1.2 Personal Interview

Extensive discussions were held with relevant officials in different agencies and organizations namely Ministry of Transportation, Command Police Force, State Hospitals, Amalgamated Commercial Motorcycle Owners/Riders Association of Nigeria (ACOMORAN), Federal Road Safety Commission and Licensing Office all located in Ado-Ekiti.

3.2 Questionnaire Administration

The data gathering exercise was made possible mainly through the use of well structured but brief questionnaires.

Table 2. Sample Questionnaire

	Factors Causing Road Accidents	Rating					
		1	2	3	4	5	6
1	Driving when tired						
2	Drinking and driving						
3	Following the vehicle in front too closely (tailgating)						
4	Driving too fast						
5	Taking medicines and driving						
6	Taking drugs and driving						
7	Poorly maintained road						
8	Using a mobile phone (hand-held) and driving						
9	Using a mobile phone (hands-free) and driving						
10	Traffic congestion						
11	Bad weather conditions						
12	Poor brakes/brake failure						
13	Bald tires						
14	Burst tires						
15	Faulty light						
16	Defective steering						
17	Lack of seat belt use						
18	Impatience of road users						
19	Children playing on the road						
20	Other mechanical failure						
21	Defective horns						
22	Wind shield (Poor visibility)						
23	Absence of rear view						

The data collection exercise took place over two months (i.e. July and August, 2011). 23 questions rated on a six-point rating scale were asked which bordered on issues of interest among users and users' perception of the causes of vehicles crashes. The scale was defined as follows: a rating of 1 indicates "Never", a rating of 2 indicates "Rarely", a rating of 3 indicates "Sometime", a rating of 4 indicates "Often", a rating of 5 indicates "Very often" and a rating of 6 indicates "Always". Table 2 shows a sample of the questionnaire that was administered.

In order to obtain risk perception data and other related data, 180 questionnaires were administered to a population of road users comprising of vehicle users (both commercial and private), victims of motorcycle crashes, various related organizations (such as Federal Road Safety Commission (FRSC), Ministry of Transport, Association of Vehicle and Motorcycle Operators in Ado-Ekiti (ACOMORON)) and hospitals. The questionnaires were also administered at various motorcycle terminals in Ado-Ekiti (complemented by one-on-one interviews) during off peak periods and peak periods. The questions were targeted towards obtaining risk perception data along six

routes/roads in Ado-Ekiti namely Old Garage, Basiri Road, Odo-Ado, Ilawe-Road, Ajilosun and Opopogbooro with each assigned 30 questionnaires.

The risk perception factors considered were developed based on the causative factors outlined in table 3.1 and abbreviated as follows: Driving when tired - DWT, Drinking and driving - DAD, following the vehicle in front too closely [tailgating] - FVFC, driving too fast - DTF, taking medicines and driving - TMAD, taking drugs and driving - TDAD, poorly maintained road - PMR, using a mobile phone (hand-held) and driving - UMP(hh)AD, using a mobile phone (hand-free) and driving - UMP(hf)AD, traffic congestion - TC, bad weather condition - BWC, poor brakes/break failure - PBF, bald tires - BaT, burst tires - BuT, faulty lights - FL, defective steering - DS, lack of seat belt - LOSB, impatience of road users - IORU, children playing on the road - CPOTR, other mechanical failure - OMF, defective horns - DH, wind shield (poor visibility) - WS(PV) and the absence of rear view (AORV). Table 3 shows responses for Basiri road (similar tables were developed for the other five roads). The responses for each risk factor were thereafter tabulated for the six roads considered as case study one after the other. One of such tables is shown in table 4 for "driving when tired (DWT)" risk factor.

4. Analysis of Data and Interpretation of Results

The data analysis was carried out using Microsoft Excel statistical package so as to arrive at the percentage possibility of each risk factor causing accidents along the selected roads. Figure 1 shows a pie chart indicating DWT's percentage possibilities of causing accidents along each of the six roads. Table 5 summarizes the percentage possibilities of accidents occurring along the six roads due to each of the risk factors.

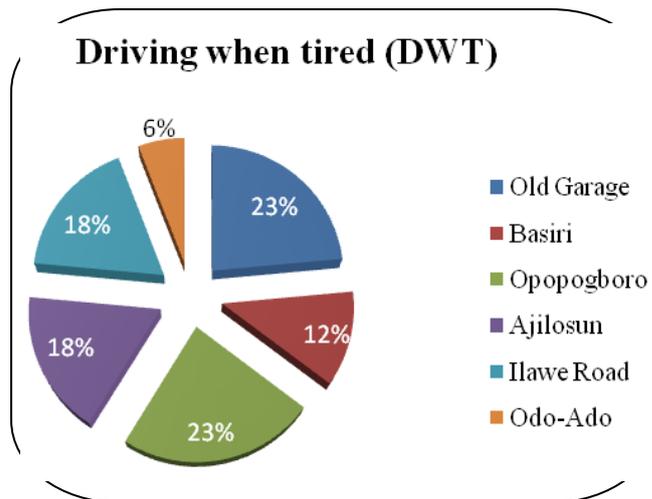


Figure 1. Percentage possibilities of "driving when tired (DWT)" causing accidents along the six roads

Based on the figures in table 4.1, the lowest possibility for accidents to occur was recorded along Ajilosun and Ilawe roads both at 0% due to "following the vehicle in front too closely (FVFC)" and "taking drugs and driving (TDAD)" respectively. The highest possibility for accidents was recorded along Opopogboro at 40% also due to "following the vehicle in front too closely (FVFC)".

Table 3. Responses from Basiri Road, Ado-Ekiti

S/N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	DWT	DAD	FVFC	DTF	TMAD	TDAD	PMR	UMP(hh)AD	UMP(hf)AD	TC	BWC	PBF	BaT	BuT	FL	DS	UOSB/LOSB	IORU	CPOTR	OMF	DH	WS(PV)	AORV
1	2	2	4	4	4	4	4	4	2	3	2	2	2	2	2	2	2	2	3	3	3	3	3
2	2	2	2	2	2	1	3	3	1	3	3	3	3	3	3	2	2	2	2	2	1	2	2
3	6	6	6	6	6	4	4	4	4	4	4	4	2	2	2	2	2	2	3	3	3	3	3
4	2	2	2	3	3	2	3	2	2	2	2	2	2	4	4	4	4	3	3	2	2	2	2
5	1	1	1	2	3	3	3	3	3	2	2	2	2	2	3	3	3	2	2	2	2	2	2
6	2	2	2	2	2	3	3	3	3	3	3	3	3	4	4	4	4	4	2	3	3	3	2
7	2	2	2	6	3	6	6	6	6	6	6	4	4	3	1	2	4	5	2	3	3	5	4
8	5	6	6	6	6	6	6	4	4	4	4	4	4	4	2	2	2	2	2	1	1	1	1
9	4	5	3	4	2	3	5	6	3	3	2	6	4	5	3	4	2	6	2	5	4	6	6
10	2	1	3	3	1	1	4	3	3	4	2	6	4	3	1	6	5	4	2	3	3	2	2
11	2	1	2	3	1	1	6	3	4	2	3	4	2	4	6	2	5	2	3	5	4	3	3
12	5	6	3	2	2	3	3	3	4	2	2	5	2	2	2	2	2	2	3	4	2	2	2
13	2	4	3	3	3	3	4	3	2	2	3	3	3	3	4	3	2	2	2	2	2	2	2
14	3	3	3	3	5	5	5	5	5	4	4	4	4	4	4	2	2	2	2	2	2	1	3
15	3	3	4	5	3	4	6	3	3	2	2	3	4	3	2	4	5	6	1	3	3	3	3
16	2	3	2	4	3	2	3	4	3	4	3	2	4	3	5	4	3	2	4	3	2	5	4
17	6	5	4	3	2	3	4	3	2	4	3	6	4	3	4	5	3	4	6	4	3	2	4
18	2	3	4	3	2	3	5	4	2	3	6	4	3	1	3	5	6	5	4	3	2	1	3
19	6	4	3	4	3	4	3	5	3	4	5	4	3	2	5	4	2	4	6	4	3	2	4
20	6	6	1	6	3	3	6	5	4	3	4	5	6	6	3	4	2	5	4	5	3	5	4
21	5	6	3	6	2	2	4	3	5	2	5	4	6	6	2	1	4	2	5	3	5	5	6
22	6	5	3	5	3	2	5	4	5	2	3	4	5	3	4	2	3	6	4	3	4	3	6
23	1	3	3	4	5	4	3	4	3	5	6	2	3	4	3	5	4	3	1	2	3	4	6
24	2	1	3	3	1	1	5	4	3	2	3	5	4	3	3	5	3	1	1	2	3	2	4
25	3	2	3	2	1	1	4	3	4	4	3	3	4	3	4	5	5	4	3	2	4	4	1
26	3	1	2	4	1	1	2	3	4	4	2	6	3	3	1	2	1	3	1	2	3	5	3
27	2	1	3	3	1	2	3	4	6	6	2	2	3	2	1	3	2	3	2	4	2	3	2
28	3	1	2	3	4	5	3	4	3	1	2	3	1	3	1	4	2	4	1	3	2	3	3
29	3	2	3	4	3	3	2	3	5	5	4	3	6	5	3	3	2	3	4	1	1	3	3
30	1	3	3	4	1	2	1	3	3	2	4	3	2	5	1	1	2	4	2	3	1	2	3

Table 4. Respondents perception on “driving when tired (DWT)” risk factor for the six roads

Respondent(s)	Road Locations					
	Old Garage	Basiri	Opopogboro	Ajilosun	Ilawe Road	Odo-Ado
1	4	2	4	3	3	1
2	4	2	3	3	3	3
3	3	6	6	3	3	2
4	5	2	2	3	4	3
5	5	1	4	1	4	2
6	6	2	3	4	4	4
7	3	2	2	2	1	1
8	3	5	2	1	1	3
9	5	4	2	5	6	4
10	6	2	5	3	6	3
11	6	2	6	3	6	2
12	5	5	5	3	5	2
13	6	2	5	3	5	3
14	5	3	5	3	6	3
15	5	3	4	3	5	2
16	2	2	4	3	3	4
17	6	6	1	3	3	4
18	3	2	3	5	5	3
19	5	6	5	3	4	5
20	3	6	6	2	4	5
21	3	5	1	5	4	6
22	4	6	6	6	4	3
23	1	1	6	1	3	3
24	1	2	1	2	5	2
25	1	3	1	3	5	6
26	1	3	6	3	6	3
27	1	2	2	3	3	5
28	6	3	3	3	3	3
29	6	3	3	1	5	3
30	2	1	2	1	6	4

Table 5. Possibilities of accidents (%) occurring along the six roads due to the risk factors.

	Risk factor	Old Garage	Basiri Road	Opopogbooro	Ajilosun	Ilawe Road	Odo-Ado
1	Driving when tired	23%	12%	23%	18%	18%	6%
2	Drinking and driving	14%	9%	24%	29%	19%	5%
3	Following the vehicle in front too closely [tailgating]	27%	13%	40%	0%	13%	7%
4	Driving too fast [overspeeding]	20%	16%	16%	24%	8%	16%
5	Taking medicines and driving	14%	9%	24%	29%	19%	5%
6	Taking drugs and driving	12%	23%	24%	29%	0%	12%
7	Poorly maintained road	16%	15%	19%	23%	19%	8%
8	Using a mobile phone (hand-held) and driving	25%	16%	21%	17%	17%	4%
9	Using a mobile phone (hands-free) and driving	17%	11%	22%	28%	17%	5%
10	Traffic congestion	38%	23%	8%	15%	8%	8%
11	Bad weather conditions	12%	12%	12%	29%	17%	18%
12	Poor brakes/brake failure	13%	9%	17%	26%	22%	13%
13	Bald tires	12%	8%	21%	25%	21%	13%
14	Burst tires	20%	7%	16%	19%	19%	19%
15	Faulty light	5%	11%	17%	17%	22%	28%
16	Defective steering	15%	10%	20%	15%	20%	20%
17	Using of seat belt/Lack of seat belt	18%	12%	12%	23%	12%	23%
18	Impatience of road users	17%	12%	23%	18%	12%	18%
19	Children playing on the road	28%	16%	11%	17%	17%	11%
20	Other mechanical failure	27%	14%	18%	5%	18%	14%
21	Defective horns	12%	17%	18%	12%	12%	29%
22	Wind shield (Poor visibility)	19%	14%	14%	10%	14%	29%
23	Absence of rear view	12%	19%	19%	12%	13%	25%

Considering each road, the risk factor resulting in the lowest possibility for accidents along Old Garage is “faulty light (FL)” at 5%, along Basiri road is “Burst tires(BuT)” at 7%, along Opopogbooro is “traffic congestion (TC)” at 8%, along Ajilosun road is “following the vehicle in front too closely (FVFC)” at 0%, along Ilawe road is “taking drugs and driving (TDAD)” at 0% and along Odo-Ado is “using a mobile phone (hand-held) and driving (UMP(hh)AD)” at 4%.

Conversely, the risk factor resulting in the highest possibility for accidents along Old Garage is “traffic congestion (TC)” at 38%, along Basiri road are “taking drugs and driving (TDAD)” and “traffic congestion (TC)” both at 23%, along Opopogbooro is “following the vehicle in front too closely (FVFC)” at 40%, along Ajilosun road are “drinking and driving (DAD)”, “taking medicines and driving (TMAD)”, “taking drugs and driving (TDAD)” and “bad weather conditions (BWC) all at 29%, along Ilawe road are “poor brakes/brake failure (PBF)” and “faulty light (FL)” both at 22% and along Odo-Ado are “defective horns (DH)” and “wind shield - poor visibility (WS(PV))” both at 29%.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study has shown that the most dominant risk factor for consideration along Opopogbooro road is “following the vehicle in front too closely i.e. tailgating (FVFC)” resulting in the highest possibility for accidents (40%) while the least dominant along Ajilosun and Ilawe roads are “following the vehicle in front too closely i.e. tailgating (FVFC)” and “taking drugs and driving (TDAD)”. Consequently, it seems that the risk factors are site specific meaning that each of them produces contrasting results at different locations as indicated by the FVFC risk factor which gives both the highest and lowest possibilities for accidents along two different roads.

Furthermore, a comparison of the range of possibilities for accidents occurring (i.e. the difference between the highest and lowest possibilities) shows that Old Garage has the highest range (33%) indicating the greatest likelihood for accident occurrence while Basiri road has the smallest range (16%) indicating the least likelihood for accident occurrence .

5.2 Recommendations

Priority should be given to reducing the incidence of tailgating since “following the vehicle in front too closely (FVFC)” has been identified as the

most dominant risk factor resulting in the highest possibility for accidents along Opopogbooro road. This can be achieved through road safety education whereby the road users are taught how to be safety conscious while on the road. Drivers should be encouraged to leave a considerable gap (equivalent to a vehicle length) between their vehicles and the ones ahead.

Other risk factors identified in this study and also considered to be considerably significant to accident occurrence can also be reduced through road safety education, safer design of roads and the roadside environment, random examination of drivers (to detect those driving under the influence of drugs, medicines and alcohol) and random vehicle checks.

REFERENCES

1. Beck, U. 1992. Risk Society: Towards a New Modernity. Sage, London.
2. Lee, J.D. 2008. Fifty years of driving safety research. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, 5(3): 521-528.
3. Gbadamosi, K.T. 2006. The emergence of motorcycle in urban transportation in Nigeria and its implication on traffic safety. Association for European Transport and Contributors.
4. Ogunsanya, A.A., Galtima, M. 1993. Motorcycle in public passenger transport services in Nigeria, Case of Yola town in urban transport in Nigeria. Heinemann Education Books, Ibadan.
5. Adeniji, K. 1985. Urban transport system in Nigeria. *Journal of West Africa Studies*, 28: 81-97.
6. Adeniji, K. 1987. Para-transit modes in Nigeria: problems and prospects. *The International Quarterly on Urban Policy*, 4(4): 339-347.
7. Adesanya, A. 1998. The use of motorcycle for public transport: the situation in Ibadan. Nigeria Institute of Social and Economic Research, Ibadan, Monograph Series, 6: 57.
8. Kuyoro, F.S. 1997. Planning motorcycle services in Ijebu-Ode, Ogun state. A Postgraduate Diploma Dissertation submitted to NITP/ TOREC.
9. Federal Road Safety Commission (FRSC), 2009. Road traffic crashes data. www.frsc.gov.ng/rtc.php. Accessed on 31/03/2012
10. Renn, O. 2000. Risks and society. Paper presented at the International Conference on Risk Analysis and its role in the European Union, Brussels.
11. Van, K., Donald J. 2001. Vehicular accident investigation and reconstruction. CRC Press LLC, Boca Roton.