STATISTICAL ANALYSIS OF TRAFFIC ACCIDENT IN NIGERIA

A CASE STUDY OF FEDERAL ROAD SAFETY CORPS

PRESENTED BY

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MATRIC NO: C110303100

SUBMITTED TO

THE DEPARTMENT OF MATHEMATICS AND STATISTICS
THE SCHOOL OF NATURAL SCIENCE
JOSEPH AYO BABALOLA UNIVERSITY IKEJI-ARAKEJI, OSUN
STATE.

IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE
AWARD OF BACHALOR OF SCIENCE DEGREE IN STATISTICS.

SEPTEMBER, 2013.

TITLE PAGE

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CERTIFICATION

This is to certify that this project is undertaken by VINCENT AUDU [C110303100] of the Department of Mathematics and Statistics as meeting the requirement for the award of Bachalor of Science in Statistics Joseph Ayo Babalola University.

Dr. A.A Akomolafe

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Dr O.O. Owolabi

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Head of Department   **Date**

Professor Obilade

………………………………..   …………………………..

External Examiner   **Date**

DEDICATION

This project work is dedicated to Almighty God the giver of wisdom and knowledge, for his infinite mercy on me. Also to my lovely wife Mrs. Vincent Audu and daughter miss Favour Vincent Audu.

Also to my parent Mr. and Mrs. Audu and my brothers, Sister Mr. Silas Audu, Mr Sunday Audu and Miss Lucy Audu. To my unit commander S O OGUNDAYO.

ACKNOWLEDGEMENT

To God be the glory for great things he had done for me. I appreciate him for his protection, provision of knowledge during the course of writing this project.

I won't forget to appreciate my lovely wife, Mrs. Vincent Audu who suffer so much on me to make sure I complete my study for the award bachelor of science in statistics, word cannot express how much I love you.

Moreover, I should not forget my colleagues all the staff of FRSC Oshodi unit for their co-operation and support during my study.

Furthermore, I appreciate my lecturers in department of mathematics and statistics Dr. Akomolafe, Mr.I O Oseghale, Mr. F D Famule, Mr. K O Olubowola and all the staff of the department. I also appreciate my fellow students most especially Mr. jaye, Mr. Ahmed, Mr.Ajala, Mr. shola , Mr. PS Olaniyi. And my friends Sunday Bulus and Sammuel Musa.

Above all, I highly salute my supervisor in person of Dr. A Akomolafe , a lecturer and co-ordinator in the department of statistics, sir, I really appreciate your support during the course of the project. I pray that God in his infinite mercy will continue to help you in all your endeour.Amen

ABSTRACT

The research work is undertaken on statistical Analysis of Traffic Accident in Nigeria having realized the alarming rate at which motorists and passenger involved in traffic accident. The use of Hotelling-T square revealed that there is significant difference in reported cases and casualties of traffic accident in the regions (Southern and Northern) and two way analsyis of variance also showed that there is significant difference in the reported cases and casualties of traffic accident in the years and geo-political zones except for those highlighted in the conclusion.

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CHAPTER ONE

1.1   INTRODUCTION

Road accident worldwide and in particular Nigeria has become a regular phenomenon. Every day Nigerian die on the road and many injured. In such circumstances, the role of medical institutions become important as the first few minutes after the accident termed the "golden hour" are very precious and crucial. Many lives could be saved and disabilities prevented by providing immediate treatment to accident victims. Among the accidents resulting from the development of air, land, sea, river transport, road accident predominate both in respect of their frequency and seriousness and in term of human and economic cost. There is no doubt about it; there are far too many accidents on the road today. Even if you are the most careful and contentious driver on the road there is still a chance that someone will slam in your car causing you at the very least, some property damage and may something far worse.

This is disheartening in deed because road accident is becoming a daily occurrence due to road traffic integration are treated as secondary issue in Nigeria. It is a known fact that transportation system is the movement of people and good's from

one location to another. Transport is performed by various modes such as air, rail, road, water, cable pipeline and space, road is an identifiable route way or path between two or more places. Road are typically smoothed, pave or otherwise prepared to allow easy travel. The most common road vehicle is the automobile which offer high flexibility and with low capacity. It allow for more efficient travel at a reduced cost.

Mr. Julius Adekoye lamented that "road accident in Nigeria claim more lives daily than any other faster because of the multiple lapses in our system contribute to such road mishap, source of which are fatal in some cases" there is nothing you can do that will guarantee you a constantly safe and totally accident free driving experience but there are several things that travelers could do to help minimize the amount of accident that occur on the road every day. First obey the traffic law that state makes prospective drivers pass a test before they get behind the wheel for a reason, automobile s can be very dangerous if they are not operated properly and according to the laws of the road. Speed limits, traffic signs and all other traffic signals should be closely adhered to every single time someone get behind the wheel traffic laws are put in place to product all the travelers who are sharing space on the road. Following traffic signals is an option, those drivers that treat it as such

are usually the ones you see pulled over to the side of the road being handed a violation paper by officers.

Nigeria Government has been trying all their effort to reduce the rate of road accidents in the country. Investigation have shown that many factors contributed to road accident which are over speeding, bad roads, careless driving by the drivers and faulty vehicles e.t.c.

1.2   TYPE OF MOTOR ACCIDENT

There are three classes of motor accident depending on degree of involvement damages done, injury sustained and fatally occasioned.

1.2.1   FATAL ACCIDENT: An accident is said to be fatal when it result in death of person using the road (passenger, driver, cyclist or pedestrians).

1.2.2   SERIOUS ACCIDENT: Accidents may not be fatal but serious enough to cause damage or injury to the person in the vehicle or those around at that time.

1.2.3   MINOR ACCIDENT: When damage cause by the vehicle is slight or no damage is caused at all or when there is no injury sustained to any person then the accident is said to be minor accident.

1.3   HISTORY OF FEDERAL ROAD SAFETY CORPS

Road traffic accident/crash at first seems relatively unimportant in Nigeria and most developing countries when compared to hunger, education, financial and economic resources problem.

The oil boom of the 70s resulted into unprecedented economic boom that led to the importation of vehicles into the country without a commensurate "importation of good driving culture. The long time neglect of road safety sector and inadequate polices to combat the menace of road traffic crash made Nigeria in 1998 to be ranked the second most accident prone /dangerous Country on the planet earth after Ethiopia to transit by road because of high road traffic crash, fatality index, which was over 120% mark.

Responding to the colossal damage to lives and properties, the Nigerian Army embarked on Road Safety Training programme among its officers and men. By 1972, they started yearly road safety awareness campaign. Efforts were also made by the Nigerian Police through the motor traffic division (MTD) to fight the precarious dimension in road traffic crash. Furthermore, the National Road Safety Corps was established in 1974 under the auspice of the Federal Ministry of Works, while in 1977 the Oyo State Government established the Oyo State Road Safety. All these efforts were indication that there were need not only to make our road safe but also the dare need to saddle an organization with such responsibility.

Therefore, by February 18th, 1988, the Federal Road Safety Corps (FRSC) was established as a paramilitary organization via Decree No 45 of 1988 as amended by Decree 35 of 1992, referred to in the statutory books as the FRSC Act Cap 141

Laws of the federation of Nigeria (LFN) 1990. This Act was amended and passed as FRSC Establishment Act in 2007 with the responsibility for traffic management, preventing and minimizing accident on the highways, the regulation of traffic offences and clearing of obstructions on any part of the highways and educating drivers, motorist and other members of the public generally on the proper use of highways and for other related matters to safety on the highways.

1.3.1 STATUTORY FUNCTIONS

❖ Making the road safe for all road users.

❖ Preventing and minimizing road traffic crash.

❖ Clearing of obstructions on the highways.

❖ Providing prompt attention and care to victims of road traffic crash.

❖ Determining and enforcing speed limit for all categories of roads & vehicles.

❖ Designing and producing driver's license and vehicle number plates.

❖ Cooperating with agencies and group engaged in road safety activities to prevent road crashes on the highway etc.

1.3.2 COMMAND STRUCTURE

The Management of FRSC over the years deemed its expedient that the responsibility can only be administered through a command structure thus creating twelve (12) Zone , thirty seven (37) Sector Commands and One Hundred and sixty

two (162) Unit Commands totaling 211 field commands. The National Headquarters is made up of eight (8) departments and twelve (12) Corps Offices that supervises the activities of field commands.

1.3.3   ZONAL AND SECTOR COMMANDS

CODE	ZONAL COMMAND	CODE	SECTOR COMMANDS
RS 1.0	KADUNA	RS 1.1	KADUNA
		RS 1.2	KANO
		RS 1.3	KATSINA
		RS 1.4	JIGAWA
RS 2.0	LAGOS	RS 2.1	LAGOS
		RS 2.2	OGUN
RS 3.0	YOLA	RS 3.1	ADAMAWA
		RS 3.2	GOMBE
		RS 3.3	TARABA
RS 4.0	JOS	RS 4.1	PLATEAU
		RS 4.2	BENUE
		RS 4.3	NASARRAWA
RS 5.0	BENIN	RS 5.1	EDO
		RS 5.2	DELTA
		RS 5.3	ANAMBRA
RS 6.0	PORTHACOURT	RS 6.1	RIVERS
		RS 6.2	CROSS RIVER
		RS 6.3	AKWA IBOM
		RS 6.4	BAYELSA
RS 7.0	ABUJA	RS 7.1	FCT
		RS 7.2	NIGER
RS 8.0	ILORIN	RS 8.1	KWARA

		RS 8.2	EKITI
		RS 8.3	KOGI
RS 9.0	ENUGU	RS 9.1	ENUGU
		RS 9.2	EBONYI
		RS 9.3	ABIA
		RS 9.4	IMO
RS 10.0	SOKOTO	RS 10.1	SOKOTO
		RS 10.2	KEBBI
		RS 10.3	ZAMFARA
RS 11.0	OSOGBO	RS 11.1	OSUN
		RS 11.2	ONDO
		RS 11.3	OYO
RS 12.0	BAUCHI	RS 12.1	BAUCHI
		RS 12.2	BORNO
		RS 12.3	YOBE

1.4   CAUSES OF ROAD ACCIDENT

There are three major causes of road accident:

a.   Human factors, b. Mechanical factors c. Environmental factor

a.   HUMAN FACTORS

Man plays major determining roles in the causation of road traffic crash

Such as: Dangerous driving, drunkerness, wrongful over taking, poor road maintenance culture etc.

b. **MECHANICAL FACTORS**

This is due to poor vehicle maintenance which lead to damage that may eventually show up while the vehicle is in motion. Some factors that can give way to mechanical failure include the following: malfunctioning engine, brake failure etc

c. **ENVIRONMENT FACTORS**

This include bad roads, poor weather and night traveling.

1.4.1 AIMS AND OBJECTIVES

The aims and objectives of this study are as follows:-

i.   To investigate whether there is significant difference in the reported cases and casualties of traffic accident in the geo-political zones and regions of Nigeria

ii.   To investigate whether there is significant difference in the reported cases and casualties of traffic accident in the years under study.

iii.   For further determine which zone and year have significant difference in the reported cases and casualties of traffic accident.

1.5   SIGNIFICANCE OF THE STUDY.

The significance of this study is to provide way of reducing the occurrences of road traffic crash/accident. It will help the road users and managements of the

Federal Road Safety Corps and the Nigeria police to see the rate and to work towards the reduction of accident in Nigeria, most especially on the two regions in the country i.e. southern region and northern region that have the highest reported cases and casualty of road traffic crash/accidents.

1.6   SCOPE AND COVERAGE

This research work is base on road accident in Nigeria. It comprises of total cases of accident and number of casualty such as injured, killed. This study covers a period of six month.

1.7   LIMITATION OF DATA COLLECTION.

As with other literary works, it is quite an obvious fact that problems are bound to be encountered in one way or either making recommendation relating to his/her own write up. This project therefore is no exception. The problems encountered include the following:-

- Administrative protocol; administrative protocol sometimes makes it difficult for the required data to be released on time.

- Call back or not on site: this is another problem that brings about wastage of time energy and money.

1.8 DEFINITION OF TERMS

DATA: This is defined as the raw factor information collected during statistical experiment or research work for the purpose of analysis and from which inference is made.

ACCIDENT: This is defined as an unpleasant event, especially in a vehicle it happens unexpectedly and cause injury or damage and some time lead to death.

CASES: This is defined as an instance of something occurring.

CASUALTY: This can be defined as a person killed or injured such as accident, war and so on.

CHAPTER TWO

2.1 LITERATURE REVIEW

The Federal Road Safety commission (FRSC) is a government agent with statutory responsibility for road safety administration in Nigeria. It was established in 1988. the federal road safety corps (FRSC) operates in all Nigerian states as well as the federal capital territory (FCT)

A corps marshal of the FRSC Osita Chidoka (2008) said that 18300 road accidents have claimed 51251 persons injured in Nigeria in the past three years. He further explained errant petroleum tankers drivers were responsible for most of the accident in Nigeria he said that in the first three months of the year 2007, 2119 accidents involving tankers drivers claimed 301 lives meanwhile; one analyst has said the figure of fatalities by the police is a gross under – estimation of the death resulting from accident.

Adegbenro (2009) studied the road accidents trends in Nigeria between the period of 1960 and 1989 his study reveal a sharp increase in fatal accident occurrence. Between 1960 and 1969 it was observed that over 18000 death occur as a result of road accidents by the third decade (1980 – 1989) this figure had increase to about five times i.e. more than 9200 death.

According to Eke (2001) it has however being observed that most of the factors involving in road accidents are created and control by man. Man initiated the process that may yield a road accidents by traveling, he or she may travel as a pedestrian as a passenger in a vehicle or as the operator of the vehicle.

Odero (1998) added that most vehicle operator also fail to ensure the road worthiness of their vehicle before they hit the highway which contributes majorly to road accidents in Nigeria.

Occasionally, the vehicle operator fails to adhere to safety regulation for instance, fastening the seatbelt and ensuring safe condition of the vehicles. It has also been observed that during the festival periods and holidays, there are always more vehicles on the Nigeria highways and road, people tend to be rushing to meet certain commitment or to arrive at their destination earlier consequently, there are more accident during theses period than other time.

A student, member of the red cross, Miss Kemi Oluwapo said that "road accidents, though labeled accidental, are most time cause by dangerous driving which informs why we keep on having them every day, despite effort by relevant agencies to have them minimized on our road and your surroundings at all times there could be many things going on in traffic all around you, so it is crucial that you pay attention to everything going on around you driving should be your only focus while behind the wheel. Some drivers while on wheels eat their breakfast, drink their coffees, apply their makeup and change their out fits and these are drivers that are involved in accident.

(Antigba 1996 and Edom 1989) "the fewer the people that would die from road accidents the better Nigeria will begin to appreciates the federal road safety corps (FRSC) and it is believed that this is possible so talking of being able to show results with the (FRSC), being effective, delivering service reducing road accidents from 100 to 80 percent per month, it is then that service will be known to being delivered.

The Federal Road Safety Corps have the responsibility of improving road safety and reducing road accident.

Odelowo (1998) believe that the role of intoxication with drugs and alcohol is important in the cause of road accident worldwide.

Odeleye (2003) in this view picture the road traffic environment in Nigeria as an environment dominated by abundant combination of largely illiterate or inexperience or drunk or overconfident of drivers, unconcerned about the line of other road users knowing nothing more than the rudiment of money a vehicle and sounding their horn with reckless abandon, meanwhile operating poorly maintained vehicle on high quantity poorly designed ill maintained roads a society that is devoid of traffic law enforcement service and that is ill equipped with emergency Rad Safety facilities where Government, Police, and Military driver

flour traffic laws with immunity where paramedical personnel are sometimes called and unconcerned about the agonies of road accident victims.

Mr. Osita Chidoka, the Corps Marshal of Nigeria's Federal Road Safety Corps (FRSC), said on Saturday that road accidents are the biggest killers of Nigerians, more than any other disease. Although he did not provide statistics for a reality check and comparison with other killers, Chidoka said the frequency of accidents has become a great source of concern.

"No other disease is killing people in the country like road traffic accidents and this is a source of concern for all the stakeholders,'' he said in Sokoto at a

 Special Marshals Sectoral Workshop, with the theme, "Advocacy as a tool for improved road safety activities''.

Last year, 3,000 people, according to a contentious statistics given by the FRSC, died in Nigeria in 2,235 accidents, making Nigeria, the second country in the world with the highest fatalities on the roads. The World Health Organization and the National Union of Road Transport Workers all disputed last year's figures. In earlier figures, FRSC reported deaths of 17,000 between 2007 and 2009.In comparison, 220,000 people were estimated to have died as a result of AIdS in 2010.

Recently, the corps marshal and chief executive of the federal road safety corps (FRSC) Osita Chidoka said the 54 person died in motor accidents in the northern region of the country between July and August this year. The corps marshal made the fact known in Sokoto at a special marshal sectorial workshop with the term advocacy as a tool for improved road activities according to Chidoka; he said 15 people died during the eld-fitr celebration in August in Zamfara and Kebbi state. 12 of them died in Fsafe, Zamfara the diseased persons where all district head from Jigawa state who were on their way to Argungu Kebbi state, he said adding that the zone road safety 10 comes third nationwide in the ranking of accidents rate during the period "no other diseases is killing people in the country like road traffic accident and this is a sure of concern for all the stakeholders.

Mrs. Josephine AGwu cautioned that "if you do not have time to eat, change or apply your make up before you get in the car it is probably good idea to start getting up earlier. Those five extra minute of sleep won't help you replace your destroyed automobile or help with your rehabilitation following an accidents" put down the cell phone, our cell phone now are a huge survival tool, they lets us make calls, receive and send text messages and e-mails, stuff in the internet and get directions, watch videos, take pictures and listen to music among other things but one place they don't belong is in your hand while you are behind the wheel.

Transport workers according to Dave Spooner of the global labor institution (UK) in 2011, he said over last 20 years the urban centers of development countries have exploded in size. Formal often state owned public transport services have not had the necessary financial or institutional capacity to meet demand and have been badly affected by deregulation and privatization, most state run bus and rail services in developing countries have in effect collapsed as a consequence the information transport section has grown rapidly unemployment and rate of urban poverty.

Not withstanding this global trend there is a spancidy of data collection and systematic analysis of information transport services. The sector is often ignored in policy making circle not least because compiling both quantities and qualitative information is exceedingly difficult. It is not surprising therefore, that there are little reliable and up to date data on the livelihoods of transport workers in the urban informal economy.

Recently the Government tendered research into in-vehicle technology that made an evaluation of devices that can inform drivers or monitor driver behaviour, including BBR and vehicle collision avoidance systems. This research involved a trial with Rayol Mail vehicles that resulted in a reduction in accident rates for vehicles installed with on-board recorders. This was similar to the aforementioned

study for school bus fleets in the USA (Lehmann and Reynolds 1999). Research commissioned by the Health and Safety Executive found that a third of serious road accidents involve

someone driving in the course of their job. Following from this it has been suggested that, unless monitored, people driving company vehicles are more likely to drive while they are tired, overtake in potentially dangerous conditions, speed, and use mobile phones while driving.

In 1986, the lack of systematic analysis on regional and intra-urban variation in accident rate was a significant cause for concern. This lead to a call for a " renewed attack on road safety problems with a detailed spatial examination, attention to movement and interaction, attention to neighbourhood and community and attention to age, sex, ethnic, and class variation that will not only tell us just what progress we have or have not made. but will give us hard evidence on which to base future policy through which progress can be monitored", Whitelegg 1986.

CHAPTER THREE

3.1 METHODOLOGY

This chapter outlines the method use in collecting the necessary information, the statistical technique applied necessary assumptions and possible derivations.

3.2 DATA COLLECTION

This is the first step in a statistical investigation or a research work. It is defined as an assembling of facts needs for the purpose of investigating a particular project at hand. There is various method of data collection. They are as follow:

i.   interview method (person or delegated investigation)

ii.   questionnaire method (mail or personal)

iii.   observation method

iv.   experimentation method

v.   registration method

vi.   transcription from records (publishes or unpublished)/

The choice of method to be employed in collecting data depends on

i.   the subject matter of the survey

ii.   the nature of the respondent

iii.   the scope of enquiring desired

iv.   the time factor and accuracy desired

v.   the resources available

3.3   SOURCE OF DATA

The source of data for this research work is secondary source of data. That is they are data not collected by the investigator himself/herself but are obtained from source one else's record or from some organization either in published or unpublished form. Data collected from secondary source need some caution before it could be used, it must be verified to be reliable current and free from falsification. They are quicker and cheaper to obtain then the primary data but it error cannot be easily traced out.

The method employed for the purpose of this study is the method of transcription from records.

3.4   MULTIVARIATE STATISTICS

This is a form of statistics encompassing the simultaneous observation and analysis of more than one outcome variable. The application of multivariate statistics is multivariate analysis. Method of bivariate statistics for example single linear regression and correlation, are not special case of multivariate statistics because only one outcome variable is involved.

Multivariate statistics concerns understanding the different aims and background of each of the different forms of multivariate analysis and how they relate to each

other. The practical implementation of multivariate statistics to a particular problem may involve several types of univariate and multivariate analysis in order to understand the relationship between variables and their relevance to the actual problem being studied.

In addition, multivariate statistics is concerns with multivariate probability distribution in terms of both.

i.   How these can be use to present the distribution of observed data.

ii.   How they can be use as part of statistical inference, particular

where several different quantities are of interest to the same analysis.

Certain types of problem involving multivariate data, for example simple linear regression and multiple regression, are not usually considered as special cases of multivariate statistics because the analysis is dealt with by considering the [univariate] conditional distribution of a single outcome variable given the other variables.

3.5   TYPES OF ANALYSIS

i.   Multivariate analysis of variance (MANOVA)

ii.   Multivariate regression analysis

iii.   Principal components analysis (PCA)

iv.   Factor analysis is similar to (PCA) but allow the user to extract a

specified number of synthetic variable fewer than the original set leaving the remaining unexplained variation as error.

v. Canonical correlation analysis. Find linear relationship among two set of variable

vi. Redundancy analysis

vii. Correspondence analysis (CA)

viii. Discriminate analysis or canonical variate analysis. Attempt to established whether a set of variable can be use to distinguish between two or more groups of cases.

ix. Hotelling's T^2 distribution for testing the hypothesis of multivariate mean

x. Linear discriminate analysis (LDA)

3.6   USE OF MULTIVARIATE ANALYSIS

Use for multivariate analysis includes:

i. design for capability (also known as capability based design)

ii. inverse design, where any variable can be treated as an independent variable

iii. analysis of alternatives (AOA) the selection of concepts to fulfill a customers need

iv. analysis of concepts with respect to changing scenarios

v.   identification of critical design drivers and correlations across hierarchical levels.

3.7   HOTELLING'S T-SQUARED DISTRIBUTION

In statistics Hotellings T-squared distribution is important because it arise as the distribution of a set statistics which are natural generalization of statistics underlying student's T distribution. In particular, the distribution arises in multivariate statistics in undertaking tests of the differences between the (multivariate) means of different populations, where tests for univariate problem would make use of a t-test. It is proportional to the F distribution. The distribution is named for Harold Hotelling who developed it as a generalization of student t-distribution.

3.7.1   THE DISTRIBUTION

If the notation $T^2_{p.m}$ is use to denote a random variable having Hotelling's T-squared distribution with parameters p and m then, if a random variable x has Hotelling's T-squared distribution $X \sim T^2_{p.m}$

        Then,

$\underline{m - p + 1}$ $x \sim F_{p.m - p + 1}$
    pm

where $F_{p.m - P + 1}$ is the F = distribution with parameters P and M − P + 1

3.7.2   HOTELLING'S T-SQUARED STATISTICS

Hotelling's T-squared statistics is a generalization of student's t statistics that is use in multivariate hypothesis testing and is defined as follows.

Let N_p (N, Σ) denote a p- variate normal distribution with location μ and covariance Σ

Let $X_1, \ldots X_n \sim N_p$ (N, Σ)

Be n independent random variables, which may be represented as P x 1 column vector of real number. Define

$$\bar{x} = \frac{x_1 + \ldots + x_n}{n}$$

To be the sample mean, it can be shown that

$$n(\bar{x} - N)T \sum\nolimits^{-1} (\bar{x} - N) \sim \varphi^2$$

Where $\varphi^2 p$ is the chi-squared distribution with p degree of freedom. To show this use the fact that $\bar{x} \sim Np$ $(N_1 \Sigma/n)$ and then derive the characteristic function of the random variable

$$y = n(\bar{x} - N)^T \sum\nolimits^{-1} (\bar{x} - N)$$

However, Σ is often unkown and we wish to do hypothesis testing on S location N defined.

$$w = \frac{1}{n-1} \sum\nolimits^{n}_{i=1} (x_i - \bar{x})(x_i - \bar{x})^T$$

To be the sample covariance. Here we denote transpose by an apostrophe. It can be shown that W is positive definite and follow a p-variatewishart distribution with n-l degree of freedom. Hotelling's T-squared is then defined to be

$$t^2 = n(\bar{x} - N)^T W^{-1} (\bar{x} - N)$$

because it can be shown that

$t^2 \sim T^2_p \, n\text{-}1$

i.e.

$$\frac{n\text{-}p}{p(n\text{-}1)} \quad t^2 \sim F_p, \, n\text{-}p$$

Where F_p, n-p is the F-distribution with parameter p and n-p in order to calculate a p value, multiply the t^2 statistics by the above constant and use the F distribution.
 • Hotelling's two sample T-squared statistics

If $X_1 \ldots X_n \sim N_p \, (N_1 \, V)$ and $y_1 \ldots, y_{ny} \sim N_p \, (N, V)$

With the sample independently drawn from two independent multivariate normal distribution with the same mean and covariance and we define.

$$\bar{x} = \frac{\Sigma \, X_i}{n_x}, \qquad \bar{Y} = \frac{\Sigma_{i=i} y_i}{n_y}$$
as the sample mean and

$$w = \frac{\Sigma^{nx}_{i=I} \, (X_i - \bar{x})^T + \Sigma y i_{=I} (y i - \bar{y})^T}{n_x + n_y - 2}$$

As the unbiased pooled covariance matric estimate, then Hotelling's two sample T-squared statistics is

$$t^2 = \frac{n_x \, n_y}{n_x + n_y} \, (\bar{x} - \bar{y})T + W^{-1} \, (\bar{x} - \bar{y}) \sim T^2(p, n_x + n_y \text{-} z)$$

And it can be related to the F- distribution by

$$\frac{n_x + n_y\text{-}\, p - 1}{(n_x + n_y\text{-}\, 2)p} \, t^2 \sim F(p, \, n_x + n_y - 1 - p; \;)$$

With

$$\delta = \quad n_x n_y \quad v^1 \, v^{-1}$$

$$\overline{n_x + n_y}$$

Where v is the difference vector between the population means.

The two- sample Hotelling's T-squared test statistics involves the computation of difference in the sample mean vectors. It also involves a calculation of the pooled variance – covariate matrix multiplied by the sum of the inverse of the sample size the resulting matrix is then inverted.

2.7.3 ASSUMPTIONS OF THE HOTELLING'S T-SQUARED TEST.

1. The vector Y_i s have common population mean vector N_y, which essentially means that there are no sub-population with mean vectors.

$a^2 + b^2 = c^2$ 2. The vector $_{Yi}$ s has common variance covariance matrix Σ_y.

3. Independence the Y_i s is independently sample in this case independent among the couple in this study.

4. Normality: The Y_i s is multivariate normally distributed.

3.8 THE COMPLETE RANDOMIZE BLOCK DESIGN (CRBD)

This is always known as two – way ANOVA . All the treatment must appear in the same block. Two ways ANOVA is of the form.

ASSUMPTIONS WHEN USING TWO-WAY ANOVA

As with other parametric tests, we make the following assumptions when using two-way ANOVA
.
The populations from which the samples are obtained must be normally distributed.

Sampling is done correctly. Observations for within and between groups must be independent.

The variance among populations must be equal (homoscedastic)
Data are interval or normal.

MODEL

$$Y_{ij} = \mu + \alpha i + \beta j + e_{ij} \text{ for } i=1, 2\ldots$$

$$i = 1,2\text{----}p$$
$$j = 1,2\text{----}q$$

Where

Y_{ij} = is the observation at the level (i^{th} and j^{th}) of factor A and B.

μ = overall mean effect

α_i = effect of the factor A at j^{th} level.

β_j = effect of the factor B at j^{th} level.

e_{ij} = random error associated with the observations.

Data layout block

Block

Treatment 1	y_{11}	y_{12}	$y_{13}\ldots y_{ij}$	
2	y_{21}	y_{22}	$y_{23}\ldots y_{2J}$	
3	y_{31}	y_{32}	$y_{33}\ldots Y_{3J}$	
,	,	,	,	,
,	,	,	,	,
i	y_{i1}	y_{i2}	y_{i3}	y_{ij}

Correction factor $[C] = \dfrac{[\Sigma y_{ij}]^2}{pq}$

$$SST=\Sigma y_{ij}{}^2 - C$$

$$SSt =\Sigma \frac{y_i{}^2. - C}{q}$$

$$SSb =\Sigma \frac{y_{.j}{}^2 - C}{p}$$

$$SSE = SST - SSt - SSr$$

ANOVA TABLE
Table 3.1

S.V	D.F	SS	MS	F ratio
Treatment	p-1	SSt	SSt/p-1	Mst/mse
Block	q-1	SSr	SSr/q-1	Msb/mse
Error	(p-1) (q-1)	SST-SSt-SSr	SSe/(p-1)(q-l)	
Total	pq-1	SST		

POST-HOC ANALYSIS

TUKEY RANGE TEST

Tukey test, also known as the Tukey range test, Tukey method. Tukey honest

significance test, Tukey HSD (honestly significant difference) test or the Tukey –

Kramermethod, is a single-step multiple comparison procedure and statistical test.

It is used in conjunction with an ANOVA to find means that are significantly different from each other. Named after John Tukey, it compares all possible pairs of means, and is based on a studentized range distribution (q) (this distribution is similar to the distribution from the t-test).

The Tukey HSD tests should not be confused with the Tukey Mean Difference tests (also known as the Bland-Altman Test).

CHAPTER FOUR

4:0   DATA PRESENTATION AND ANALYSIS

The data below were collected on the reported cases and casualties of road accidents in Nigeria based on Regions from years 2007 to 2012.

The two regions in Nigeria namely:

Table 4.1

Northern Region		
Northern Central	Northern Eastern	Northern Western
Benue	Adamawa	Jigawa
Kogi	Bauchi	Kaduna
Kwara	Borno	Kano

Nasarawa	Gombe	Katsina
Niger	Taraba	Sokoto
Plateau	Yobe	Zamfara
F.C.T		Kebbi

Table 4.2

Southern Region		
South East	South South	South West
Abia	Akwa Ibom	Ekiti
Anambra	Bayelsa	Lagos
Eboyi	Cross River	Ogun
Enugu	Delta	Ondo
Imo	Edo	Oyo
	Rivers	Osun

Table4.3 **REPORTED CASES OF ROAD TRAFFIC ACCIDENT**

Southern Region cases			
year	South West	South East	South South
2007	857	362	391

2008	703	487	580
2009	914	398	576
2010	836	374	304
2011	1053	294	392
2012	1409	455	657

Table 4.4

Northern Region Cases			
Year	North West	North East	North Central
2007	488	501	826
2008	596	496	1024
2009	608	582	1135
2010	551	340	962
2011	590	454	1427
2012	638	566	1642

Table 4.5 **REPORTED CASUALTIES OF ROAD TRAFFIC ACCIDENT**

Southern Region Casualty			
Year	South West	South East	South South
2007	5547	3329	1568
2008	4854	44513	5304
2009	5805	1921	5236
2010	4432	1353	2521
2011	9203	2531	2950
2012	11261	3593	5433

Table 4.6

Northern Region Casualty			
Year	North West	North East	North Central
2007	5001	3012	4003
2008	6791	4767	8412
2009	6181	4522	9293
2010	4850	2335	6674
2011	5013	3270	11,221
2012	5709	2648	11,774

Table 1: A table of reported casualties in Nigerian Geo-political zones.

	SW	SE	SS	NW	NE	NC
2007	5547	3329	1568	5001	3012	4003
Year 2008	4854	4513	5304	6791	4767	8412
2009	5805	1921	5236	6181	4522	9293
2010	4432	1353	2521	4850	2335	6674
2011	9203	2531	2950	5013	3270	11,221
2012	11,261	3593	5433	5709	2648	11,774

Source: Federal Road Safety Headquarters, Abuja.

Table 2: A table of reported cases of accident in Nigerian Geo-political zones

	SW	SE	SS	NW	NE	NC
2007	857	362	391	488	501	826
Year 2008	703	487	580	596	496	1024
2009	914	398	576	608	582	1135
2010	836	374	304	551	340	962
2011	1053	294	392	590	454	1427
2012	1409	455	657	638	566	1642

Source: Federal Road Safety Headquarters, Abuja.

Univariate Analysis of Variance

Tests of Between-Subjects Effects

Dependent Variable:REPORTED CASUALITIES IN NIGERIAN GEO-POLITICAL
ZONES

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	1.162E9	11	1.056E8	40.913	.000
YEARS	44471120.222	5	8894224.044	3.446	.017
ZONES	1.476E8	5	29529980.044	11.440	.000
Error	64533250.778	25	2581330.031		
Total	1.226E9	36			

a. R Squared = .947 (Adjusted R Squared = .924)

Post Hoc Tests

Year

Multiple Comparisons

REPORTED CASUALITIES IN NIGERIAN GEO-POLITICAL ZONES

Tukey HSD

(I) YEARS	(J) YEARS	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
2007.00	2008.00	-2030.1667	927.60085	.278	-4888.8334	828.5001
	2009.00	-1749.6667	927.60085	.433	-4608.3334	1109.0001
	2010.00	49.1667	927.60085	1.000	-2809.5001	2907.8334
	2011.00	-1954.6667	927.60085	.316	-4813.3334	904.0001
	2012.00	-2993.0000*	927.60085	.036	-5851.6668	-134.3332
2008.00	2007.00	2030.1667	927.60085	.278	-828.5001	4888.8334
	2009.00	280.5000	927.60085	1.000	-2578.1668	3139.1668
	2010.00	2079.3333	927.60085	.255	-779.3334	4938.0001
	2011.00	75.5000	927.60085	1.000	-2783.1668	2934.1668
	2012.00	-962.8333	927.60085	.900	-3821.5001	1895.8334
2009.00	2007.00	1749.6667	927.60085	.433	-1109.0001	4608.3334
	2008.00	-280.5000	927.60085	1.000	-3139.1668	2578.1668
	2010.00	1798.8333	927.60085	.403	-1059.8334	4657.5001
	2011.00	-205.0000	927.60085	1.000	-3063.6668	2653.6668

		Mean Difference	Std. Error	Sig.	Lower Bound	Upper Bound
	2012.00	-1243.3333	927.60085	.760	-4102.0001	1615.3334
2010.00	2007.00	-49.1667	927.60085	1.000	-2907.8334	2809.5001
	2008.00	-2079.3333	927.60085	.255	-4938.0001	779.3334
	2009.00	-1798.8333	927.60085	.403	-4657.5001	1059.8334
	2011.00	-2003.8333	927.60085	.291	-4862.5001	854.8334
	2012.00	-3042.1667*	927.60085	.032	-5900.8334	-183.4999
2011.00	2007.00	1954.6667	927.60085	.316	-904.0001	4813.3334
	2008.00	-75.5000	927.60085	1.000	-2934.1668	2783.1668
	2009.00	205.0000	927.60085	1.000	-2653.6668	3063.6668
	2010.00	2003.8333	927.60085	.291	-854.8334	4862.5001
	2012.00	-1038.3333	927.60085	.869	-3897.0001	1820.3334
2012.00	2007.00	2993.0000*	927.60085	.036	134.3332	5851.6668
	2008.00	962.8333	927.60085	.900	-1895.8334	3821.5001
	2009.00	1243.3333	927.60085	.760	-1615.3334	4102.0001
	2010.00	3042.1667*	927.60085	.032	183.4999	5900.8334
	2011.00	1038.3333	927.60085	.869	-1820.3334	3897.0001

*. The mean difference is significant at the 0.05 level.

ZONES

Multiple Comparisons

REPORTED CASUALITIES IN NIGERIAN GEO-POLITICAL ZONES

Tukey HSD

(I) ZONES	(J) ZONES	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
SOUTH WEST	SOUTH EAST	3977.0000*	927.60085	.003	1118.3332	6835.6668
	SOUTH SOUTH	3015.0000*	927.60085	.034	156.3332	5873.6668
	NORTH WEST	1259.5000	927.60085	.751	-1599.1668	4118.1668
	NORTH EAST	3424.6667*	927.60085	.012	565.9999	6283.3334
	NORTH CENTRAL	-1712.5000	927.60085	.456	-4571.1668	1146.1668
SOUTH EAST	SOUTH WEST	-3977.0000*	927.60085	.003	-6835.6668	-1118.3332
	SOUTH SOUTH	-962.0000	927.60085	.901	-3820.6668	1896.6668
	NORTH WEST	-2717.5000	927.60085	.069	-5576.1668	141.1668
	NORTH EAST	-552.3333	927.60085	.990	-3411.0001	2306.3334
	NORTH CENTRAL	-5689.5000*	927.60085	.000	-8548.1668	-2830.8332
SOUTH SOUTH	SOUTH WEST	-3015.0000*	927.60085	.034	-5873.6668	-156.3332

		Mean Difference	Std. Error	Sig.	Lower Bound	Upper Bound
	SOUTH EAST	962.0000	927.60085	.901	-1896.6668	3820.6668
	NORTH WEST	-1755.5000	927.60085	.430	-4614.1668	1103.1668
	NORTH EAST	409.6667	927.60085	.998	-2449.0001	3268.3334
	NORTH CENTRAL	-4727.5000*	927.60085	.000	-7586.1668	-1868.8332
NORTH WEST	SOUTH WEST	-1259.5000	927.60085	.751	-4118.1668	1599.1668
	SOUTH EAST	2717.5000	927.60085	.069	-141.1668	5576.1668
	SOUTH SOUTH	1755.5000	927.60085	.430	-1103.1668	4614.1668
	NORTH EAST	2165.1667	927.60085	.218	-693.5001	5023.8334
	NORTH CENTRAL	-2972.0000*	927.60085	.038	-5830.6668	-113.3332
NORTH EAST	SOUTH WEST	-3424.6667*	927.60085	.012	-6283.3334	-565.9999
	SOUTH EAST	552.3333	927.60085	.990	-2306.3334	3411.0001
	SOUTH SOUTH	-409.6667	927.60085	.998	-3268.3334	2449.0001
	NORTH WEST	-2165.1667	927.60085	.218	-5023.8334	693.5001
	NORTH CENTRAL	-5137.1667*	927.60085	.000	-7995.8334	-2278.4999
NORTH CENTRAL	SOUTH WEST	1712.5000	927.60085	.456	-1146.1668	4571.1668
	SOUTH EAST	5689.5000*	927.60085	.000	2830.8332	8548.1668
	SOUTH SOUTH	4727.5000*	927.60085	.000	1868.8332	7586.1668
	NORTH WEST	2972.0000*	927.60085	.038	113.3332	5830.6668
	NORTH EAST	5137.1667*	927.60085	.000	2278.4999	7995.8334

*. The mean difference is significant at the 0.05 level.

Univariate Analysis of Variance

Tests of Between-Subjects Effects

Dependent Variable:REPORTED CASES OF ACCIDENTS IN NIGERIAN GEO-POLITICAL ZONES

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3356360.333[a]	10	335636.033	16.585	.000
Intercept	16630084.000	1	16630084.000	821.755	.000
YEARS	444327.333	5	88865.467	4.391	.005
ZONES	2912033.000	5	582406.600	28.779	.000
Error	505931.667	25	20237.267		
Total	20492376.000	36			
Corrected Total	3862292.000	35			

a. R Squared = .869 (Adjusted R Squared = .817)

Post Hoc Tests

YEARS

Multiple Comparisons

REPORTED CASES OF ACCIDENTS IN NIGERIAN GEO-POLITICAL ZONES

Tukey HSD

(I) YEARS	(J) YEARS	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
2007.00	2008.00	-76.8333	82.13255	.933	-329.9482	176.2816
	2009.00	-131.3333	82.13255	.607	-384.4482	121.7816
	2010.00	9.6667	82.13255	1.000	-243.4482	262.7816
	2011.00	-130.8333	82.13255	.610	-383.9482	122.2816
	2012.00	-323.6667[*]	82.13255	.007	-576.7816	-70.5518
2008.00	2007.00	76.8333	82.13255	.933	-176.2816	329.9482
	2009.00	-54.5000	82.13255	.984	-307.6149	198.6149
	2010.00	86.5000	82.13255	.895	-166.6149	339.6149
	2011.00	-54.0000	82.13255	.985	-307.1149	199.1149
	2012.00	-246.8333	82.13255	.059	-499.9482	6.2816
2009.00	2007.00	131.3333	82.13255	.607	-121.7816	384.4482
	2008.00	54.5000	82.13255	.984	-198.6149	307.6149
	2010.00	141.0000	82.13255	.534	-112.1149	394.1149
	2011.00	.5000	82.13255	1.000	-252.6149	253.6149

	2012.00	-192.3333	82.13255	.215	-445.4482	60.7816
2010.00	2007.00	-9.6667	82.13255	1.000	-262.7816	243.4482
	2008.00	-86.5000	82.13255	.895	-339.6149	166.6149
	2009.00	-141.0000	82.13255	.534	-394.1149	112.1149
	2011.00	-140.5000	82.13255	.538	-393.6149	112.6149
	2012.00	-333.3333[*]	82.13255	.005	-586.4482	-80.2184
2011.00	2007.00	130.8333	82.13255	.610	-122.2816	383.9482
	2008.00	54.0000	82.13255	.985	-199.1149	307.1149
	2009.00	-.5000	82.13255	1.000	-253.6149	252.6149
	2010.00	140.5000	82.13255	.538	-112.6149	393.6149
	2012.00	-192.8333	82.13255	.213	-445.9482	60.2816
2012.00	2007.00	323.6667[*]	82.13255	.007	70.5518	576.7816
	2008.00	246.8333	82.13255	.059	-6.2816	499.9482
	2009.00	192.3333	82.13255	.215	-60.7816	445.4482
	2010.00	333.3333[*]	82.13255	.005	80.2184	586.4482
	2011.00	192.8333	82.13255	.213	-60.2816	445.9482

*. The mean difference is significant at the 0.05 level.

ZONES

Multiple Comparisons

REPORTED CASES OF ACCIDENTS IN NIGERIAN GEO-POLITICAL ZONES

Tukey HSD

(I) ZONES	(J) ZONES	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
SOUTH WEST	SOTH EAST	567.0000*	82.13255	.000	313.8851	820.1
	SOUTH SOTH	478.6667*	82.13255	.000	225.5518	731.7
	NORTH WEST	383.5000*	82.13255	.001	130.3851	636.6
	NORTH EAST	472.1667*	82.13255	.000	219.0518	725.2
	NORTH CENTRAL	-207.3333	82.13255	.155	-460.4482	45.7
SOTH EAST	SOUTH WEST	-567.0000*	82.13255	.000	-820.1149	-313.8
	SOUTH SOTH	-88.3333	82.13255	.886	-341.4482	164.7
	NORTH WEST	-183.5000	82.13255	.258	-436.6149	69.6
	NORTH EAST	-94.8333	82.13255	.854	-347.9482	158.2
	NORTH CENTRAL	-774.3333*	82.13255	.000	-1027.4482	-521.2
SOUTH SOTH	SOUTH WEST	-478.6667*	82.13255	.000	-731.7816	-225.5
	SOTH EAST	88.3333	82.13255	.886	-164.7816	341.4
	NORTH WEST	-95.1667	82.13255	.852	-348.2816	157.9
	NORTH EAST	-6.5000	82.13255	1.000	-259.6149	246.6
	NORTH CENTRAL	-686.0000*	82.13255	.000	-939.1149	-432.8
NORTH WEST	SOUTH WEST	-383.5000*	82.13255	.001	-636.6149	-130.3
	SOTH EAST	183.5000	82.13255	.258	-69.6149	436.6
	SOUTH SOTH	95.1667	82.13255	.852	-157.9482	348.2
	NORTH EAST	88.6667	82.13255	.885	-164.4482	341.7
	NORTH CENTRAL	-590.8333*	82.13255	.000	-843.9482	-337.7
NORTH EAST	SOUTH WEST	-472.1667*	82.13255	.000	-725.2816	-219.0
	SOTH EAST	94.8333	82.13255	.854	-158.2816	347.9
	SOUTH SOTH	6.5000	82.13255	1.000	-246.6149	259.6
	NORTH WEST	-88.6667	82.13255	.885	-341.7816	164.4
	NORTH CENTRAL	-679.5000*	82.13255	.000	-932.6149	-426.3
NORTH CENTRAL	SOUTH WEST	207.3333	82.13255	.155	-45.7816	460.4
	SOTH EAST	774.3333*	82.13255	.000	521.2184	1027.4

	SOUTH SOTH	686.0000[*]	82.13255	.000	432.8851	939.1
	NORTH WEST	590.8333[*]	82.13255	.000	337.7184	843.9
	NORTH EAST	679.5000[*]	82.13255	.000	426.3851	932.6

*. The mean difference is significant at the 0.05 level.

Table 2: A table of reported cases of accident in Nigerian Geo-political zones

REGION					
Southern			Northern		
South West	South East	South South	North West	North East	North Centre
857	362	391	488	501	826
703	487	580	596	496	1024
914	398	576	608	582	1135
836	374	304	551	340	962
1053	294	392	590	454	1427
1409	455	657	638	566	1642

Source: Federal Road Safety Headquarters, Abuja.

Table 3: A table of reported casualties in southern and Northern regions of Nigeria

REGION					
Southern			Northern		
South West	**South East**	**South South**	**North West**	**North East**	**North Centre**
5,547	3,329	1568	5001	3012	4003
4,854	4,513	5304	6791	4767	8412
5,805	1921	5236	6181	4522	9293
4,432	1353	2521	4850	2335	6674
9,203	2531	2950	5013	3270	11,221
11,261	3593	5433	5709	2648	11,774

Source: Federal Road Safety Headquarters, Abuja.

General Linear Model

Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.
REGION	Pillai's Trace	1.533	9.842	6.000	18.000	.000
	Wilks' Lambda	.020	16.358	6.000	16.000	.000
	Hotelling's Trace	21.780	25.411	6.000	14.000	.000
	Roy's Largest Root	20.402	61.207	3.000	9.000	.000

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	REPORTED CASUALTIES IN THE WEST	4.691E8	2	2.346E8	57.704	.000
	REPORTED CASUALTIES IN THE EAST	1.199E8	2	59973709.667	51.083	.000
	REPORTED CASUALTIES IN THE SOUTH	5.282E8	2	2.641E8	46.646	.000
REGION	REPORTED CASUALTIES IN THE WEST	4.691E8	2	2.346E8	57.704	.000
	REPORTED CASUALTIES IN THE EAST	1.199E8	2	59973709.667	51.083	.000
	REPORTED CASUALTIES IN THE SOUTH	5.282E8	2	2.641E8	46.646	.000
Error	REPORTED CASUALTIES IN THE WEST	40647392.167	10	4064739.217		
	REPORTED CASUALTIES IN THE EAST	11740396.667	10	1174039.667		
	REPORTED CASUALTIES IN THE SOUTH	56616582.167	10	5661658.217		
Total	REPORTED CASUALTIES IN THE WEST	5.098E8	12			
	REPORTED CASUALTIES IN THE EAST	1.317E8	12			
	REPORTED CASUALTIES IN THE SOUTH	5.848E8	12			

General Linear Model

Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.
REGION	Pillai's Trace	1.833	32.828	6.000	18.000	.000
	Wilks' Lambda	.003	49.584	6.000	16.000	.000
	Hotelling's Trace	62.295	72.677	6.000	14.000	.000
	Roy's Largest Root	56.633	169.899	3.000	9.000	.000

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	REPORTED CASES IN THE WEST	7549084.167	2	3774542.083	118.732	.000
	REPORTECASES IN THE EAST	2375770.167	2	1187885.083	191.604	.000
	REPORTED CASES IN THE SOUTH	9605709.333	2	4802854.667	84.247	.000
REGION	REPORTED CASES IN THE WEST	7549084.167	2	3774542.083	118.732	.000
	REPORTECASES IN THE EAST	2375770.167	2	1187885.083	191.604	.000
	REPORTED CASES IN THE SOUTH	9605709.333	2	4802854.667	84.247	.000
Error	REPORTED CASES IN THE WEST	317904.833	10	31790.483		
	REPORTECASES IN THE EAST	61996.833	10	6199.683		
	REPORTED CASES IN THE SOUTH	570090.667	10	57009.067		
Total	REPORTED CASES IN THE WEST	7866989.000	12			

REPORTECASES IN THE EAST	2437767.000	12			
REPORTED CASES IN THE SOUTH	10175800.000	12			

STATEMENT OF HYPOTHESIS

Hypothesis Statement 1:(Reported cases of accident in zones)

H_0:   The reported cases of accident in geo-political zones are the   same.

H_I: The reported cases of accident in geo-political zones are significantly

different.

Hypothesis Statement 2: (Reported casualties of accident in zones)

H_0:   The reported causalities of accident in the regions are the same.

H_I: The reported casualties of accident in the regions are   significantly

different.

Hypothesis Statement 3: (Reported cases in the years)

H_0:   The reported cases of accident are the same in the years.

H_I: The reported cases of accident are significantly different in   the years.

Hypothesis Statement 4: (Reported causalities in the years)

H_0:   The reported casualties of accident are the   same in the year.

H_I: The reported causalities of accident are significantly different in   the

years.

Hypothesis Statement 5: (Reported cases of accident in the region)

H_0:   The reported cases of accident are the same in the region.

H_I: The reported cases of accident are significantly different.

Hypothesis Statement 6: (Reported casualties of accident in the region)

H_0:   The reported casualties of accident are the same in the region.

H_I: The reported casualties of accident are significantly different.

4.2   INTERPRETATION OF RESULTS ON ANALYSIS

From the results of analysis, the p-values for test of subject –effects that is zone, year, and region are less than 2-value for both reported causalities (zone (casualties) = 0.000, year = 0.017, Zone (Cases) = 0.000; year = 0.047, region (Casualties) = 0.47, cases = 0.001

Thus, the null hypothesis is rejected in favour of the alternative hypothesis. We therefore obtain that;

1. The reported causalities of accident in the zones are significantly different.

2. The reported cases of accident in the zones are equally significantly different.

3. The reported casualties of accident in the years are not the same.

4. The reported cases of accident in the years are not the same.

5. The reported causalities of accident in the region are significantly different.

The multiple comparisons further tells us that the p-values for all the paired zones of the casualties recorded are less than α-value except for the following;

South West Vs North West (0.751)

South West Vs North Central (0.456)

South East Vs South South (0.901)

South East Vs South West (0.069)

South East Vs North East (0.99)

South South Vs North West (0.43)

South South Vs North East (0.998)

North West Vs North East (0.218)

In case of the paired zones for reported cases of accident. All the p=vales are less than α-values except for;

South West Vs North Central (0.732)

South East Vs South South   (0.858)

South East Vs North West (0.202)

South East Vs North East (0.819)

South South Vs North West (0.817)

South South Vs North East (1.000)

North West Vs North East (0.856)

For the years, in both casualties and cases reported, the p-values are greater than α-value except 2007 Vs 2012 (0.036) and 2010Vs 2012 (0.032)

The implication of p-values greater than α-value is that the null hypothesis is accepted and vice versa.

CHAPTER FIVE

5.0   FINDINGS, CONCLUSION AND RECOMMENDATION

5.1   FINDINGS

Based on the analysis carried out, the following were found;

1.   There is significant difference in the reported cases and causalities of accident in the geo-political zones.

2.   There is significant difference in the reported cases and casualties of accident in the years under study.

3.   There exists significant difference in the reported cases and causalities of accident in the southern and Northern regions.

4.   The multiple comparison revealed that the reported casualties are not the same except for;

- South West and North West

- South West and North Central

- South East and South South

- South East and South West

- South East and North East

- South South and North West

- South South and North East

- North West and North East

5. The reported cases of accident are not different in the following zones

- South West and North Central

- South East and South South

- South East and North West

- South East and North East

- South South and North West

6. Finally, the results showed that there is significant difference in the reported cases and casualties of traffic accident in years 2007 and 2012, 2010 and 2012.

5.3 CONCLUSION

From the findings of this research work, it can be concluded that there is significant difference in the reported cases and casualties of road accident in the zones, years and regions except for the paired zones and years highlighted in the findings

5.4 RECOMMENDATION

On the basis of the findings obtained from this research, the following are recommended,

1. Government at all levels should introduce road education in Nigeria system of education.

2. Government at all levels should pay more attention to the maintenance of high ways and roads in general for safe use of the citizens.

3. Personnel in charge of road should enforce the use of seatbelts by all motorists.

4. Driving license should be issued under strict compliance with the government regulations.

5. Motor Vehicles should be inspected to ensure their road worthiness before registration.

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