STATISTICAL MODELING OF FACTORS ASSOCIATED WITH SOME FORMS OF GENDER-BASED VIOLENCE AMONG WOMEN IN SELECTED STATES IN NIGERIA

BY

OJO, IFEOLUWA IBIDAPO

B.tech. Mathematics and Statistics (Ogbomoso)

MATRIC NUMBER: 210576

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF SCIENCE DEGREE IN BIOSTATISTICS

DEPARTMENT OF EPIDEMIOLOGY AND MEDICAL STATISTICS,

FACULTY OF PUBLIC HEALTH, COLLEGE OF MEDICINE,

UNIVERSITY OF IBADAN

February, 2021.

ABSTRACT

Gender-based violence (GBV) data in Nigeria has been modeled with one-part models. The distribution of male to female gender-based violence in Nigeria is rightly skewed. This suggests that models which can accommodate over-dispersion are imperative to investigate the factors influencing episodes of GBV. Therefore, this study used the negative binomial model to examine factors associated with number of episodes of male to female gender-based violence among women in Nigeria.

A sample of 1298 women of reproductive age (15-49 years) within households in communities was obtained from a large survey conducted in 2011using a multistage cluster random sampling procedure. Information extracted includes socio-economic and demographic characteristics. The number of episodes of sexual denial, beaten up, and verbal abuse were the outcome variables used to represent GBV while the explanatory variables include age, tribe, level of education, monthly incomes, religion, alcohol use, and smoking cigarette. Descriptive statistics used were frequency tables, mean, standard deviation kurtosis, skewness, and negative binomial regression were used to model GBV.

The mean age of women was 33.3years (SD=11.1years). About 64% were married while 1.8% were divorced. The proportion of women who drank alcohol was 17.1% while 42.7% were educated. The proportion of women who responded from the Igbo tribe was slightly higher (38.9%) while women from the Hausa tribe were (13.3%). Those women who smoke cigarettes were lower than those who did not smoke a cigarette. The mean number of episodes of male to

female GBV through sexual denial, “beaten up” and verbal abuse were 2.57 (SD=10.68), 2.13(SD=8.54), and 2.68(SD=6.29) respectively.

The results of the negative binomial analysis for sexual denial indicated that women who are Igbo were about four times more likely to experience sexual denial (IRR=3.75, 95%CI= 1.13-12.42). The analysis further revealed that women who were from the eastern part of Nigeria have a higher risk of experiencing “beaten up” (IRR=6.07, 95%CI= 2.47-14.92). Likewise, the model indicated that the Igbo (IRR= 3.40, CI= 2.43-4.77) and the Hausa (IRR= 2.66, CI= 1.70-4.16) were about three times more likely to experience verbal abuse compared to Yoruba women.

Negative binomial regression was able to detect the over-dispersion present in the data on gender-based violence. The analysis showed that age, tribe, and income are associated with the number of episodes of Gender-Based Violence among women of reproductive age in selected states in Nigeria.

Keywords: Negative Binomial regression model, Over-dispersion, Gender-Based Violence

Word Count: 430

ACKNOWLEGDEMENTS

I am grateful to God for His sufficient grace and help.

My sincere appreciation goes to my supervisor, Dr. (Mrs) O.B. Yusuf for her immense contribution, encouragement, valuable advice, and motherly love.

My heartfelt thanks go to all my lecturers; Dr. S.A. Adebowale, Dr. J.O. Akinyemi, Dr. O.M. Akpa, Dr. S.A. Fagbamigbe, Dr. R.F. Afolabi and Dr. B.M. Gbadebo.

To my husband, Mr. Ojo Moboluwaji Raphael, and son Ojo David Anuoluwakitan for the enormous sacrifices.

I am grateful to Olowoyeye Oluwatosin for his resolute support.

To my course mates, I thank them for their acquaintance. Recognition goes to Kunle Afolayan, Adeleke Nafisat, Eniade Olarenwaju, Odubela Rofiat, Sulaimon Mutiu and Olasunkanmi Yusuf.

DEDICATION

This project is dedicated to God Almighty whose infinite mercy sustained me throughout the duration of the study.

To my Late Father Pastor Augustine Adebayo Awelewa who inspired me to further.

CERTIFICATION

I certify that this work titled "Statistical modelling of factors associated with gender-based violence among women in selected states in Nigeria" was carried out by Ojo, Ifeoluwa Ibidapo in the Department of Epidemiology and Medical Statistics, Faculty of Public Health, the University of Ibadan under my supervision.

.....

Supervisor

Dr. Oyindamola B. Yusuf

B.Sc. (Ibadan), M.Sc. (Ibadan), Ph.D. (Ibadan)

Department of Epidemiology and Medical Statistics,

Faculty of Public Health,

University of Ibadan, Nigeria.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURE

CHAPTER 1

1.0 INTRODUCTION

1.1 Background of the study

Gender-based violence (GBV) is described as a harmful threat directed at any group or individual based on actual or perceived sex, gender identity and/or expression, sexual orientation, and or lack of adherence to varying socially constructed norms (USAID, 2012). Implicit in the above definition given to gender-based violence are key descriptive terms that point out harm inflicting acts targeted towards a victim(s) that both women and men experience gender-based violence. Gender-Based Violence includes physical and sexual violence, economic deprivation, threats, blackmail, and psychological abuse (USAID & U.S., 2016). Several decades of research on GBV have enabled an understanding of how GBV fuels health inequalities and perpetuates power dynamics that leave women marginalized (Shannon, 2014). The most common form of violence against women is gender-based violence (GBV) which is defined by WHO as the use of power or force, threatened by a husband or intimate male partner that result in injury, death, or psychological harm. The UN Declaration on the Elimination of Violence against Women (DEVW) defines the term "violence against women" as: "Any act of gender-based violence that results in, or is likely to result in physical, sexual or psychological harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or in private life (USAID, 2012).

In America, it was shown that the prevalence of male-to-female partner violence (MFPV) ranged from 4.4% to 19.8%. Also, female-to-male partner violence (FMPV) prevalence rates ranged from 3.1% to 14.5% (Graham, 2008). Consequently, there have been increases in several related

social and health issues, domestic violence, traffic injuries, and several chronic diseases, suggesting a need to develop more comprehensive population-wide preventive measures. (Adeoye, 2019).

Count data reflect the number of occurrences of behavior in a fixed period, including, number of episodes of gender-based violence. In cases in which the dependent variable is a count, the regression model that provides appropriate analyses for count data is standard Poisson regression. The Poisson family of regression models provides improved and now easy to implement analyses of count data. Poisson regression modeling is widely used in count data analysis. It assumes that the conditional distribution of the outcome variable is Poisson, which requires that the mean and variance be equal. In modeling such count data in diverse disciplines, the model often used is the Poisson regression, the regression models the conditional mean of the counts as linear regression on covariates through the log link function. Poisson regression is a member of a family of analyses known as the generalized linear model. General Linear Model family analyses can provide accurate results for data sets having binary, ordered categorical, count, and time to failure (or success) dependent variables. The GLM allows transformations of the predicted outcome, which can linearize a potentially nonlinear relationship between the dependent variable and the predictors. This modification implies that the predicted scores can be in a different unit of measurement than the observed dependent variable scores. In Poisson regression, the observed scores are counts, and the predicted scores are the natural logarithms of the counts. However, the Poisson models impose parametric assumptions that, if invalid, can lead to incorrect inferences, that is, its equality of mean and variance assumption is too stringent for many empirical applications. When this assumption is violated then the outcome variable is

either over-dispersed or under-dispersed. Over-dispersion is when the variance exceeds the mean and under-dispersion is when the variance is smaller than the mean.

Because of the limitations of the Poisson model which fails to account for over/under –dispersion in data and occurrence dependence, while the problem of occurrence dependence is not easily resolved, the issue of over-dispersion usually caused by unobserved heterogeneity and or excess zeros have been addressed in the literature with the use of the negative binomial model (Kareem et al, 2017). Negative binomial regression is a generalization of Poisson regression which unfastens the restrictive assumption that the variance is equal to the mean made by the Poisson model. The conventional negative binomial regression model is based on the Poisson-gamma mixture distribution. This formulation is popular because it allows the modeling of Poisson heterogeneity using a gamma distribution.

1.2 Problem Statement

Gender-based violence is deeply rooted in many African countries, including Nigeria. The social context of such violence in Nigeria is linked to the traditional African patriarchal society that determines the gender power structure. For instance, according to (Ifemeje, 2008), Nigerian citizens are predominantly in polygamous marriages under customary law, and custom demands that the husband exercises exclusive sexual rights and obedience from his wives. This invariably gives the husband the liberty to violate and batter a wife if he feels she has failed to fulfill her obligations to him or on some other pretext, however frivolous. The powerful cultural and traditional forces that have hitherto hindered the eradication of gender-based domestic violence include the following: dehumanizing widowhood practices, deprivation of property rights of

women and girl children, female genital mutilation, child and/or forced marriage, wife chastisement, the wife as an inheritance, the preference for sons and trafficking in girls.

About 35% of women worldwide have experienced physical and/or sexual violence by an intimate partner or non-partner sexual violence (WHO, 2017). Gender-based violence (GBV) prevalence rates ranging from 4% (Japan) to 54% (Ethiopia) (WHO 2005). In Zambia, 27% of ever-married women reported being beaten by their spouse and about 13% of 15-19years old were sexually pressurized. Gender-based violence rates have been reported during pregnancy as 58.9% and 31.3% among civil servants in a study in Nigeria (Fawole, 2005). The major causes of gender-based violence have been contested by social scientists for decades as poverty, or aggression (Gureje, 2019).

1.3 Justification of the Study

Studies had shown that gender-based violence still constitutes a problem in Nigeria, affecting more women than men (Oladepo, 2011, Chika, 2012). Most of these studies have used the logistic regression model in assessing factors influencing Gender-Based Violence (Zubairu, 2011; Oladepo, 2011; Ojengbede 2018; Fawole, 2019; Balogun and Fawole, 2014).

However, Logistic regression cannot be used to model gender-based violence if GBV is classified as a count variable. Therefore, it is imperative to model the number of episodes or incidents of gender-based violence with a model which can account for highly skewed count data with excessive zeros. A negative Binomial regression model will be appropriate to account for the association between the number of episodes of gender-based violence and checking for over-dispersion.

1.4 Objectives

1.4.1 Main Objective

The main objective of this study is to examine factors associated with the number of episodes of male to female Gender-Based violence among women in Nigeria using the Negative Binomial Model.

1.4.2 Specific objectives

1. To determine the prevalence of Gender-based violence among women.
2. To investigate the association between the number of episodes of Gender-Based Violence and demographic characteristics using the Negative Binomial Regression.

CHAPTER TWO

2.0 LITERATURE REVIEW

Violence against women plays a key role in maintaining women's subordinate position and control over women by men. Denial and the fear of being ostracized often avert women from reaching out for help (Krug, 2002). This limits a woman's capacity to act independently or autonomously. Gender is the fact of being either male or female a fact used culturally to determine the roles or pattern of behavior and attitudes which either of the genders is expected to exhibit. It refers to the different characteristics of men and women that are socially determined. Contrarily, gender refers to the different social roles men and women have in a particular society. It defines culturally acceptable attitudes, behavior, responsibilities opportunities, and constraints of men and women. Research indicates that women's needs tend to be overlooked (Beth, 2002). Violence on the other hand refers to all acts or threats that cause straight physical, mental, or sexual harm or suffering. The research defines violence to also include indirect acts such as coercion and intimidation. It is pertinent to point out that while women, men, boys, and girls can be victims of Gender-Based Violence (GBV), women and girls are disproportionately affected. In GBV literature, a victim of GBV is most often referred to as a survivor (UNIFEM, 2008).

2.1 Understanding Gender-Based Violence against women

Worldwide, one in three women experiences gender-based violence, which imparts physical, mental, and sexual health morbidities. It also causes mortality more than a third of homicides of women are attributable to male partners. Gender transformative policy and cultural reforms are also important to change prevailing norms and customs that devalue women and girls. Implementation and enforcement of nondiscriminatory policies and practices that require gender

equity in inheritance, property rights, education, and civil liberties, and that otherwise reduce women's social and economic reliance on men, are imperative. The 2010 launch of UN Women indicates a building worldwide momentum to ensure that these goals become reality. Without such reforms, successful and sustained modification of the individual, family, and community norms that enable gender-based violence perpetration is unlikely.

National and International gender-based violence responses should be simultaneously committed to perpetration prevention and accountability and survivor support. Moreover, findings of heterogeneity of patterns and predictors of gender-based violence across settings support the need for local tailoring in collaboration with community practitioners and stakeholders. Without effective reduction of male gender-based violence perpetration, women's health, wellbeing, and safety will continue to suffer worldwide. Gender-Based Violence includes a variety of acts of violence committed against females because they are females and against males because they are males. It includes sexual violence, intimate partner, or spouse abuse (violence), emotional and psychological abuse, sex trafficking, forced prostitution, sexual exploitation, sexual harassment, harmful traditional practices, and discriminatory practices based on gender. Research indicates that most GBV cases involve a female survivor and a male perpetrator.

2.2 Prevalence of Gender-Based Violence.

Gender-Based Violence (GBV) is the most frequently occurring form of violence against women (WHO, 2005) and refers to any behavior within an intimate relationship that causes physical, psychological, or sexual harm to those in the association (Krug, 2002). In surveys from around the world, in the middle of 10% and 69% of women reported being physically assaulted by an intimate male partner at some point in their lives (Krug, 2002).

Several studies on women's health and domestic violence on women of reproductive age revealed that between one-third and three-quarters 35% -76% of women had been physically or sexually assaulted since the age of 15. Overall, 15%-71% had experienced gender-based violence and in most settings, violence was reported as ongoing (Fawole,2005). These studies are important in that they all attempt to measure the scale of violence experienced by women and to describe the types of violence that are experienced in which is mainly physical, sexual, and psychological, among other types.

Gender-Based violence rates have been reported during pregnancy as 58.9% and 31.3% among civil servants in a study in Nigeria (Fawole, 2005). However, a higher prevalence of 40% and 78.8% were reported by (Ilika.,2002) in Anambra. Gender-based violence in intimate relationships is often accompanied by psychological abuse, and in one-third to over one-half of cases by sexual abuse as well (Habib, 2011). Studies on Gender-Based Violence in Nigeria have focused mainly on physical violence (Fawole, 2005; Adesina, 2011). Little information is available on women's experience of all types of GBV and associated factors in Nigeria. Studies on GBV in Nigeria have been conducted in urban areas (Fawole, 2005; Adesina, 2011), but very few data are available from the rural areas (Antai, 2008). However, various dominant traditional and cultural values and norms and socio-cultural factors relating to GBV have been reported to be prevalent in rural settings (Lamichhane, 2011; Antai, 2008). Another study conducted in an urban area, Ibadan, revealed that women justified wife-beating for reasons such as being disrespectful to the husband, disobedience, unfaithfulness, not caring for the children adequately, refusing sex, using family planning without the husband's consent, and failing to have food ready on time, amongst others (Fawole, 2005)

2.3 Correlates of Gender-based Violence.

At the global level, research by WHO has strongly indicated that GBV is perpetrated by husbands or male partners (WHO 2002). According to KNBS (2010) GBV and forced sex are highly prevalent in the East African region. In Kenya, 43% of 15-49-years old women reported having experienced some form of gender-based violence in their lifetime, with 29% reporting an experience in the previous year; 16% of women reported having ever been sexually abused, and for 13%, this had happened in the last year (KNBS and ICF Macro, 2010). Research conducted in Kasarani discovered that 47,551 women aged 15–49 are likely to have experienced physical violence since age 15 while 39,352 women aged 15– 49 are likely to have engaged in physical or sexual violence committed by a husband/partner (Otsola, 2012).

Famoye, 2004 addressed the number of violent incidents against women's economic dependence among adults in the United States who were either married or living together; were single parents with children under 18 in the household; or had been married or had lived with a partner of the opposite sex within the past years and the distribution of the frequency of violent incidents was highly skewed. The purpose of the survey was to ascertain methods of conflict resolution within the family. The data used shows that intimate partners violence is still pervasive in US society, women experience more intimate partner violence than men, rates of intimate partner violence vary significantly among women of diverse racial background and most intimate partner violence are not reported to the law enforcement officials, although the rate of reporting has increased. The paper concluded that less economic dependence of women is associated with less violence.

Global statistics indicate that well over 200 million people abuse drugs, with the most abused drug being alcohol, with impacts being felt differently in regions, communities, and families

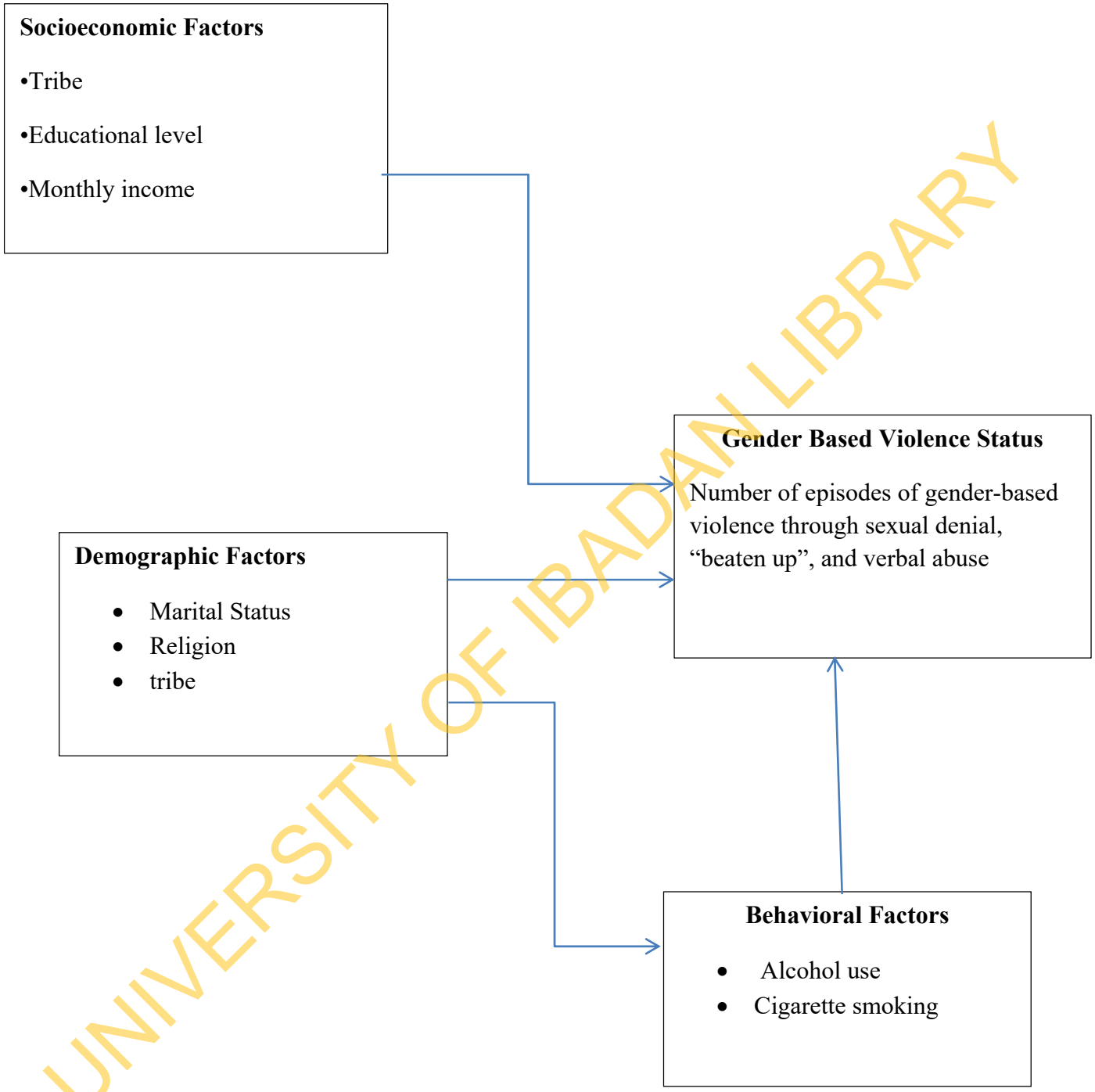
(Sonke Gender Justice: human rights, 2014). In Africa abuse is more common among men than women, though trends are changing rapidly. Amongst women abuse is 'less visible, more private' has it is observed more as a male problem with women being more involved in the trade and being victims of the same.

Oladepo et al, (2011) reported factors influencing gender-based violence among men and women in Nigeria using a survey of 3000 men and women from 3 selected states in Nigeria. The results showed that a lower risk of experiencing sexual violence among males was observed among those who do not drink alcohol and it was concluded that gender-based violence still accounts for a problem in Nigeria affecting women more than men. Similarly, Fawole et al, (2014) studied intimate partner violence in Southwestern Nigeria. Multiple logistic regression models were used to identify independent factors associated with the current experience of IPV and different forms of IPV using a survey of 300 women in southwestern Nigeria among Yoruba ethnicities. The results showed that history of alcohol consumption by partners was significantly associated with reporting physical violence and it was concluded that intimate partner violence is a frequent experience in women in both rural and urban communities, although the types of intimate partner violence experienced differed.

2.5: Conceptual Framework for Number of episodes of gender-based violence against women

The conceptual framework builds on existing knowledge to analyze the socio-economic and demographic factors associated with gender-based violence among males to females (Cunradi et al, 2012). Figure 2.1 shows the determinants of gender-based violence against women.

Figure 2.1: Determinants of Gender-based violence against women.



CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Area

Nigeria lies on the west coast of Africa between latitude 4º16′and 13º53′ north and longitudes 2º40′ and 14º41′ east. It occupies approximately 923,768 square kilometers of land stretching from the Gulf of Guinea on the Atlantic coast in the south to the fringes of the Sahara Desert in the north. Nigeria is the most populous country in Africa and the 14th largest in landmass. The country's 2020 Population and Housing Census placed the country's population at 206,139,589. (Nigeria: population 1950-2020, ghdx.healthdata.org)

Nigeria began its existence as a nation-state in 1914 through the amalgamation of the northern and southern protectorates. Before this time, there were various cultural, ethnic, and linguistic groups, such as the Oyo, Benin, Nupe, Jukun, Kanem-Bornu, and Hausa-Fulani empires. These groups lived in Kingdoms and emirates with sophisticated systems of government. There were also other strong ethnic groups such as the Igbos, Ibibios, and Tivs. (Yusuf, 2011)

Nigeria became a republic on October 1, 1963, with different administrative structures. Within the boundaries of Nigeria are many social groups with distinct cultural traits; there are about 374 identifiable ethnic groups, with the Hausa, Yoruba, and Igbo as the major groups. Presently, Nigeria is made up of 36 states and a Federal Capital Territory, grouped into six geographical zones: North Central, North East, North West, South East, South-South, and South West.

Oyo State is a state in southwestern Nigeria with its capital at Ibadan. Enugu state is inland in south-eastern Nigeria with its capital at Enugu, while Kaduna state is located at the northern end

of Nigeria's high plains which has its capital in Kaduna. Oyo state is part of the Yoruba ethnic group, Enugu is part of the Igbo ethnic group, and Kaduna state is part of the Hausa ethnic group.

3.2 Study Design

This study utilized data from a large survey conducted in 2011 which was a descriptive cross-sectional design. Nigeria is divided into states, each state is subdivided into Local Government Areas (LGAs), and each LGA is divided into localities, each locality was subdivided into Census Enumeration Areas (EAs).

3.3 Study Population and Sample Size

The study population was women aged 15 – 49 years from three selected states in Nigeria. The study included women of reproductive age who have had an intimate relationship in the past. A total of 1298 records were retrieved for the present analysis.

3.4 Sampling Procedure

A Multistage cluster random sampling procedure was employed. The 6 geo-political zones of Nigeria were identified as clusters. Stage 1 required the random selection of 3 geo-political zones from a list of the 6 geo-political zones in the country. This resulted in the selection of the southwest, northcentral, and southeast zones. Stage 2 involved the random selection of one state in each of the selected zones with the selection of Oyo, Enugu, and Kaduna states. These three states were selected using simple random sampling from a list of all states in the zones, after which local governments were randomly selected and then communities within the local government areas. In the selected communities, a landmark was picked out (e.g., a church,

mosque, or marketplace) and a coin was tossed. If it revealed a head, the research assistant proceeded in the right direction; if it showed a tail, the left direction was followed. Every consecutive household was visited and respondents who were of reproductive age were selected. One eligible respondent was recruited per household. If there were more than one, they were asked to the ballot. To be eligible for an interview, the adult woman (whether married or single) must have been (previously or currently) in an intimate relationship.

3.5 Data Collection

The study utilized an interviewer-administered questionnaire. The survey questions were derived from a thorough literature review including the WHO Multi-Country Study of Violence against Women. The primary gender-based violence outcome variables, collected was a slap on the face, throwing something at you, pushing, biting, tying up, pulling your hair, beaten up, hit with an object, burning or acid attack, choking, stabbing, thrown out, kicks on the body, shoving, dragging, knife threat and gun threat). Three of these outcome variables were considered in this analysis. The choice of variables for the number of times those women experienced gender-based violence in 3months was based on previous published studies and literature reviews on gender-based violence. (Cunradi et al., 2012, Oladepo et al., 2011)

3.6 Study Variables

The study variables are described below:

3.6.1 Outcome Variables

The number of episodes or incidents of violence was used as an index of gender-based violence and it is a count variable. The number of episodes or incidents of gender-based violence in this study refers to the number of times male-to-female partner violence occurred. The number of episodes or incidents of violence was the dependent variable.

3.6.2 Independent variables

The independent variables include smoke cigarettes, alcohol intake, and socio-demographic variables: tribe, educational level, religion, monthly income, age, sex. Table 3.1 shows the variable characteristics.

Table 3.1: Variables Characteristics

Variables	Category
Age	Below 20
	20-24
	25-29
	30-34
	35-39
	40-44
	45 and above
Tribe	Yoruba
	Igbo
	Hausa
Level of Education	No formal education
	Primary education
	Secondary education
	Tertiary education
Monthly income	No income
	Less than 5,000
	5,000-10,000
	10,001-15,000
	15,000-20,000

	20,000-25,000
	25,000 and above
Religion	Christianity
	Islam
	Traditional
	Others
Drink Alcohol	Yes
	No
Smoking cigarette	Yes
	No

3. 7 Statistical Data Analysis

Descriptive statistics such as frequency tables, means, standard deviation, skewness, and kurtosis were used to summarize variables. Incidence risk ratios (IRR), Standard error, P-value, and 95% confidence Interval were presented. The STATA Statistical Package 14 was used to analyze the data. The negative binomial regression model was fitted to the number of episodes of gender-based violence: Over-dispersion and under-dispersion assumptions were checked using Pearson dispersion (chi-square) statistics. When Pearson dispersion value > 1 = over-dispersion and when Pearson dispersion value < 1 = under-dispersion. The test for multicollinearity was done for the covariates using Variance Inflation Factor (VIF must not exceed 10) and Tolerance to assess whether factors are correlated with each other which could affect p-values and the model.

3. 8 Statistical Models, Assumptions, and Specification

The Poisson and the negative binomial model belong to a class of Generalized Linear Models (GLMs). In these models, the independent variables need not be normally distributed, but typically assumes to follow an exponential family distribution (including Binomial, Normal, and Poisson). Generalized Linear Models do not assume a linear relationship between the dependent variable, but it does assume a linear relationship between the independent variables through a link function. Errors need not be normally distributed but independent, the homogeneity of variance assumption in the case of linear regression models may not be satisfied; thus, allowing for over-dispersion. Contrary to the Linear regression model, which uses the Least Square to estimate parameters, General Linear Models use the method of Maximum Likelihood Estimation (MLE) to estimate the parameters and thus rely on large sample approximations.

3.8.1 Poisson Model

The most common technique employed to model count data is Poisson regression, so named because the error process is assumed to follow the Poisson distribution. The Poisson distribution describes the number of events that occur in each period where its mean μ is the average number of events per period. It has the unusual feature that its mean equals its variance. Its probability density function is.

$$\Pr(Y = y) = \frac{e^{-\mu}\mu^{y}}{y!}, y = 0,1,2, \ldots \quad (3.1)$$

Where e is the natural logarithm and y! is the factorial of y.

μ is the intensity or rate parameter; the first two moments about the central is equal to its rate parameter, that is:

$$E(Y) = V(Y) = \mu \quad (3.2)$$

The Poisson regression model is derived from Poisson distribution using the exponential means parameterizing the relation in which the conditional mean of observation *i* depends on a number of covariates,

$$\mu_{i=\exp(x'_i\beta)} \; ;i=1,2,\ldots,N \quad (3.3)$$

By introducing the observation subscript $_i$, attached to both y and μ, the framework extended to non-identically independently distributed data, by assumption, there are k linearly independent covariates, usually including a constant. Hence $V(y_i/x_i) = \exp(x'_i\beta)$, by property (3.2). The Poisson regression is intrinsically heteroskedastic.

This model may be estimated by maximum likelihood (ML), where the parameter estimates are the solutions to the first-order conditions.

$$\sum_{i=1}^{N}(yi - \exp(x'_i\beta)\, x_i = 0 \qquad (3.4)$$

If x_i include a constant term, then the residuals $yi - \exp(x'_i\beta)$ sum to zero by (3.4).

$$lnL(\beta) = \sum_{i=1}^{N}\{yix'_i\beta - \exp(x'_i\beta) - lny_i!\} \qquad (3.5)$$

The loglikelihood function is globally concave; the estimation converges rapidly and yields unique parameter estimates. By standard maximum likelihood theory of correctly specified models, the estimator $\hat{\beta}_p$ is consistent for β and asymptotically normal with the sample covariance matrix.

$$V[\hat{\beta}_p] = (\sum_i^N \mu_i\, x_i x'_i)^{-1} \qquad (3.6)$$

In the case where μ_i is of the exponential form (3.3). In practice, an alternative more general form for the variance matric is estimated by the quasi-maximum likelihood estimation which considers models that are even more partially parametric, such as the incomplete specification of the conditional mean. In this study the condition for overdispersion was valid. Therefore, this study used the Negative binomial model.

3.8.2 Negative Binomial Model

The Negative Binomial distribution is a two-parameter distribution, the distribution for any positive n. The negative binomial distribution is a mixture of the Poisson distribution and the Gamma distribution (Gamma-Poisson Mixture) or generalized factorial function. The assumptions of negative binomial:

- The data is a count data.
- The data is either over-dispersed or under-dispersed.

Suppose the distribution of a random count y is Poisson, conditional on the parameter λ, so that $(y/\lambda) = \exp(-\lambda)\frac{\lambda^y}{\lambda!}$. Suppose now that the parameter λ is random, rather than being a completely deterministic function of x, for example, $\exp(x'_i\beta)$ and $v > 0$ is independently identically distributed with density $g(v/\boldsymbol{\alpha})$**.** This is an example of unobserved heterogeneity, as different observations may have different λ (heterogeneity), but part of this difference is due to a random (unobserved) component v.

The marginal density of y, unconditional on the random parameter v but conditional on the deterministic parameters μ and α, is obtained by integrating out v. This yield.

$h(y/\mu, \alpha) = \int f(y/\mu, v)g(v/\alpha)dv$

where $g(v/\boldsymbol{\alpha})$ is called the mixing distribution and $\boldsymbol{\alpha}$ denotes the unknown parameter of the mixing distribution. The integration defines an "average" distribution. For some specific choices of f(.) and g(.), the integral will have an analytical or closed-form solution.

If (y/λ) is the Poisson density and g(v), $v > 0$ is the gamma density with *E(v) =1* and *V(v) = α:* we obtain the negative binomial density.

$$h(y/\mu, \alpha) = \frac{\Gamma(\alpha^{-1}+y)}{\Gamma(\alpha^{-1})\Gamma(y+1)}\left(\frac{\alpha^{-1}}{\alpha^{-1}+\mu}\right)^{\alpha^{-1}}\left(\frac{\mu}{\mu+\alpha^{-1}}\right)^{y} \quad (3.7)$$

where Γ(.) denotes the gamma integral which specializes in a factorial for an integer argument. The first two moments of the negative binomial distribution are.

$$E[y/\mu, \alpha] = \mu \quad (3.8a)$$

$$V[y/\mu,\alpha] = \mu(1+\alpha\mu) \qquad (3.\ 8b)$$

The variance exceeds the mean since $\alpha > 0$ and $\mu > 0$. Indeed, it can be shown easily that over-dispersion always arises if (y/λ) is Poisson and the mixing is of the term $\lambda = \mu v$ where E(v) =1. Special cases of the negative binomial include the Poisson ($\alpha = 0$) and the geometric ($\alpha = 1$. Two standard variants of the negative binomial are used in regression applications. Both variants specify $\mu_i = \exp(x'_i\beta)$. The most common variant lets α be a parameter to be estimated, in which case conditional variance function, $\mu + \alpha\mu^2$ from (3. 8b), is quadratic in the mean. The loglikelihood is easily obtained from (3.6), and estimation is by maximum likelihood. The other variant of the negative binomial model has a linear variance function, $V[y/\mu,\alpha] = \mu(1+\delta)\mu$, obtained by replacing α by $\frac{\delta}{\mu}$ through (3.7). Estimation by ML is again straightforward. Sometimes this variant is called negative binomial 1 (NB1) in contrast to the variant with quadratic variance function which has been called the negative binomial 2 (NB2) model (Cameron and Trivedi, 1999). The negative binomial model with quadratic variance function is extremely useful in applied work. It is the standard cross-section model for counts, which are usually over-dispersed, along with the Quasi-Maximum Likelihood Estimation.

The Maximum Likelihood Estimation for Negative Binomial Model thus given as:

$$L(\beta/y,x) = \prod_{i=1}^{N} h(y/\mu,\alpha) = \prod_{i=1}^{N} \frac{\Gamma(\alpha^{-1}+y_i)}{\Gamma(\alpha^{-1})\Gamma(y_i+1)} \left(\frac{\alpha^{-1}}{\alpha^{-1}+\mu}\right)^{\alpha^{-1}} \left(\frac{\mu}{\mu+\alpha^{-1}}\right)^{y_i} \qquad (3.\ 9)$$

3.8.3 Model Description:

$$\mu_i = exp\ (In(t_i) + \beta_1 X_{1i} + \beta_2 X_{2i} + \ldots + \beta p X pi + ei) \quad (3.10)$$

where

- $\boldsymbol{\mu}$ is the number of episodes of gender-based violence through sexual denial, physical violence, and verbal abuse.
- $\mathbf{X}_i$ is the explanatory variables (age, tribe, monthly income, religion, level of education, drink alcohol, smoke cigarette).
- $\boldsymbol{\beta_1 \equiv 1, \beta 1}$ is called the intercept.
- The regression coefficients $\boldsymbol{\beta 1, \beta 2, \ldots, \beta p}$ are unknown parameters that are estimated from a set of data.
- The parameter $\boldsymbol{\mu}$ is the mean incidence rate of $\boldsymbol{y}$ per unit of exposure.
- $\boldsymbol{t_i}$ is the exposure for a particular observation.

CHAPTER FOUR

4.0 RESULTS

4.1 Descriptive Statistics of the Outcome Variables

More than 70% of the respondents had experience of verbal abuse. The number of times of male to female gender-based violence through verbal abuse ranges from 0 to 15, with a mean of 2.68, SD = 6.29. About 18% of the respondents had the experience of "beaten up". The number of times of male to female gender-based violence through "beaten up" ranges from 0 to 20, with a mean of 2.13, SD = 8.54. The respondents that experienced sexual denial had the least percentage of 8.87%. The number of times of male to female gender-based violence with verbal abuse ranges from 0 to 18, with a mean of 2.57, standard deviation = 10.68. Table 4.1 shows the descriptive statistics of the outcome variables.

Table 4.1: Descriptive statistics of the outcome variables

	N	MEAN	SD	SKEWNESS	KURTOSIS
SEX DENIAL	77	2.57	10.678	7.638	61.502
BEATEN UP	155	2.13	8.539	10.178	114.291
VERBAL ABUSE	636	2.68	6.292	8.477	105.584

4.2 Socio-economic and Demographic Characteristics of Respondents

The socio-economic and demographic characteristics of respondents were presented in Table 4.2. A total of 1298 records of women within the age of 15-49years were extracted with a weighted mean age of 33.3yrs SD =11.1years. The proportion of those women who are educated were about 42.7% while those who had no formal education were 8.3%. The proportion of women who responded from the Igbo tribe was slightly higher (38.9%) compared to women from the Hausa tribe (13.3%). Those women who smoke a cigarette were lower than those who do not smoke a cigarette. The Proportion of women who earned between #5,001 to #10,000 monthly was 28.3% while those who earned #20,001+ were 12.9%. About 75.7% were of the Christian faith, 23.8% were Muslims and others are either traditionalist or do not practice any faith.

Table 4.2: Frequency Distribution of Respondents by Socio-economic and Demographic Characteristics

Variables	Category	Frequency	Percentage
Age	Below 20	52	4
	20-24	254	19.6
	25-29	268	20.6
	30-34	215	16.6
	35-39	160	12.3
	40-44	132	10.2
	45 and above	217	16.7
	Mean±*s*	**33.3±11.1**	
Tribe	Yoruba	470	36.2
	Igbo	505	38.9
	Hausa	172	13.3
	Others	151	11.6
Level of Education	No formal education	108	8.3
	Primary education	191	14.7
	Secondary education	445	34.3
	Tertiary education	554	42.7
Monthly income	No income	296	22.8
	Less than 5,000	266	20.5
	5,001-10,000	367	28.3

	10,001-20,000	202	15.6
	20,001+	167	12.9
Religion	Christianity	982	75.7
	Islam	309	23.8
	Others	7	0.5
Drink Alcohol	Yes	222	17.1
	No	1076	82.9
Smoking cigarette	Yes	16	1.2
	No	1282	98.8
Total		1298	100

4.3 Dispersion Test

The result of the dispersion test using seven explanatory variables: age, tribe, religion, level of education, alcohol use, monthly income, and smoke cigarette gave values of 51.76, 70.95, 123.30 and indicated that there exists over-dispersion in the GBV through sexual denial, beaten up and verbal abuse which is statistically significant at 0.001. Table 4.3 shows the results of the dispersion test.

Table 4.3: Results of the Dispersion Test

	Dispersion estimates	P-value
Sex denial	51.76	<0.001
Physical Violence	70.95	<0.001
Verbal Abuse	123.30	<0.001

4.4 Multicollinearity Test

The result of the multicollinearity test of variables used for the model was presented. Seven independent variables: tribe, level of education, monthly income, religion, alcohol use, cigarette smoking, and age were extracted for the analysis.

The collinearity checks of the seven variables used in the analysis were presented in table 4.4a, b, c. The Variance Inflation Factor of the 7 independent variables was acceptable since none of the values exceeds 10.

Table 4.4a: Collinearity Check of Outcome variable: Number of episodes of GBV through Sexual denial

	Collinearity Statistics	
Model Variables	VIF	Tolerance
Tribe	1.41	0.707
Educational Level	1.36	0.735
Monthly income	1.66	0.603
Age	1.69	0.862
Alcohol use	1.26	0.791
Religion	1.27	0.787
Smoke cigarette	1.18	0.845

Table 4.4b: Collinearity Check of Outcome variable: Number of episodes of GBV through "beaten up"

	Collinearity Statistics	
Model Variables	**VIF**	**Tolerance**
Tribe	1.08	0.923
Educational Level	1.27	0.787
Monthly income	1.27	0.785
Age	1.20	0.834
Alcohol use	1.14	0.877
Religion	1.02	0.981
Smoke cigarette	1.12	0.891

Table 4.4c: Collinearity Check of Outcome variable: Number of episodes of GBV through verbal abuse

	Collinearity Statistics	
Model Variables	**VIF**	**Tolerance**
Tribe	1.12	0.894
Educational Level	1.29	0.775
Monthly income	1.35	0.741
Age	1.24	0.810
Alcohol use	1.15	0.868
Religion	1.07	0.935
Smoke cigarette	1.09	0.916

4.5.1 Model Estimates of Negative Binomial Regression for GBV through Sexual Denial

The result of the negative binomial regression is presented in table 4.5.1. The table shows the Incidence Rate Ratios (IRR), Standard Error, Z-value, and P-value. The negative binomial regression model of GBV through sexual denial identified age 45+, tribe: Igbo, and Hausa to be statistically significant factors influencing gender-based violence through sexual denial at p-value <0.05.

The analysis indicated that women who are Igbo were about four times more likely to engage in gender-based violence through sexual denial (IRR=3.752, 95% CI:1.133-12.423). Likewise, women who are Hausa were about four times more likely to involve in gender-based violence through sexual denial (IRR=3.727, 95% CI: 1.158-11.996).

Table 4.5.1 Negative Binomial Model of Sexual denial and Independent variables

Sexual denial	IRR	Std. Err.	Z-value	P-value	[95% Conf. Interval]
Age(yrs)					
Below 20	Ref.				
20-24	0.553	0.447	-0.73	0.464	(0.113-2.697)
25-29	0.522	0.466	-0.73	0.466	(0.091- 2.999)
30-34	0.478	0.465	-0.76	0.448	(0.071-3.215)
35-39	0.378	0.377	-0.98	0.329	(0.053-2.672)
40-44	0.856	0.911	-0.15	0.884	(0.106-6.904)
45+	0.084	0.104	-1.99	0.046*	(0.007-0.958)
Tribe					
Yoruba	Ref.				
Igbo	3.752	2.292	2.16	0.030*	(1.133 -12.423)
Hausa	3.727	0.223	2.21	0.027*	(1.158 -11.996)
Others	2.819	2.075	1.41	0.159	(0.666-11.933)
Level of Education					
No formal education	Ref.				
Primary	1.650	1.799	0.46	0.646	(0.195-13.973)
Secondary	1.979	1.737	0.78	0.437	(0.354-11.054)
Tertiary	0.491	0.402	-0.87	0.384	(0.099-2.439)
Monthly Income					
No Income	Ref.				
Less than 5000	0.242	0.195	-1.76	0.078	(0.050-1.171)
5,001-10,000	0.532	0.360	-0.93	0.351	(0.141-2.004)
10,001-20,000	1.952	1.430	0.91	0.361	(0.464-8.206)
20,001+	0.630	0.508	-0.57	0.567	(0.130-3.061)

Smoking Cigarette					
Yes	Ref.				
No	0.101	0.141	-1.65	0.099	(0.007-1.540)
Religion					
Christianity	Ref.				
Islam	0.622	0.351	-0.84	0.401	(0.206-1.882)
Alcohol use					
Yes	Ref.				
No	1.627	0.845	0.94	0.349	(0.588 -4.504)

4.5.2 Model Estimates of Negative Binomial Regression for GBV through Beaten up

The result of the negative binomial regression is presented in table 4.5.2. The table shows the Incidence Rate Ratios (IRR), Standard Error, P-value, and 95% confidence interval. The negative binomial regression model of GBV through "beaten up" identified women who are Igbo, women who do not drink alcohol, and women who earned between 20000 plus naira to be statistically significant factors influencing gender-based violence through "beaten up" at p-value <0.05.

The analysis indicated that women who Igbo are six times more likely to engage in gender-based violence through "beaten up" (IRR=6.074, 95% CI: 2.472-14.924). The women who lived in the eastern part of Nigeria are at higher risk of engaging in gender-based violence through "beaten up". Likewise, women who earned between 20000 plus are 0.75 times less likely to involve in gender-based violence through "beaten up" (IRR=0.025, 95% CI: 0.069-0.905).

Table 4.5.2: Negative Binomial Model of "Beaten up" and Independent variables.

Physical violence	IRR	Std. Err.	Z-value	P-value [95% Conf.Interval]	
Age					
Below 20	Ref.				
20-24	0.646	0.684	-0.41	0.680	(0.081-5.142)
25-29	0.396	0.430	-0.85	0.394	(0.047- 3.334)
30-34	0.225	0.249	-1.35	0.178	(0.026-1.974)
35-39	0.420	0.486	-0.75	0.453	(0.044- 4.054)
40-44	0.553	0.615	-0.53	0.594	(0.063-4.888)
45+	0.098	0.114	-2.01	0.045	(0.010-0.946)
Tribe					
Yoruba	Ref.				
Igbo	6.074	2.786	3.93	0.001*	(2.472-14.924)
Hausa	2.561	1.259	1.91	0.056	(0.978-6.710)
Others	1.978	0.981	1.37	0.169	(0.748-5.230)
Religion					
Christian	Ref.				
Islam	1.505	0.649	0.95	0.344	(0.646-3.506)
Others	0.065	0.108	-1.66	0.098	(0.003-1.652)
Level of education					
No formal education	Ref.				
Primary	1.019	0.503	0.04	0.969	(0.387-2.684)
Secondary	0.723	0.336	-0.70	0.486	(0.291-1.798)
Tertiary	0.577	0.299	-1.06	0.289	(0.209-1.595)
Monthly income					
No income	Ref.				

Less than 5000	0.933	0.433	-0.15	0.882	(0.376- 2.319)
5001 -10000	0.603	0.266	-1.15	0.251	(0.254-1.431)
10001-20000	0.326	0.189	-1.93	0.054	(0.105-1.017)
20001+	0.250	0.164	-2.11	0.035*	(0.069-0.905)
Smoking Cigarette					
Yes	Ref.				
No	1.129	1.081	0.13	0.899	(0.173-7.370)
Alcohol use					
Yes	Ref.				
No	0.378	0.147	-2.49	0.013*	(0.176-0.812)

4.5.3 Model Estimates of Negative Binomial Regression for GBV through Verbal Abuse

The result of the negative binomial regression is presented in table 4.5.3. The table shows the Incidence Rate Ratios (IRR), Standard Error, P-value, and 95% confidence interval (CI). The negative binomial regression model of GBV through verbal abuse identified women who are Igbo, Hausa, and women who do not drink alcohol to be statistically significant factors influencing gender-based violence through beaten up at p-value <0.05.

The analysis indicated that Igbo and Hausa women are three and about three times more likely to engage in gender-based violence through verbal abuse respectively (IRR=3.404, 95% CI:2,429-4.769) and (IRR=2.659, 95% CI:1.702-4.155). The women who do not drink alcohol are at lower risk of engaging in gender-based violence through verbal abuse. (IRR=0.652, 95% CI: 0.485-0.875).

Table 4.5.3 Negative Binomial Model of Verbal Abuse and Independent variables

Verbal Abuse	IRR	Std. Err.	Z-value	P-value	[95% Conf. interval]
Age					
Below 20	Ref.				
20-24	1.032	0.416	0.08	0.937	(0.468-2.275)
25-29	0.683	0.274	-0.95	0.342	(0.311-1.499)
30-34	1.287	0.517	0.63	0.530	(0.586-2.828)
35-39	0.874	0.360	-0.33	0.743	(0.390-1.959)
40-44	1.140	0.472	0.32	0.752	(0.506-2.568)
45+	0.761	0.311	-0.67	0.505	(0.342- 1.696)
Tribe					
Yoruba	Ref.				
Igbo	3.404	0.586	7.12	0.001*	(2.429-4.769)
Hausa	2.659	0.605	4.29	0.001*	(1.702-4.155)
Others	1.959	0.466	2.82	0.005*	(1.226-3.119)
Religion					
Christian	Ref.				
Islam	0.796	0.146	-1.24	0.214	(0.556-1.140)
Others	0.451	0.406	-0.88	0.377	(0.077-2.635)
Level of Education					
No formal education	Ref.				
Primary	1.315	0.384	0.94	0.348	(0.742-2.331)
Secondary	1.572	0.434	1.64	0.101	(0.915-2.701)
Tertiary	1.312	0.364	0.98	0.328	(0.761-2.260)
Monthly Income					
No income	Ref.				

Less than 5000	0.824	0.170	-0.94	0.348	(0.551-1.234)
5001-10000	0.839	0.161	-0.91	0.360	(0.576 -1.222)
10001-20000	0.751	0.162	-1.33	0.184	(0.492-1.146)
20001+	0.612	0.152	-1.98	0.048	(0.377-0.996)
Smoking Cigarette					
Yes	Ref.				
No	1.578	0.783	0.92	0.359	(0.596-4.175)
Alcohol use					
Yes	Ref.				
No	0.652	0.098	-2.85	0.004*	(0.485-0.875)

CHAPTER FIVE

5. 0 DISCUSSION, CONCLUSION, RECOMMENDATION AND LIMITATIONS

5.1 Discussion

This study considered three incidents of gender-based violence from men to women. However, out of seventeen incidents collected, three were selected based on literature:

- Number of times women experienced sexual denial in the last 3 months.
- Number of times women experienced "beaten up" in the last 3 months.
- Number of times women experienced verbal abuse in the last 3 months

The major focus of this study was to investigate the association between the number of episodes of male to female gender-based violence such as socio-demographics, alcohol use, and smoking of cigarette as well as their monthly income, the number of times women experienced sexual denial, physical violence, and verbal abuse in the last 3months in three states (Kaduna, Enugu, and Oyo) of Nigeria.

Gender-based violence (GBV) is based on sex differences, a gender identity that are socially defined norms of femininity or masculinity. Both men and women are likely to experience this type of violence in society. However, research reviews have shown that women are more prone to violence as the rate is significantly higher compared to men (Grades Fixer, 2018). According to the World Health Organization (WHO), approximately 60% of women worldwide have experienced either sexual denial or verbal abuse. However, at least 27% of the women and girls have been sexually harassed by non-partners. GBV is tied to health distortion to women or girls who have experienced or going through issues in their lives. The prevalence of different types

and experiences of gender-based violence among women aged 15 to 49 years in selected communities in southwestern Nigeria in 2007 were 64% in the rural and 70% in the urban areas (M. O. Balogun et al.2014).

The negative binomial regression model is usually preferred in public health research for a count data that is over-dispersed or under-dispersed because it gives robust standard error estimates than the Poisson model (Cameron et al; 1999, Kleiber et al; 2008) from previous studies that would be incorporated in the new study assigned to the research hypothesis. The descriptive of the outcome variables shows that more than 70% of the respondents had experience of verbal abuse. About 18% of the respondents had experience of physical violence. The respondents that experienced sexual denial had the least percentage of 8.87%. The description of the covariates shows the proportion of women who were married had 64.2% while those divorced were 1.8%. The proportion of those women who drink alcohol and those who do not was 17.1% and 82.9% respectively. Women who are educated were about 42.7% while those who had no formal education were 8.3%. The proportion of women who responded from the Igbo tribe was slightly higher 38.9% compared to women from the Hausa tribe 13.3%. Those women who smoke cigarettes were lower than those who do not smoke a cigarette. About 75.7% were of the Christian faith, 23.8% were Muslims and others are either traditionalist or do not practice any faith.

The results of the Negative Binomial regression analysis showed that participants socio-demographic characteristics such as age (45+ years), monthly income (20001+ naira), tribe (Igbo & Hausa), and drinking alcohol (no) are associated factors affecting GBV through sexual denial, physical violence, and verbal abuse.

5.2 Conclusion

This study has given insight into factors associated with gender-based violence among males to females of reproductive age in Nigeria. It is hoped that the identified factors of this finding will assist in reducing gender-based violence in Nigeria. Health policymakers and International agencies interested in gender-based violence-related issues may direct their intervention towards factors responsible for the male to female gender-based violence.

The negative binomial model provided the estimates of gender-based violence through verbal abuse, physical violence, and sexual abuse among males to females and capture the gender-based violence experienced in the Nigerian setting.

5.3 Limitation of Study

A large survey data is reported retrospectively, cultural beliefs and norms often affect the report and data that involves violence, especially of the women who were not available at the time of the survey. Therefore, there is always a suspicion of the reliability of data from retrospective studies.

5.4 Recommendation

For grossly skewed variables, it will be wrong to use Logistics regression and even the median. Therefore, the Negative Binomial regression method is suggested.

REFERENCES

Abelson, A., Lyons C.E. (2019). Lifetime experiences of gender-based violence, depression and condom use among female sex workers in Cameroon: *International Journal of Social Psychiatry*.

Abeya, S. G., Afework M. F., & Yalew A. W. (2011). Intimate partner violence against women in western Ethiopia: Prevalence, patterns, and associated factors. *BMC Public Health*,11:913.

Abramsky, T., C. H. Watts, C. Garcia-Moreno, K. Devries, L. Kiss, M. Ellsberg, et al.2011. What factors are associated with recent intimate partner violence? Findings from the WHO multi-country study on women's health and domestic violence. *BMC Public Health*,11:109.

Abramsky, T., Watts C. H., Garcia-Moreno C., & Devries K. (2011). What factors are associated with recent intimate partner violence? Findings from the WHO multi-country study on women's health and domestic violence. *BMC Public Health*.11:109.

Adesina, O., I. Oyugbo, and A. Olubukola. (2011). Prevalence and pattern of violence in pregnancy in Ibadan, South-West Nigeria. *Jobstet Gynaecol* 31(3):232–6.

Anderson, K. L. (2002). Perpetrator or victim? Relationships between intimate partner violence and well-being. *Journal of Marriage and the Family*, 64,851–863.

Antai, D. (2011). Traumatic physical health consequences of intimate partner violence against women: What is the role of community-level factors? *BMC Women Health*,11:56.

Arulogun O.S & Jidda K.A. (2011). Experiences of Violence among Pregnant Women Attending Ante-Natal Clinics in Selected Hospitals in Abuja, Nigeria. Sierra Leone Journal of Biomedical Research 3(1), 43 – 48

Beth (2002): Gender-Based violence: Emerging Issues in programs serving displaced populations. *Reproductive health for refugee consortium,* 2(3),1-158

Bharati Basu & Felix Famoye., 2010. Domestic Violence against Women, and their Economic Dependence: a Count Data Analysis, Review of Political Economy, 16:4, 457-472.

Bohning D, Dietz E, Schlattmann P, Mendonca L, & Kirchner U. The zero-inflated Poisson model and the decayed, missing, and filled teeth index in dental epidemiology. *J R Stat*. 1999;162(2):195–209.

Britt, C. and Weisburd, D. (2010). Statistical power. In Piquero A. and Weisburd, D. (eds.) Handbook of Quantitative Criminology. Springer: New York, NY.

Caetano R, Schafer J, Clark CL, Cunradi C. (2000): Intimate partner violence, acculturation, and alcohol

Cameron AC, Trivedi P K. Count data models for financial data. Handbook of Statistics 1996, 14, Statistical Methods in Finance, 363-392, Amsterdam

Cameron, C., Trivedi, P., (1990). Regression-Based Tests for Overdispersion in the Negative binomial Regression Model. *Journal of Econometrics*, 46, pp. 347–364.

Cameron, C., Trivedi, P., 1998. Regression Analysis of Count Data. Cambridge University Press, New York.

Campbell J, Lewandowski LA. Mental and physical health effects of intimate partner violence on women and children.Psychiatr Clin North Am. 1997;20:353-374.

Caplan, J., Kennedy, L., and Miller, J. (2011). Risk terrain modeling: Brokering criminological theory and GIS methods for crime forecasting. *Justice Quarterly*, 25(2): 360-381.

Centers for Disease Control., Division of Violence Prevention. Injury prevention and control: Division of violence prevention.2016 [cited 2016 May 1]; Available from:http://www.cdc.gov/violenceprevention/intimatepartnerviolence/consequences.html

Chika (2012): Gender based domestic violence in Nigeria: A socio-legal perspective. *India journal of gender studies,* 19(1),137-148

Christina Mair, Carol B. Cunradi, Paul J. Gruenewald, Michael Todd & Lillian Remer, (2013). Drinking context-specific associations between intimate partner violence and frequency and volume of alcohol consumption: *Prevention Research Center, Pacific Institute for Research and Evaluation*, Berkeley, CA, USA. Addiction,108, 2102–2111

Cunradi C. B., Mair C., Todd M., Remer L., 2012. *D*rinking context and intimate partner violence: evidence from the California community health study of couples. *J Stud Alcohol Drugs;*73: 731–9.

Ellsberg M, Jansen HA, Heise L, (2008). Intimate partner violence and women's physical and mental health in the WHO multi-country study on women's health and domestic violence: an observational study. *Lancet*; 371:1165–72.

Eme T Owoaje and Funmilola M OlaOlorun, (2012). Women at Risk of Physical Intimate Partner Violence: A Cross-sectional Analysis of a Low-income Community in Southwest Nigeria. *African Journal of Reproductive Health; 16(1): 43.*

Enayatollah Bakhshi (2018) Overall Effects of Risk Factors Associated with Dental Caries Indices Using the Marginalized Zero-Inflated Negative Binomial Model

Fawole, O.I, Ajuwon, A.J., Osungbade, K.O, (2005). Evaluation of Interventions to prevent gender-based violence among young female apprentices in Ibadan, *Nigeria Health Education*, 105(3), 186-203.

Fawole, O.I., Aderonmu, A.L., & Fawole, A.O. (2005). Intimate partner abuse: Wife beating among civil servants in Ibadan, Nigeria. *African Journal of Reproductive Health,* 9(2), 54-64.

Fawole, O.I., Ajuwon, A.J., Osungbade, K.O. & Fawega, C.O. (2002). Prevalence and nature of violence to young female hawkers in Motor parks in South-Western Nigeria. *Health Edu Res*, 102:230-238.

Fletcher, J. (2010). The effects of intimate partner violence on health in young adulthood in the United States. *Social Science & Medicine*, 70,130–135.

Graham-Kevan. N. (2008), Does control behavior predict physical aggression and violence to partners?. *Journal of family violence.* 23(7), 539-547

Graham, K., Plant, M., & Plant, M. (2004). Alcohol, gender, and partner aggression: A general population study of British adults. *Addiction Research & Theory*, 12,385–401.

Hilbe, J. M. (2011). Negative binomial regression (2nd ed.). Cambridge, England: Cambridge University Press.

Hunt, G. P., & Laidler, K. J. (2001). Alcohol and violence in the lives of gang members. *Alcohol Research and Health*, 25(1), 66-71.

Ifemeje (2008), A critique of gender discriminatory practices in Igbo customary marriages. *Journal of women and minority right.* 1(1), 19-28

Jasmine Schulkind, Martin Mbonye, Charlotte Watts & Janet Seeley., (2016). The social context of gender-based violence, alcohol use and HIV risk among women involved in high-risk sexual behavior and their intimate partners in Kampala, Uganda: 17(8), 175-182

Jewkes R, Penn-Kekana L, Levin J. Risk factors for domestic violence(2002): findings from a South African cross-sectional study. *Soc Sci Med* (in press).

K.Shannon (2014) A systematic review of the correlate of violence against sex workers . *America journal of public health.*104(5), e42-e55.

Karen M. Devries, Jennifer C. Child, Loraine J. Bacchus & Lori Heise, 2013. Intimate partner violence victimization and alcohol consumption in women: a systematic review and meta-analysis. *Addiction,* 109, 379–391

Krug Etienne G (2002): The world report on violence and health. *The lancet.* 360(9339) 1083-1088.

Long D.L., Preisser J.S., Herring A.H., Golin C.E. (2014). A marginalized zero-inflated Poisson regression model with overall exposure effects. *Stat Med*.33(29):5151–65.

Mary O. Balogun, Eme T. Owoaje & Olufunmilayo I. Fawole 2012. Intimate Partner Violence in Southwestern Nigeria: Are There Rural-Urban Differences? *Women & Health*, 52:7, 627-645

Max, W.(2004), The economic toll of intimate partner violence against women in the United States. *Violence Vict*. 19(3): p. 259-72.

Morrison A, Ellsberg M, Bott S., (2007) Addressing gender-based violence: a critical review of interventions. the *World Bank Research Observer*, 22(1), 25-51

Nyaronga, D., Greenfield, T. K., & McDaniel, P. A. (2009). Drinking context and drinking problems among Black, White, and Hispanic men and women in 1984, 1995, and 2005 U.S. National Alcohol Surveys. *Journal of Studies on Alcohol and Drugs*, 70,16–26.

Okemgbo, C.N., Omideyi, A.K., Odimegwu, C.O., (2002). Prevalence, patterns, and correlates of domestic violence in selected Igbo communities of Imo State. Nig. Afr. J. Reprod Health, 6 (2), 101-114.

Oladepo O., Yusuf O.B., Arulogun O.S.,(2011). Factors Influencing Gender-Based Violence among Men and Women in the Selected States in Nigeria. *African Journal of Reproductive Health December* ,15(4),78.

Oladosu Ojengbede, Tolulope Babawarun, Olufunke Olayiwola, (2019), Sexual and gender-based violence in camps for internally displaced people and host communities in northeast Nigeria: a mixed methods study. *Published by Elsevier Ltd.*

Otsola, J.K. (2012). Baseline Survey Report on Gender-Based Violence in Kasarani. Nairobi: Humanities and Socio Sciences, 560

Patricia U. Agbawodikeizu, Prince C. Ekoh, Malachy E. Ebue, Henry, T. Ajibo, Chiemezie S. Atama & Uzoma O. Okoye., (2019). Knowledge of what constitutes gender-based violence among adult residents of Igbo-Eze North LGA, Enugu State, Nigeria, and practice implications for social workers. *African Journal of Reproductive Health,* 9(2), 54-64.

Sugg, N. (2015), Intimate partner violence: prevalence, health consequences, and intervention. *Med Clin North Am*, 99(3): p. 629-49.

Tjaden P, Thoennes N. (2000). Prevalence, and consequences of male-to-female and female-to-male intimate partner violence as measured by the national violence against women survey. *Violence Against Women*, 6(4), 142–61.

USAID, (2016). Gender-based violence against female sex workers in Cameroon: Prevalence and associations with sexual HIV risk and access to health services and justice.

USAID, (2009). Activities on Gender-Based Violence Working Group

USAID, (2009). A Guide to Programming Gender-Based Violence Prevention and Response

USAID, 2012 Prevalence of rape and client-initiated gender-based violence among female sex workers:

Wechsberg, W. M., Parry, C. D., & Jewkes, R. K. (2010). Drugs, sex, gender-based violence, and the intersection of the HIV/AIDS epidemic with vulnerable women in South Africa. North Carolina, USA.

Wells, S., Graham, K., Speechley, M., & Koval, J. J. (2005). Drinking patterns, drinking contexts and alcohol-related aggression among late adolescent and young adult drinkers. Addiction, 100, 933–944.

WHO, (2005). Gender-based violence: concepts, methods, and findings

WHO (2017). The contribution of gender-based violence and network trauma to gender differences among traumatic stress disorder.

WHO, (2013). Global and regional estimates of violence against women: Prevalence and health effects of intimate partner violence and non-partner sexual violence. Geneva: World Health Organization.

WHO, (2009). Promoting gender equality to prevent violence against women. Geneva: World Health Organization, 2009.

WHO, (2012). World Report on Violence and Health, Geneva, 2002. Available at: http://whqlibdoc.who.int/publications/2002/9241545615_eng.pdf