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Logistic Regression Analysis of Marriage Instability in Nigeria

O.J. Braimah
Abdur-Raheem College of Advanced Studies, Igbaja,
An Affiliate of Al-Hikmah University, Ilorin, Kwara State, Nigeria
G. Adewumi
Department of Statistics, University of Ilorin, Ilorin, Kwara State, Nigeria
P.E. Omaku
Department of Mathematics and Statistics, Federal Polytechnic Nasarawa, Nasarawa State, Nigeria
Y.K Saheed
Department of Computer Science, Abdul-Raheem College of Advance Studies Igbaja,
An Affiliate of Al- Hikmah University, Ilorin, Kwara State, Nigeria

Abstract:
This study is aimed at fitting binary logistic model that will describe the pattern of marriage instability in Nigeria in order to identify the factors that trigger marriage instability in Nigeria. The data used for this paper are secondary data from the Nigeria Demographic and Health Surveys (NDHS) reports for 2008. These are national population based surveys conducted across the six geo-political zones in Nigeria. The survey included registered married women across the country. Binary logistic regression was used to analyze the data on number of unions extracted from National Demographic and Health Survey (NDHS), 2008. Based on the nature of the NDHS data, 24 independent variables (predictors), all categorical were suspected to influence the response variable (number of unions). From the six geopolitical zones, our result shows that the risk of having more than one union in north east zone is 123.6% more than the risk of having more than one union in north central. Also the risk of having more than one union in North West and south west are 92.3% and 26.6% respectively more than the north central. And the risk of having more than one union in south east is 38.9% less than the risk of having more than one union in the north central revealing that instability marriage is very common in north east, north west and south west in Nigeria.

Keywords: *Logistic Regression, Marriage instability, Divorce.*

1. Introduction

Divorce or termination of marital vows is very rampant across the Nigeria these days. There are times in person's life when it becomes almost impossible to continue with the cordial relationship with one's spouse. In such cases one might decide to separate amicably. Cases have been reported when husbands murdered their wives and a vice versa. Hence the following questions:
Why do couples want to terminate their marriage? What happened to the vows and promises that they have made to each other when they first got married? These sorts of questions are very subjective, as there are no definite answers to be the real causes for divorce; divorce is therefore considered as a global challenge.
Not all marriages fail for the same reason, nevertheless, but some reasons more prominent than others. In these work marriage instability in Nigeria is model as a function of some socio-economic and demographic factors/variables.

1.1. Causes of Marriage Instability in Nigeria

In marriage, because of our different cultural diversity, problems that result from marital breakdown are multidimensional in our society today; the exigencies of these factors either combine to or singly rock marriage (Undiyaundeye, 2000). It is extremely difficult to understand the character of an individual because of human complex behavior patterns. If interaction in the family with one of its members leads to conflict, it is a symptom of a sick system. If the symptom persists, it may not only cause misery to the individuals but also to the rest of the members in that family. Several factors are responsible for marital instability in Nigeria. Ezinyi (2001) identified the following factors among others are:
Cultural and ethnic norms that influence how roles are carried out within a given family system, Poor level of exposure of spouses, Communication gap, Influence of wrong models, Infidelity, Infertility, Breach of Trust, Early Marriage, Sexual Deprivation, Conflict in Marital Roles, Finance and Religious Differences.

2. Materials and Methods

2.1. Logistic Regression

Logistic regression is used to predict a categorical (usually dichotomous) variable from a set of predictor variables. With a categorical dependent variable, discriminant function analysis is usually employed if all of the predictors are continuous and nicely distributed, logit analysis is employed if all of the predictors are categorical, and logistic regression is used if the predictor variable are a mixture of continuous and categorical variable or if they are not nicely distributed [logistic regression makes no assumption about the distribution of the predictor variables]. Logistic regression has been especially popular with medical research in which the dependent variable is whether or not a patient has a disease.

Interpreting Parameters In Logistic Regression

For a binary response variable Y which represent the success and failure outcomes 1 and 0.

$$Y = \begin{cases} 1 \text{ if success} \\ 0 \text{ if failure} \end{cases}$$

Pr(Y=1) = π and Pr(Y=0) = 1 –π

$$f(y;\pi) = \pi^{y}(1-\pi)^{1-y} = \left[1 - \pi\left(\frac{\pi}{(1-\pi)}\right)^{y}\right]$$

The log odd, called logit has the linear relationship:

$$\log\left(\frac{\pi_i}{1-\pi_i}\right) = \sum_{k=0}^{k} \beta_k x_{ik}$$

For solving π_i

$$\frac{\pi_i}{1-\pi_i} = \exp \sum_{k} \beta_k x_{ik}$$

$$\pi_i = \exp \sum_{k} \beta_k x_{ik} - \pi_i \exp \sum_{k} \beta_k x_{ik}$$

$$\pi_i = \frac{\exp \sum_k \beta_k x_{ik}}{1 + \exp \sum_k \beta_k x_{ik}}$$

2.2. Odds Ratio

Odd ratio of an event is the number of those who experience the event divided by the number of those that do not experience the event. If π is the probability of success and 1-π is the probability of failure, then the odd of success is the ratio $\Omega = \frac{\pi}{(1-\pi)}$

The logit model is especially appropriate when the issue of interest is to describe the odds of success or another substantive outcome, or the odds of success faced by one group relative to another. Odds are defined as the ratio of probability of one outcome to another.

For the logit transformation, the quantity will be recognized as the antilog of the logit, exp Ω.

To interpret β, its sign determine whether π is increasing or decreasing

2.2.1. Stepwise Procedures

In explanatory studies, an algorithmic method for searching among models can be informative if we use results cautiously. Goodman (1971) proposed methods analogous to forward selection and backward elimination in ordinary regression.

Forward Selection

It adds terms sequentially until further addition do not improve the fit. The method starts with no independent variable but only with intercept β_0. It continues by introducing the best independent variable one at a time into the regression model and access the goodness of fit of the model at each stage. This continues until, according to some criteria, a satisfactory model is obtained.

Backward Selection

It begins with a complex model and sequentially removes terms. At each stage, it selects the term for which its removal has the least damaging effect on the model (e.g. largest p value). The process stops when any further deletion leads to a significantly poorer fit.

2.2.2. Criteria For Model Selection

Akaike Information Criterion (AIC): It judges a model by how close its fitted values tend to the true values in terms of a certain expected value. Even though a simple model is farther from the true model than is a more complex model, it may be preferred because it tends to provide better estimate of certain characteristics of the true model, such as cell probabilities. Thus, the optimal model is the one that tends to have fit close to reality.

$$\text{AIC} = -2(\text{maximim likelihood} - \text{number of parameters in the model})$$

This penalizes model for having many parameters

Deviance G^2: It measures the extent to which the current model deviates from saturated model. The deviance is calculated as minus twice the logarithm of the ratio of likelihoods of the current model to the full model.

$$G^2 = -2\log\left(\frac{L_c}{L_f}\right) = -2(\log L_c - \log L_f)$$

Where L_c = represents likelihood estimate for current model, $L_{f=}$ represents likelihood of full model.

Letting $y_i = n_i p_i$ denote the fitted value for y_i, or expected number of successes under the model, the deviance for binomial models may be written as

$$G^2 = 2\sum_{i=1}^{n}\left\{y_i \log\frac{y_i}{y_i} + (r_i - y_i)\log\left(\frac{n_i - y_i}{n_i - y_i}\right)\right\}$$

This expression shows how the deviance compares the fitted values of y_i to the observed values of y_i.

2.3. Inference For Logit Regression

The Wald Test: The Wald test is a more general test that may be used to test several constraints. Significance test focuses on H_0: $\beta = 0$, the hypothesis independence. The Wald test uses the log likelihood at $\ddot{\beta}$ with test statistic $Z - \ddot{\beta}/SE$ or its square; under H_0, Z^2 is asymptotically χ_1^2.

Chi-Square Statistic: The Pearson chi square statistic can be constructed by considering the observed frequencies and those expected under the model.

$$\chi^2 = \sum \frac{(o_i - e_i)^2}{e_i}$$

Pseudo R^2: It measures the variation in the dependent variable explained by the independent variable.

$$\text{Pseudo } R^2 = \frac{\log L_c - \log L_0}{\log L_f - \log L_0}$$

It lies between 0 and 1. This quantity is 0 when the current model offers no improvement over the null model and equals 1 when the current model provides a perfect fit to the data.

Another R^2 measure proposed by Mc. Faddan (1974) is

$$D = \frac{\text{lcgL}_0 - \log L_c}{\log L_0}$$

Or, in the case of grouped binary (or binomial) data, this can be constructed using the deviance statistics, G^2

$$D = \frac{G_0^2 - G_c^2}{G_0^2}$$

Where G_0 denotes the deviance from the null model and G_c denotes the deviance from the current model.

2.5 Likelihood Ratio Test: Log L cannot be used alone as an index of fit because it is not independent of the sample size. Log Likelihood Function for Binomial Data is given as:

$$f(\pi) = \text{pr}\left(\frac{y}{n}, \pi\right) = \binom{n}{y}\pi^y(1-\pi)^{n-y}$$

Assuming independence of observation, likelihood is the product of the individual densities; we can express the likelihood as

$$L = \sum\left\{\log\binom{n_i}{y_i} + y_i \log F(x_i\beta) + (n_i - y_i)\log\left(1 - F(x_i\beta)\right\}\right.$$

Where $F(.)$ is a cumulative probability distribution function for logistic.

The binomial coefficient $\binom{n_i}{y_i}$ is simply a constant multiplier, which does not involve unknown parameters. Therefore, we maximize the log likelihood

$$\log L = \sum\{y_i \log F(x_i, \beta) + (n_i - y_i)\log\left(1 - F(x_i - \beta)\right)\}$$

2.4. Fitting Logistic Regression Models

The logistic regression model is given as:

$$\pi_i = \frac{\exp\left(\sum_{j=1}^{p}\beta_j X_{ij}\right)}{1 \mid \exp\left(\sum_{j=1}^{p}\beta_j X_{ij}\right)}$$

Likelihood equations

When more than one observation occur at X_i value, it is sufficient to record the number of observations n_i and the number of successes. We then let y_i refer to this success count rather than to an individual binary response. Then $(y_1 \ldots y_n)$ are independent binomial with $E(Y_i = n_i y_i)$, where $n_1 + \cdots + n_n = n$. Their joint probability mass function is proportional to the product of N binomial functions,

The likelihood equation is given as: $\sum_i y_{ij}x_{ij} - \sum_i n_i \pi_i x_{ij} = 0$ where $j = 1, 2, \ldots, p$ and

$$y_i = \frac{\exp\sum_k \beta_k x_{ik}}{1 + \exp\sum_k \beta_k x_{ik}}$$

2.5. Choice of Categories for the Response Variable

The common believe in most Nigeria community is that a woman can have only one husband at a time. Hence, the response variable (number of unions) was divided into two categories as those women having only one union and those that have more than one union.

Let Y_i be the number of unions of the i^{th} respondent, then response can be categorized as follows

$$Y_i = \begin{cases} 0, \textit{if the ith respondent has just 1 union} \\ 1, \textit{if the ith respondent has more than 1 union} \end{cases}$$

Therefore, in the context of our objective we are interested in the factors that are responsible for having more than one union.

2.6. Level of Measurement of the Dependent and Independent Variables

The dependent variable (number of unions) was grouped into nominal categories which satisfies the binary logistic regression requirement for dependent variable. The independent variables are wealth (Rich, Middle, and Poor), religion (Islam, Christianity, and Traditional), partners' education level (No education, Primary, Secondary, and Tertiary), work at home (Away or At home), beating wife when she refuse sex (Yes or No), partner's tired/mood (Yes or No), fertility preference (Fertile, Sterilized, and Not fertile) which are all categorical variables.

2.6.1 Overall Test Of Relationship

The overall test of relationship among the independent variables and categories defined by the dependent variable (number of unions) was based on the reduction in the likelihood values for a model which does not contain any independent variable and the model which does. The significance test for the final model Chi-square (after the independent variables have been added) is the statistical evidence of the presence of relationship between the dependent variable and a set of independent variables.

2.6.2. Strength Of Binary Logit Regression Model

Pseudo R^2 was used to compute the correlation (estimate the strength of relationship between the dependent variable and independent variables). This quantity measures the percentage or proportion of total variation in the dependent variable explained by the combination of the independent variable. It is a good measure of fit as a very high percentage indicate adequacy of the model.

2.6.3. Testing Relationship Of Individual Independent Variables And The Dependent Variable

There are two types used in testing for individual independent variable: the likelihood ratio test and the Wald test.

2.6.4. The Likelihood Ratio Test

This test is used to evaluate the overall relationship between the dependent variable (number of unions) and the independent variables.

2.6.5. The Wald Test

This test is used to evaluate whether or not an independent variable is statistically significant in differentiating between the two categories in each embedded binary logistic comparisons.

The interpretation of an independent variable focuses on its ability to distinguish between pairs of category and the contribution which it makes to change the odds of being in one dependent variable rather than the other.

If an independent variable has an overall relationship to the dependent variable, it might not be statistically significant in differentiating between pairs of categories defined by the dependent variable due to this, interpretation of significance of an independent variable which does have an overall relationship to the dependent variable in the likelihood ratio test was not made.

2.6.6. Descriptive Techniques

Descriptive statistics involves arranging, summarizing and interpreting a set of data in such a way that the meaningful essentials of the data can be produced and interpreted (Keller and Warrack, 2003).

2.6.7. Graphical Descriptive Techniques

In the attempt to graphically describe the number of unions of and household, multiple bar chart was used to present the frequencies of each category across religion, wealth index, educational attainment, work at home, beating wife when she refuse sex, husband tired/mood and fertility preference.

2.6.8. Sample Size

The NDHS data for 2008 contained socio-demographic data that were required for the study. A total of 28,869 households were involved in the NDHS survey. Out of this figure, information on number of unions was available for only 28,485 of the respondents. Also, complete information over all the factors considered in this study is only available for 14,875 respondents, and as a result, the remaining 13,994 respondents with incomplete information were excluded from the final analysis.

3. Data Analysis

Using the approach of binary logistic regression to analyze the data on number of unions extracted from National Demographic and Health Survey (NDHS), 2008. Based on the nature of the NDHS data, 24 independent variables (predictors) all categorical

were suspected to influence the response variable (number of unions). In the course of carrying out of this analysis, SPSS package and R package are being
used to analyze the data.

3.1. Value Coding

$$Number\ of\ unions\ Y_i = \begin{cases} 0, if\ i^{th}\ has only\ 1\ union \\ 1, if\ otherwise \end{cases}$$

Education Status:

Primary education: $\begin{cases} 0, & if\ otherwise \\ 1, if\ primary \end{cases}$

Secondary education: $\begin{cases} 0, if\ otherwise \\ 1, if\ secondary \end{cases}$

Higher education: $\begin{cases} 0, & if\ otherwise \\ 1, if\ higher\ education \end{cases}$

The rest of predictors were coded accordingly using one category as the REFERENCE CATEGORY

		Number of Union			
Determinants	**Factor level**	One union(0) 12,973(87.2%)	More than one union(1) 1,902(12.8%)	Total 14,785(100%)	P value
Wealth Index	Rich	4821(91.8%)	430(8.2%)	5251(35.3%)	0.001
	Middle	2429(86%)	396(14%)	2825(19%)	0.001
	Poor(ref)	5723(84.2%)	1076(15.8%)	6799(45.7%)	0.001
Religion	Muslim	7250(84.3%)	1349(15.7%)	8599(57.8%)	0.001
	Christian(ref)	5366(91.6%)	492(8.4%)	5858(39.4%)	0.001
	Traditional	357(85.4%)	61(14.6%)	418(2.8%)	0.001
Husband Education Background	Higher Educ.	1689(92.8%)	131(7.2%)	1820(12.2%)	0.001
	Secondary	3663(92.6%)	294(7.4%)	3957(26.6%)	0.001
	Primary	2835(86.2%)	453(13.8%)	3288(22.1%)	0.001
	No Educ.(ref)	4786(82.4%)	1024(17.6%)	5810(39.1%)	0.001
Wife Education Backgrond	Higher Educ.	895(97%)	28(3%)	923(6.2%)	0.001
	Secondary	3128(92.9%)	239(7.1%)	3367(22.6%)	0.001
	Primary	3100(87.3%)	451(12.7%)	3551(23.9%)	0.001
	No Educ.(ref)	5850(83.2%)	1184(16.8%)	7034(47.3%)	0.001
Working At Home Or Away	Away(ref)	6010(90.2%)	650(9.8%)	6660(44.8%)	0.001
	At home	6963(84.8%)	1252(15.2%)	8215(55.2%)	0.001
Beating When She Refuse Sex	No(ref)	8999(88.7%)	1152(11.3%)	10151(68.2%)	0.001
	Yes	3974(84.1%)	750(15.9%)	4724(31.8%)	0.001
Preference Fertility	Fertile	9405(87.4%)	1360(12.6%)	10765(72.4%)	0.401*
	Not Fertile(ref)	3381(86.9%)	508(13.1%)	3889(26.1%)	0.415*
	Sterilized	187(84.6%)	34(15.4%)	221(1.5%)	0.262*
Husband Tired/Mood For Sex	No(ref)	4625(84.5%)	851(15.5%)	5476(36.8%)	0.001
	Yes	8348(88.8%)	1051(11.2%)	9399(63.2%)	0.001
Recent Sex Activity	Often	8935(86.6)	1377(13.4)	10,312(69.3)	
	Not often	4038(88.5)	525(11.5)	4563(30.7)	0.002
Husband Has Std	No	1995(86.2)	320(13.8)	2315(15.6)	
	Yes	10,978(87.4)	1582(12.6)	12,560(84.4)	0.104
Husband Has Other Women	No	4731(87.0)	710(13.0)	5441(36.6)	
	Yes	8242(87.4)	1192(12.6)	9434(63.4)	0.467
Beating When She Goes Out Without Telling Him	No	8008(88.5)	1045(11.5)	9053(60.9)	
	Yes	4965(85.3)	857(14.7)	5822(39.1)	0.001
Beating When She Argues With Him	No	8927(88.1)	1204(11.9)	10131(68.1)	
	Yes	4046(85.3)	698(14.7)	4744(31.9)	0.001
Earn Than Partner	More than	1094(87.0)	164(13.0)	1258(8.5)	
	Less than	11224(87.0)	1677(13.0)	12901(86.7)	0.002
	Same	655(91.5)	61(8.5)	716(4.8)	
Recent Sexual Activities	Often	8935(86.6)	1377(13.4)	10312(69.3)	
	Not often	4038(88.5)	525(11.5)	4563(30.7)	0.002
Husband Lives In House	Living with	12972(100)	0(0)	12972(87.2)	
	Staying elsewh.	1(1)	1902(99)	1903(12.8)	0.001

Table 1: Frequency (Percentage in Parenthesis) distribution of Number of Unions and the predictors (Socio-demographic factors)

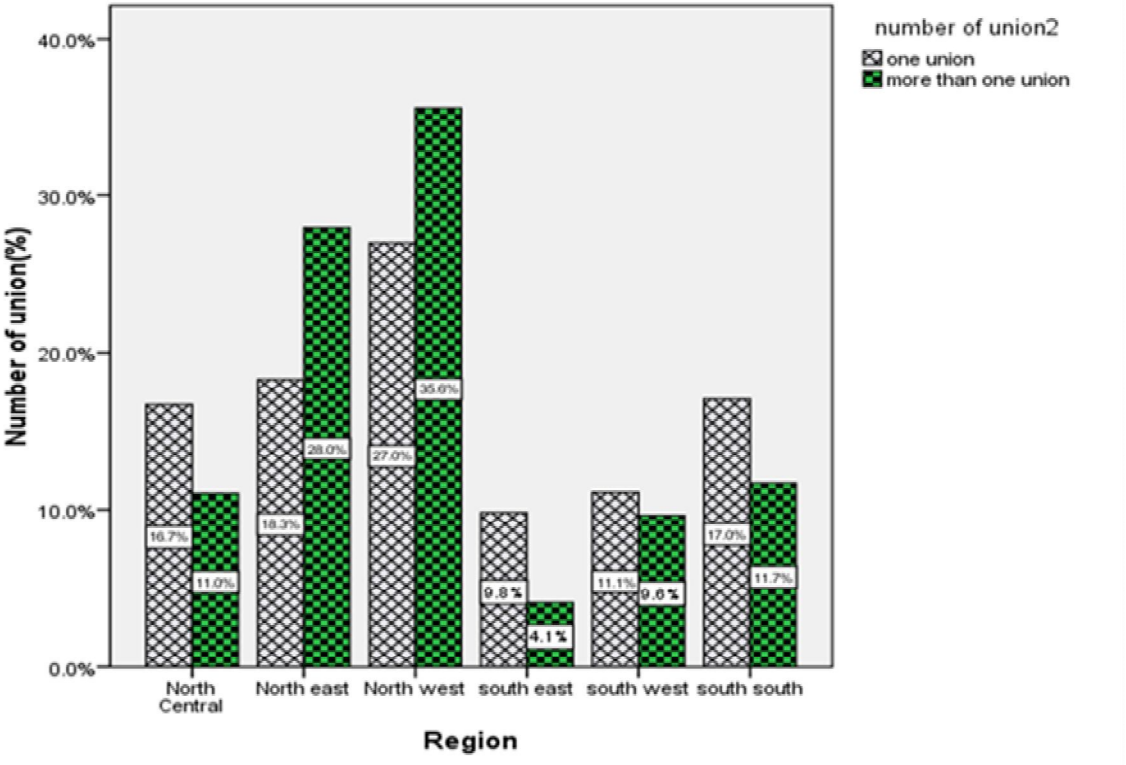

Figure 1: Bar chart of percentage of sampled household with one union and more than one union across the six geo-political zone based on the NDHS data for 2008.North west has the highest percentage of more than one union followed by North east with South east being the least

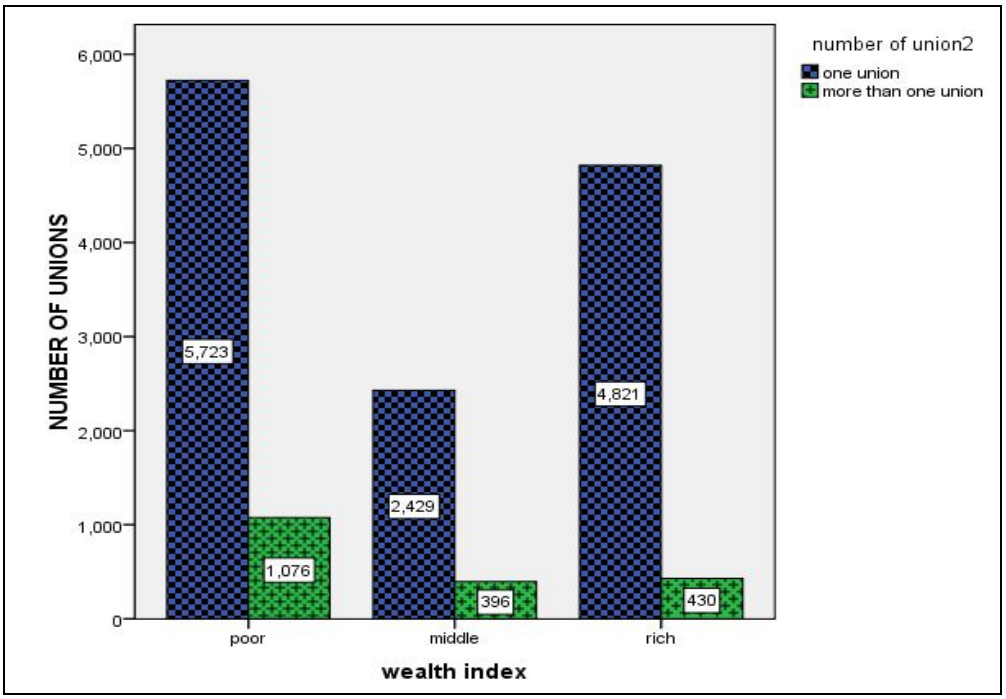

Figure 2: Multiple Bar chart showing the distribution of outcome with respect to Wealth index
The plot above shows that those that are poor tends to have more than one union compare to the others.

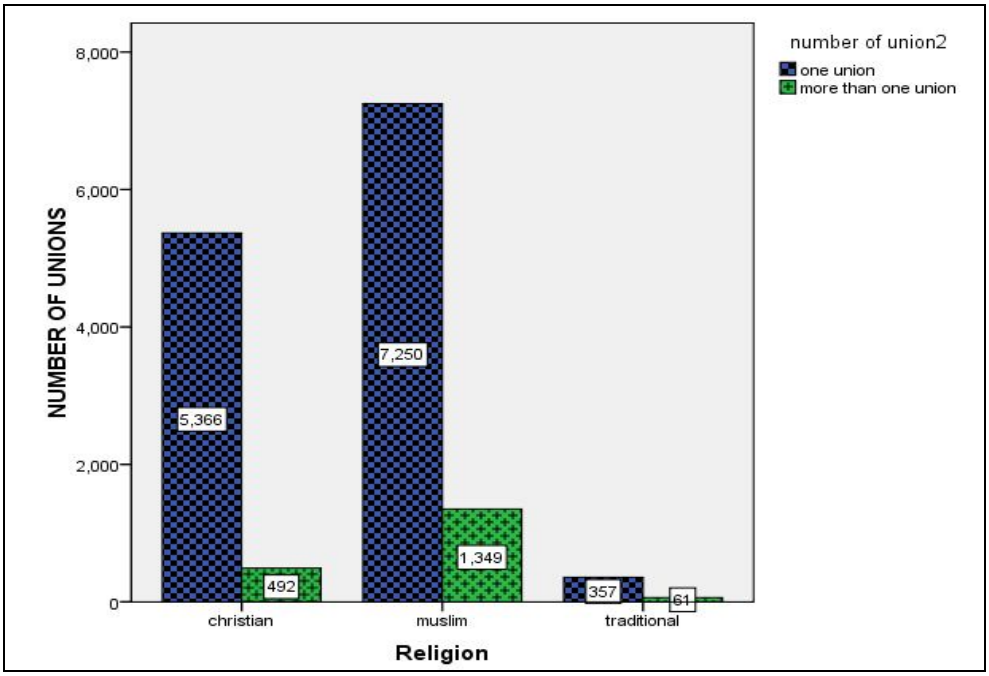

Figure 3: Multiple Bar charts showing the Distribution of outcome with respect to Religion.
The plot above shows that those that are Muslim tends to have more than one union compare to the other religions.

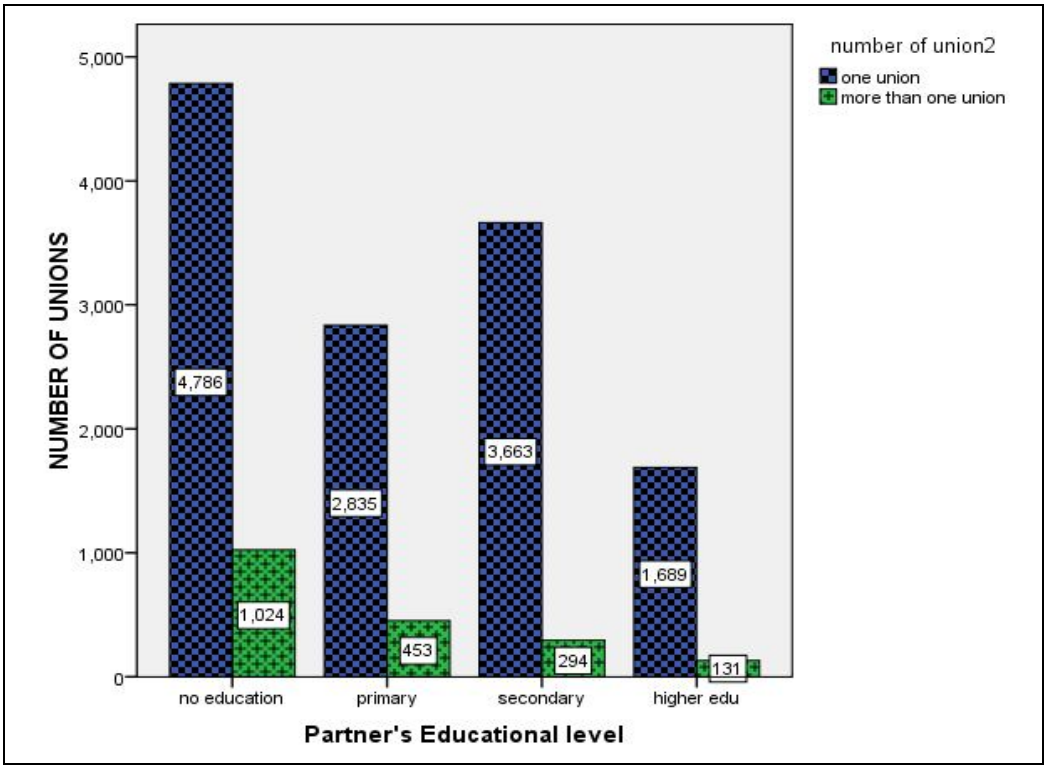

Figure. 4: Multiple Bar charts showing the Distribution of outcome with respect to Partner's Educational level.
The plot above shows that Partner's with no education tends to have instability in marriage compare to those who do.

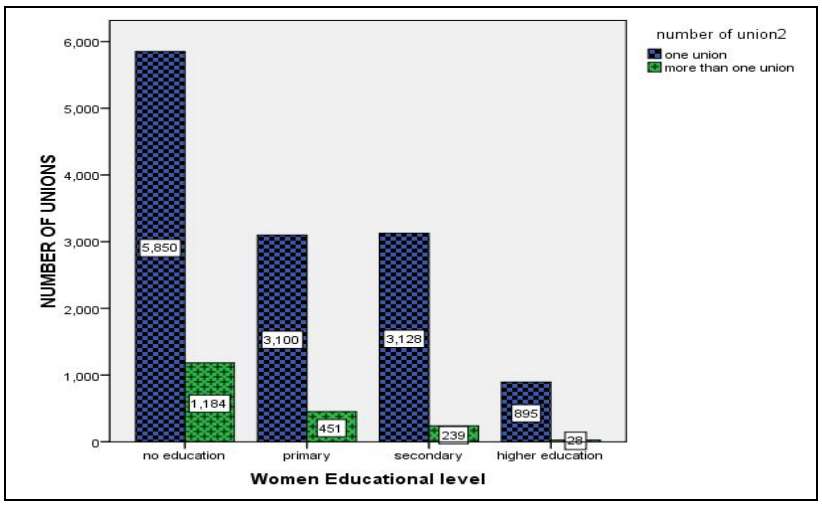

Figure. 5: Multiple Bar charts showing the Distribution of outcome with respect to women Educational level.
The plot shows that Women with no education tend to have instability in marriage which leads to more than one union.

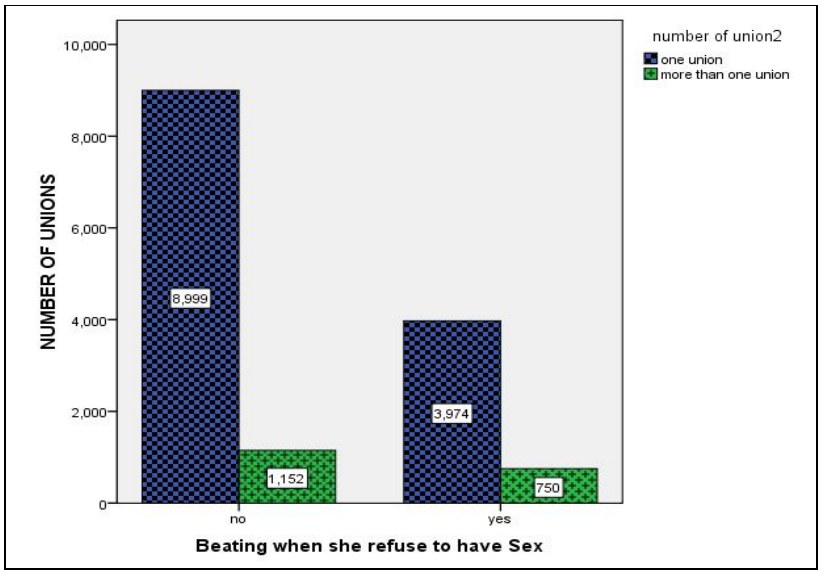

Figure. 6: Multiple Bar chart showing the Distribution of outcome with respect to partner's beating their wife when she refuse sex.
The plot above shows that partners that do not beat their wife have greater number of one union than those that beat their wife.

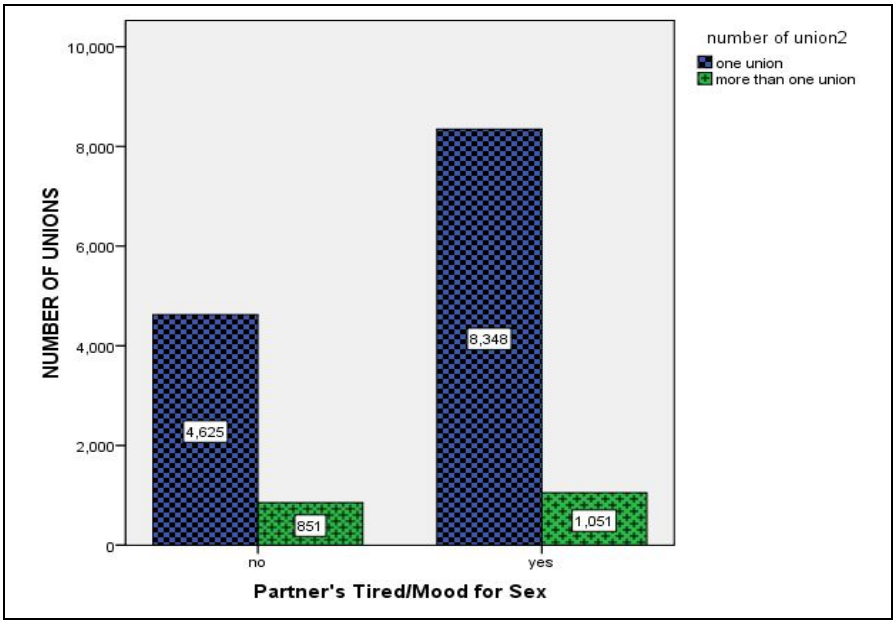

Figure. 7: Multiple Bar charts showing the Distribution of outcome with respect to Partner's Tired/Mood for Sex.
The plot above shows that partners that get tired or not always in mood for sex have more than one union compare to those that are always in mood and never tired.

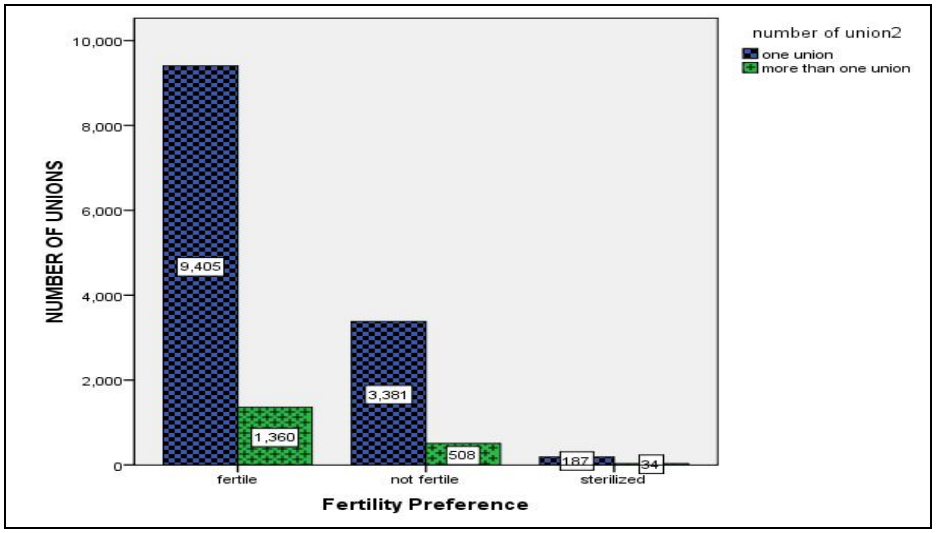

Figure. 8: Multiple Bar charts showing the distribution of outcome with respect to fertility preference.
The plot above shows that women that are fertile have greater numbers of union compare to others and also have greater number of more than one union

3.2. Logistic Regression Analysis for the Six Geo-Political Zones

Coefficients:	Estimate	Std. Error	z value	Pr(>|z|)	Odd Ratio
(Intercept)	-2.29852	0.07040	-32.647	< 2e-16 ***	
S.S	-0.03547	0.10090	-0.352	0.725188	0.96515
N.E	0.80199	0.08519	9.414	< 2e-16 ***	2.22997
N.W	0.65368	0.08197	7.975	1.53e-15 ***	1.92260
S.E	-0.49311	0.13625	-3.619	0.000295 ***	0.61072
S.W	0.23561	0.10543	2.235	0.025435 *	1.26568

Table 1

It can be observed from the above that each region contributed differently to the marriage instability in Nigeria. Marriage instability is common most in North east followed by North West, South west and south east being the least using North central as a reference region.

Coefficients	Estimate	Std. Error	Z value	P-value	Odd Ratio
(Intercept)	-1.56616	0.08642	-18.123	< 2e-16 ***	
Rich	-0.14244	0.06891	-2.067	0.03873*	0.86724
Fertile	-0.12778	0.05599	-2.282	0.02247*	0.88005
Muslim	0.18883	0.06473	2.917	0.00353**	1.20784
Partner's secondary education	-0.51906	0.07508	-6.914	4.72e-12***	0.59508
Partner's tertiary education	-0.28639	0.10965	-2.612	0.00901**	0.75097
Women's secondary education	-0.38028	0.08704	-4.369	1.25e-05***	0.68367
Women's tertiary education	-1.20474	0.21461	-5.614	1.98e-08***	0.29977
Beating when refuse sex	0.13130	0.05300	2.478	0.01323*	1.14031
Partner's tired/mood	-0.11457	0.05268	-2.175	0.02965*	0.89175
Women's place of work	-0.17154	0.05866	-2.924	0.00346**	0.84237

Table 2: Model parameters estimate for the six geo-political zones combined
Logistic Regression Analysis by Forward Selection of Significant Socio-Demographic Factors

3.2.1. Interpretation of The Model

- Wealth index**:** The risk of a rich household having more than one union is 13.3% smaller than the risk of a poor household having more than one union.
- Fertility preference: The risk of a fertile household having more than one union is 12% smaller than the risk of infertile household having more than one union
- Religion**:** The risk of a Muslim household having more than one union is 21% more than the risk of a Christian household having more than one union
- Partner's education background: The risk of having more than one union for a woman whose partner has a secondary education is 40% smaller than that of a woman whose partner has no formal education. Also the risk of a partner having a tertiary education level was 25% smaller than the risk of a 3partner having no formal education
- Women's education background: The risk of women having a secondary school background was 32% smaller than the risk of women having no education. Also the risk of a woman having a tertiary education was 70% smaller than the risk of women having no education
- Beating when she refuses sex: The risk of having more than one union for a partner beating his wife when she refuse sex was 14% more than the risk when she does not refuse sex
- Partners tired/mood: The risk of having more than one union for a partner tired/mood was 11% less than the risk when partner are not tired and also in mood
- Women's place of work: The risk of having more than one union for women working outside their matrimonial home was 16% less than the risk of when women work at their matrimonial home.

3.3 zonal analysis:

3.3.1. North-West Zone

Coefficients	Estimate	Std. Error	z value	P-value	Odd Ratio
(Intercept)	-2.34818	0.36795	-6.382	1.75e-10***	
Muslim	0.92915	0.35559	2.613	0.008975**	2.53236
Partner's secondary education	-0.86735	0.18403	-4.713	2.44e-06***	0.42006
Women secondary education	-1.25633	0.35825	-3.507	0.000453***	0.28470
Women place of work	-0.38026	0.18140	-2.096	0.036056*	0.68368

Table 3: Model Parameters estimate for the North-West zone using Forward selection

The following can be deduced from table above (using R-Programme):

- Religion**:** The risk of a Muslim household having more than one union is 153% more than that of Christian.
- Education background: The risk of household with secondary school background having for partners and women are 57.9% and 71.5% respectively.
- Women place of work: The risk of women that work outside their matrimonial home is 31.6% less than the risk of women that work in their matrimonial home

3.3.2. North Central Zone

Coefficients	Estimate	Std. Error	z value	P-value	Odd Ratio
(Intercept)	-1.714982	0.232563	-7.374	1.65e-13 ***	
Women secondary education	-0.594866	0.232610	-2.557	0.010547 *	0.551636
Women tertiary education	-1.847634	0.556540	-3.320	0.000901 ***	0.157610
Muslim	-0.414349	0.159128	-2.604	0.009218 **	0.660770
Partner's secondary education	-0.688604	0.206396	-3.336	0.000849 ***	0.502277
Women place of work	-0.609359	0.153656	-3.966	7.32e-05 ***	0.543699
Beating when she refuse sex	0.491690	0.153208	3.209	0.001331 **	1.635077

Table 4: Model Parameters estimate for the North-Central zone using Forward selection

The following can be deduced from table above (using R-Programme):

- Religion: The risk of a Muslim household having more than one union is 33.9% less than that of Christian.
- Education background: The risk of household with secondary school background having more than one union for partners and women are 49 % and 44.8% respectively less than the household with no education.
- Women place of work: The risk of women that work outside their matrimonial home is 45.6% less than the risk of women that work in their matrimonial home

Beating when she refuses sex: The risk of a household having more than one union where husband beat their wife when she refuse sex is 63.5% more than when the does not refuse sex.

3.3.3. North-East Zone

Coefficients:	Estimate	Std. Error	z value	P-value	Odd Ratio
(Intercept)	-1.89992	0.21374	-8.889	< 2e-16***	
Muslim	0.53949	0.17264	3.125	0.00178**	1.71513
Partner's secondary education	-0.47921	0.16523	-2.900	0.00373**	0.61927
Beating when she refuse sex	0.20502	0.09798	2.092	0.03640*	1.22755

Table 5: Model Parameters estimate for the North-East zone using Forward selection

The following can be deduced from table above (using R-Programme):

- Religion**:** The risk of a Muslim household having more than one union is 71.5% more than that of Christian.
- Education background: The risk of household with secondary school background having more than one union for partners is 38.1% less than the household with no education.
- Beating when she refuses sex: The risk of a household having more than one union where husband beat their wife when she refuse sex is 22.8% more than when the does not refuse sex

3.3.4. South-West Zone

Coefficients:	Estimate	Std. Error	z value	P-value	Odd Ratio
(Intercept)	-1.4863	0.2729	-5.446	5.15e-08***	
Rich	-0.4349	0.1737	-2.504	0.01228*	0.64733
Partner's secondary education	-0.4103	0.1788	-2.295	0.02171*	0.66345
Partner's tertiary education	-0.9714	0.3461	-2.807	0.00501**	0.37855
Women tertiary education	-1.4232	0.6328	-2.249	0.02451*	0.24094

Table 6: Model Parameters estimate for the South-West zone using Forward selection

The following can be deduced from table above (using R-Programme):

- Education background: The risk of household with secondary school background having more than one union for partners is 33.7% less than the household with no education.

Wealth index: The risk of a rich household having more than one union is 35.3% less than that of poor household

3.3.5. South-South Zone

Coefficients	Estimate	Std. Error	Z value	P-value	Odd Ratio
(Intercept)	-1.254271	0.242908	-5.164	2.42e-07***	
Fertile	-0.625197	0.145223	-4.305	1.67e-05***	0.53516
Partner's secondary education	-0.802731	0.178838	-4.489	7.17e-06***	0.44810
Partner's tertiary education	-0.643862	0.301077	-2.139	0.032474 *	0.52526
Beating wife when she refuse sex	0.682882	0.190134	3.592	0.000329 ***	1.97957
Women place of work	-0.348901	0.147807	-2.361	0.018249*	0.70546

Table 7: Model Parameters estimate for the South-South zone using Forward selection

The following can be deduced from table above (using R-Programme):

- Women place of work: The risk of women that work outside their matrimonial home is 29.5% less than the risk of women that work in their matrimonial home
- Beating when she refuses sex: The risk of a household having more than one union where husband beat their wife when she refuse sex is 98% more than when the does not refuse sex
- Fertile**:** The risk of a fertile household having more than one union is 46.5% less than that of infertile household
- Education background: The risk of household with secondary school background having more than one union for partners is 55.2% less than the household with no education.

3.3.6. South-East Zone

Coefficients:	Estimate	Std. Error	z value	P-value	Odd Ratio
(Intercept)	-2.36136	0.42235	-5.591	2.26e-08***	
Women secondary education	-1.34909	0.35012	-3.853	0.000117***	0.25948
Women tertiary education	-1.73510	0.64562	-2.688	0.007199**	0.17638

Table 8: Model Parameters estimate for the South-East zone using Forward selection

The following can be deduced from table above (using R-Programme):

- Education background: The risk of household with secondary school background having more than one union for women is 74.1% less than the household with no education and the risk of household with tertiary education having more than one union is 82.4% less than the household with no education

4. Discussion of Result

The entire six geo-political zones were first considered to know the behavior of household to marriage instability using the north central as a reference. The result shows that out of the remaining five geo-political zones, it was only south-south region that was not significant to the model. The risk of having more than one union in north east zone is 123.6% more than the risk of having more than one union in north central. Also the risk of having more than one union in North West and south west are 92.3% and 26.6% respectively more than the north central. And the risk of having more than one union in south east is 38.9% less than the risk of having more than one union in the north central.

Therefore, instability marriage is very common in north east, north west and south west in Nigeria. Having observed that, we now put all the identified factors into the model using forward selection and this selected ten factors for the whole Nigeria. Since the behavior of each geo-political zone to the instability marriage in Nigeria differs, it is expected that the factors that will contribute to having more than one union in each geo-political zone will also differ. Therefore using the table 9 above, being rich is significant in Nigeria and south west alone. Fertile is also significant in Nigeria and south-south , Muslim is significant in Nigeria and all the north zones, partner's secondary education is significant in Nigeria and all the zones except the south east, women secondary education is significant in Nigeria, north central, north west and south east, beating wife when she refuse sex is strongly significant in Nigeria and other zones except south east and south west , partners tired/mood only significant in Nigeria, and finally women place of work is significant in Nigeria, north central, north west and south-south.

5. Conclusion

Model selection (forward selection) procedure showed that not all the twenty four variables identified in this study are significant in Nigeria as a whole. Ten variables contribute significantly to the number of unions in Nigeria. Hence, we focus our attention on the zonal effect of our response variable using the predictors stated above.

The effect of religion and partner's secondary education on the number of unions for household in the entire North zone was significant. On the average, the risk that a Muslim household will have more than one union is 63.6% more than the risk of a Christian household having more than one union. This is so due to the religion provision of Islam that allows a man to marry at most four wives. Also it is being deduced from the analysis that the more educated a household is, the lower the risk of having more than one union.

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