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LOG-LINEAR MODELS FOR HIV/AIDS PREVALENCE IN ADAMAWA STATE, NIGERIA

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ABSTRACT

Geographically, prevalence of HIV/AIDS in Nigerian States can be classified into high, medium and low with Adamawa State falling into the medium category (between 1% – 1.9%). Despite several measures and interventions put in place to mitigate the burden of HIV/AIDS in the state, its prevalence has fluctuated with certain age groups carrying a far greater burden than the rest of the population. This paper examines the association between some key factors and HIV/AIDs prevalence in Adamawa State, Nigeria using the Log-linear model approach. Data was collected on 3,779 patients infected with HIV/AIDs who came for treatment at Specialist Hospital, Yola, Adamawa State drawing information on their gender, age, viral load, and marital status from 2019 to 2020. Data analysis was done using the R programming software version 3.6.3. Fourteen (14) log-linear models were fitted examining mutual and conditional independence of the study factors and all possible pairwise (and three-way) associations. The results show that progression to AIDS following HIV diagnosis differed depending on the age at diagnosis, marital status, viral load and gender. Therefore, there is need to sustain efforts at reducing the prevalence of HIV in this regard.

Keywords: HIV/AIDS, Prevalence, Log-linear models, Viral load, Age, Adamawa state

INTRODUCTION

Despite measures taken by the Nigerian government at federal, state and local levels, HIV/AIDS infection rate has remained on the rise, and has become a threat to human existence. Sub-Saharan Africa accounts for about 70% of all new HIV infections, with higher total mortality counts than developed countries across the globe. The disease is responsible for about 1 million deaths annually, with 39.7 million people living with the infection globally and an estimated 25.7 million people in Sub-Saharan Africa (WHO, 2019; UNAIDS, 2013).

The HIV pandemic disproportionately impacts young women aged 15–24 years at rates twice that of young men, with young women alone accounting for nearly a quarter of all new HIV infections (Eugene *et al.*, 2014). The joint effect of age, marital status and place of residence (whether urban or rural) (Kimani et al., 2013), and gender inequality (Ntombifikile *et. al.*, 2014) are also central to higher HIV infection. Low health literacy (Andrew *et al*., 2013); increased number of out-of-school and/or dropout amongst teenage girls (Gregson *et al.*, 2001) are directly related to poor adherence to antiretroviral therapy and higher susceptibility. Health literacy is known to affect vulnerable communities such as persons living with HIV/AIDS.

On HIV/AIDS prevalence, Nigeria has the second highest HIV rate in Sub-Saharan Africa (Arinze-Onyia *et al.*, 2016) and the third highest in the world after India and South Africa (Awofala & Ogundele, 2016). The prevalence rate of HIV in Nigeria in 1986 was 1.8%, increasing to 4.5% in 1996 and to 5.4% in 1999, with the most prevalent age group consisting of young people in their productive years (Arinze-Onyia *et al.*, 2016); while in 2001, it dropped to 5.0%, 4.4% in 2005, 4.6% in 2008 and 4.1% in 2010 (NACA, 2015). In 2016, it was about 3.2%, which was 0.9% lower compared to 2010. Nigeria now has a prevalence rate steady at 1.4% (UNAIDS, 2018). The current status shows that new infection is at its lowest level compared to previous years. Notwithstanding, people living with HIV/AIDS (PLWHA) are still more than 1.9 million which is significantly large.

Geographically, seven states in Nigeria are considered to have high prevalence of 2.0% and above; a further thirteen states plus the Federal Capital Territory have medium prevalence between 1.0% and 1.9% among whom is Adamawa state; the other states are considered to have a low prevalence below 1.0% (UNAIDS, 2018). Despite measures put in place to tackle HIV/AIDS in Adamawa State, prevalence rate has fluctuated substantially in recent years (ADSACA, 2016). It has a mixed epidemic status, meaning that while HIV/AIDS prevalence among the general population is high, certain age group carry a far greater HIV burden compared to the rest of the population. This study thus explores the association between patients' age, gender and marital status as risk factors for HIV/ AIDs using the log-linear model approach in an attempt to determine the model that describes the prevalence of HIV/AIDs in Adamawa State, Nigeria.

Related Review

Suresh *et al.* (2016), conducted a cross-sectional survey of 1255 adult patients on antiretroviral therapy (ART) for at least 1 year across four provinces in Vietnam. Bivariate and multivariate logistic analysis were conducted, chi-square test was used to ascertain association with other categorical variables, while a trend analysis was conducted to examine the relationship between viral suppression and time on ART using the Cochran–Armitage trend test. The study results showed that factors associated with HIV viral load include: social isolation, multiple late appointments in the previous year, not on a single tablet regimen, high-internalized HIV stigma and immunological treatment failure, while Age (<35years), and fear of disclosure demonstrated a trend toward associations with unsuppressed viral load.

Ofuoku (2017), while examining HIV/AIDs awareness and communication methods among students in Delta Central Senatorial district, Delta State, Nigeria, showed that there was significant difference in the awareness level of male and female students on causes and means of transmitting HIV/AIDs infection; there was no significant difference in the awareness level of preventive measures in either urban or rural areas.

Adejumo *et al.* (2020) used multivariate analysis techniques to identify the factors associated with HIV infection and knowledge of HIV.A total of 4,273 clients were screened for HIV within the study period. The study revealed a prevalence rate of19%. Factors found to be associated with HIV infection were: age (above 24 years), gender, previous marriage (divorced, widowed, separated), and poor knowledge of HIV. Males were found to be 15 times more likely to have good knowledge of HIV than females. In addition, the clients who were single and married were about four times more likely to have good knowledge of HIV than clients who were previously married.

Wajun *et al.* (2021) conducted a facility-based cross-sectional study on 669 patients on first-line antiretroviral (ARV) therapy. Socio-demographic, treatment, clinical, immunological, and viral load data were extracted and a multivariate logistic regression analysis was performed to identify factors independently associated with viral non-suppression. The study revealed that there is a high level of systems failure among adult HIV patients, and confirms the need to develop close follow-up strategies of targeted interventions for patients in care who are at high risk of unsuppressed viral load.

MATERIALS AND METHODS

The concept of log-linear analysis in contingency tables is analogous to the Analysis of variance (ANOVA) for the continuously distributed factor responses. While the response variable is assumed to be continuous with underlying normal distributions in ANOVA, the log-linear analysis assume that the response observations are counts having Poisson distributions (Lawal, 2003). The log-linear model analysis is a non-dependent procedure for accounting for the distribution of cases in a cross tabulation of categorical variable (Agresti, 2002).

The Log-linear model:

$$log_e \mu_{ij} = \mu + \mu_{1(i)} + \mu_{2(j)} \quad (1)$$

$$\mu = \frac{\sum_i^r \sum_j^c log_e \mu_{ij}}{rc};$$

$$\mu_{1(i)} = \frac{\sum_{j=1}^c log_e \mu_{ij}}{c} - \frac{\sum_{i=1}^r \sum_{j=1}^c log_e \mu_{ij}}{rc};$$

$$\mu_{2(j)} = \frac{\sum_{i=1}^r log_e \mu_{ij}}{r} - \frac{\sum_{i=1}^r \sum_{j=1}^c log_e \mu_{ij}}{rc}$$

where

μ =overall mean of the natural log of the expected frequencies,

$\mu_{1(i)}$=main effect of the i category of variable 1(row);

$\mu_{2(j)}$=main effect of the j category of variable 2(column)

It can be seen that the model is in additive form. Thus (1) specifies a linear model for the logarithms of the frequencies or, in other words, what is generally known as unsaturated log-linear model (Agresti, 2002).

Consequently:

$\sum_{i=1}^r \mu_{1(i)} = 0 \qquad \sum_{j=1}^c \mu_{2(i)} = 0$

Or using an obvious dot notation

$\mu_{1(.)} = 0 \qquad \mu_{2(.)} = 0$

Log-Linear Models for Three Categorical Variables

Let n denote number of sample units for which we observe 1=i, 2= j, 3= k, where i=1,2,....,i, j=1,2,...,j, and k=1,2,...,k-levels for the respective categorical variables. Also, let $\pi_{ijk} = P(1 = i, 2 = j, 3 = k)$and log n$\pi_{ikj}$ =log(μ_{ikj})

The most complex Log-linear model (saturated model) for this class of variable is

$$\text{Log}(\mu_{ikj}) = \mu + \mu_i^1 + \mu_j^2 + \mu_k^3 + \mu_{ij}^{12} + \mu_{ik}^{13} + \mu_{jk}^{23} + \mu_{ijk}^{123} \quad (2)$$

Reverting back to the previous notation, a non-hierarchical model would look like the following:

$$\log(\mu_{ijk}) = \mu + \mu_i^1 + \mu_{ij}^{12} \quad (3)$$

Notice that the main effect term, μ_j^2, is not included in the model therefore violating the hierarchical requirement. The use of non-hierarchical modeling is not recommended because it provides no statistical procedure for choosing from among potential models.

Independence and interaction in three-way tables

A three-way I*J*K cross-classification of response variables 1, 2 and 3 has several potential types of independence. We assume multinomial distribution with cell probabilities $\{\pi_{ijk}\}$ and $\sum_i \sum_j \sum_k \pi_{ijk}$ =1, the models also apply to Poisson sampling with means $\{ \mu_{ijk} \}$.

The three variables are mutually independent when

$$\pi_{ijk} = \pi_{i++} + \pi_{+j+} + \pi_{++k} \forall_{i,j} \text{and } K \quad (4)$$

For expected frequencies $\{ \mu_{ijk} \}$, mutual independence has log-linear form

$$\text{Log}(\mu_{ijk}) = \mu + \mu_i^1 + \mu_j^2 + \mu_k^3 \quad (5)$$

variable 2 is jointly independent of 1 and 3 when

$$\pi_{ijk} = \pi_{i+k}\pi_{+j+} \forall i, j \text{and k} \quad (6)$$

This is ordinary two-way independence between 2 and a variable composed of the K combinations of levels of 1 and 3. The log-linear model is

$$\log(\mu_{ijk}) = \mu + \mu_i^1 + \mu_j^2 + \mu_k^3 + \mu_{ik}^{13} \quad (7)$$

Similarly, variable 1 could be jointly independent of variables 2 and 3, or variable 3 could be jointly independent of variables 1 and 2. Mutual independence (1) implies joint independence of any one variable from the others; 1 and 2 are conditionally independent, given 3 when independence holds for each partial table within which 3 is fixed. That is, if $\pi_{ij/k} = p(1 = i, 2 = j / \quad 3 = k)$

$$\pi_{ij/k} = \pi_{i+/k}\pi_{+j/k} \forall i, j \text{ and k}$$

For joint probabilities over the entire table, equivalently

$$\pi_{ijk} = \pi_{i+k}\pi_{+jk} / \quad \pi_{++k} \forall i, j \text{and k} \quad (8)$$

Conditional independence of X and Y, given Z, is the log-linear model

$$\text{Log}(\mu_{ijk}) = \mu + \mu_i^1 + \mu_j^2 + \mu_k^3 + \mu_{ik}^{13} + \mu_{jk}^{23} \quad (9)$$

This is a weaker condition than mutual or joint independence. Mutual independence implies that 2 is jointly independent of 1 and 3, which itself implies that 1 and 2 are conditionally independent.

Area of study

Adamawa is a State in Northeastern Nigeria, with its capital at Yola. It lies between latitude 8^0 N and 11^0N and longitude 11.5^0 E and 13.5^0 E. It was created in 1991 from part of Gongola State with four administrative divisions namely: Adamawa, Ganye, Mubi and Numan. It is one of the thirty-six (36) States which constitute the Federal Republic of Nigeria. (Federal Republic of Nigeria, 2010).

Population of the Study

In this study, the population consist of 3,779 patients infected with HIV/AIDs that visited the Specialist Hospital, Yola, Adamawa State for the period of two (2) years (2019 – 2020) as documented in the hospital register.

Method of Data Collection

A Secondary data was collected. Information on patient infected with HIV/AIDs were extracted from hospital register. The target variables were: gender, age group, year of occurrence and marital status.

Method of Data Analysis

Four-way contingency tables and related structure such as conditional independence and homogeneous association were examined.

Type of Independence

A five-way $I \times J \times K \times L \times M$ cross classification of response variables, Y, V, A, M and G has several potential types of independence. We assume a multinomial distribution with cell probabilities (π_{ijklm}) and $\sum_i \sum_j \sum_k \sum_l \sum_m \pi_{ijklm} = 1$ The models also apply to Poisson sampling with means (μ_{ijklm}).

The five variables are mutually independent when

$\pi_{ijkjlm} = \pi_{i++++}\pi_{+j+++}\pi_{++k++}\pi_{+++l+}\pi_{++++m}$ for all i, j, k, l and m (10)

For expected frequencies (μ_{ijklm}) mutual independence has log linear form

$$log\,\mu_{ijklm} = \lambda + \lambda_i^Y + \lambda_j^V + \lambda_k^A + \lambda_l^M + \lambda_m^G \quad (11)$$

Y=Year; V=Viral Load; A=Age; M=Marital Status; and G=Gender.

Similarly, A, M and G are conditionally independent given Y and V when independence holds for each partial table within which Y and V is fixed. That is,

$$log\,\mu_{ijklm} = \lambda + \lambda_i^Y + \lambda_j^V + \lambda_k^A + \lambda_l^M + \lambda_m^G + \lambda_{kl}^{AM} + \lambda_{km}^{AG} + \lambda_{lm}^{MG} + \lambda_{klm}^{AMG} \quad (12)$$

The general log-linear model for a five-way table is

$$log\,\mu_{ijklm} = \lambda + \lambda_i^Y + \lambda_j^V + \lambda_k^A + \lambda_l^M + \lambda_m^G + \lambda_{ij}^{YV} + \lambda_{ik}^{YA} + \lambda_{il}^{YM} + \lambda_{im}^{YG} + \lambda_{jk}^{VA} + \lambda_{jl}^{VM}\lambda_{jm}^{VG} + \lambda_{kl}^{AM} + \lambda_{km}^{AG} + \lambda_{lm}^{MG} + \lambda_{ijm}^{YVG} + \lambda_{ijl}^{YVM} + \lambda_{ilm}^{YGM} + \lambda_{jlm}^{VGM} + \lambda_{ijk}^{YVA} + \lambda_{jmk}^{VGA} + \lambda_{ilk}^{YMA} + \lambda_{jlk}^{VMA} + \lambda_{mlk}^{GMA} + \lambda_{ijml}^{YVGM} + \lambda_{ijmk}^{YVGA} + \lambda_{imlk}^{YGMA} + \lambda_{jmlk}^{VGMA} + \lambda_{ijklm}^{YVGMA} \quad (13)$$

With dummy variables, λ_{ijklm}^{YVGMA} is coefficient of the product of the i^{th} dummy variable of Y, j^{th} dummy variable of V, k^{th} dummy variable of G, l^{th} dummy variable of M and m^{th} dummy variable of A. The total number of non-redundant parameters is

$$1 + (I-1) + (J-1) + (K-1) + (L-1) + (M-1) + (I-1)(J-1) + (I-1)(K-1) + (I-1)(L-1) + (I-1)(M-1) + (J-1)(K-1) + (J-1)(L-1) + (K-1)(M-1) + (K-1)(L-1) + (K-1)(M-1) + (I-1)(J-1)(K-1) + (I-1)(J-1)(L-1) + (I-1)(J-1)(M-1) + (J-1)(K-1)(L-1) + (J-1)(K-1)(M-1) + (K-1)(L-1)(M-1) + (I-1)(J-1)(K-1)(L-1)(M-1) = IJKLM \quad (14)$$

The total number of cell counts. This model has many parameters as observations and is saturated. It describes all possible positive variables (μ_{ijklm}). Each pair of variables may be conditionally dependent and an odds ratio for any pair may vary across categories of the third variable.

Goodness-of-fit test and Model Selection

Naturally, the modeling process yields a number of models out of which the best model is then selected. Akaike Information Criterion (AIC), one of the information criteria used for model selection, shall be employed in this study. The mathematical formula is given below

$$AIC = -2Log(\hat{L}) + 2P \quad (15)$$

Here, P is the number of estimated parameters in the model; i.e., number of variables plus the intercept and $\hat{L}$ is the maximum value of the likelihood function for the estimated model. Hence, the model with the lowest measure of AIC will be considered as the best measure of fit to the data. R statistical package version 3.6.3 was used to analyze the risk factors associated with HIV/AIDs in Adamawa State.

RESULTS AND DISCUSSION

Table1 gives a descriptive analysis of the distribution of counts by gender, age group, year of occurrence and marital status of patients infected with HIV/AIDs in Specialist Hospital, Yola, Adamawa State. The data consist of 2067 (54.7%) patients in year 2019 and 1712 (45.3%) patients in year 2020 infected with HIV/AIDS. Out of the 3,779 patients, 1,135 (30.03%) were males while 2,644 (69.97%) were females. In terms of age group, 204 (5.4%) were within age group 0 - 20 years, 1,768 (46.78%) were within age group 21-40 years, 1,612 (42.66%) were within age group 41 - 60 years while 195 (5.16%) infected with HIV/AIDs were above 60 years of age. Based on marital status, 1005 (26.59%) patients with HIV/AIDs were single, 2,316 (61.29%) patients were married, 148 (3.92%) patients were divorced while 310 (8.20%) patients were widow/widower.

Table 1: Percentage Distribution of Numbers of Patients Infected with HIV/AIDs in Yola, Adamawa State

Factors	Frequency	Percentage (%)
Gender		
Male	1,135	30.03
Female	2,644	69.97
Age Group		
0 – 20 years	204	5.40
21 – 40 years	1,768	46.78
41 – 60 years	1,612	42.66
Greater than 60 years	195	5.16
YEARS		
2019	2,067	54.70
2020	1,712	45.30
MARITAL STATUS		
Single	1,005	26.59
Married	2,316	61.29
Divorced	148	3.92
Widow/Widower	310	8.20

In order to model the prevalence of the disease (HIV/AIDS), fourteen (14) log linear models were fitted to the data as shown in Table 2. Table 2 shows that the best model which fits the patients with HIV/AIDs is model 9 because it has the smallest AIC (= 605.93). The model 9 examines the independence of marital status, age, year, gender, viral load and interaction between year and viral load.

Table 2: Summary of Log-linear Models for the 5-Dimensional Table for Patients Infected with HIV/AIDs in Specialist Hospital, Yola

	Models		**df**	χ^2	**AIC**
1	Mutual Independence	$\log\mu_{ijklm} = \lambda + \lambda_i^Y + \lambda_j^V + \lambda_k^A + \lambda_l^M + \lambda_m^G$	181	237.0928	618.65
2	Mutual Independence	$\log\mu_{ijkl} = \lambda + \lambda_i^Y + \lambda_j^V + \lambda_k^A + \lambda_l^M$	182	848.6837	1236.30
3	Mutual Independence	$\log\mu_{ijkm} = \lambda + \lambda_i^Y + \lambda_j^V + \lambda_k^A + \lambda_m^G$	184	3361.149	3217.10
4	Mutual Independence	$\log\mu_{ijlm} = \lambda + \lambda_i^Y + \lambda_j^V + \lambda_l^M + \lambda_m^G$	184	2637.703	3310.40
5	Mutual Independence	$\log\mu_{iklm} = \lambda + \lambda_i^Y + \lambda_k^A + \lambda_l^M + \lambda_m^G$	183	7033.178	7672.3
6	Mutual Independence	$\log\mu_{jklm} = \lambda + \lambda_j^V + \lambda_k^A + \lambda_l^M + \lambda_m^G$	182	1642.601	2171.90
7	Conditional Independence	$\log\mu_{ijklm} = \lambda + \lambda_i^Y + \lambda_j^V + \lambda_k^A + \lambda_l^M + \lambda_m^G + \lambda_{lm}^{MG}$	178	234.6023	621.61
8	Conditional Independence	$\log\mu_{ijklm} = \lambda + \lambda_i^Y + \lambda_j^V + \lambda_k^A + \lambda_l^M + \lambda_m^G + \lambda_{kl}^{AM}$	172	229.3122	629.64
9	Conditional Independence	$\log\mu_{ijklm} = \lambda + \lambda_i^Y + \lambda_j^V + \lambda_k^A + \lambda_l^M + \lambda_m^G + \lambda_{ij}^{YV}$	179	181.5551	605.93*
10	Conditional Independence	$\log\mu_{ijklm} = \lambda + \lambda_i^Y + \lambda_j^V + \lambda_k^A + \lambda_l^M + \lambda_m^G + \lambda_{ik}^{VA}$	175	225.8764	625.56
11.	Conditional Independence	$\log\mu_{ijklm} = \lambda + \lambda_i^Y + \lambda_j^V + \lambda_k^A + \lambda_l^M + \lambda_m^G + \lambda_{im}^{VG}$	179	232.651	619.39
12.		$\log\mu_{ijklm} = \lambda + \lambda_i^Y + \lambda_j^V + \lambda_k^A + \lambda_l^M + \lambda_m^G + \lambda_{kl}^{AM} + \lambda_{km}^{AG} + \lambda_{lm}^{MG} + \lambda_{klm}^{AMG}$	159	222.5318	642.49
13.		$\log\mu_{ijklm} = \lambda + \lambda_i^Y + \lambda_j^V + \lambda_k^A + \lambda_l^M + \lambda_m^G + \lambda_{jkl}^{VA} + \lambda_{jl}^{VM} + \lambda_{kl}^{AM} + \lambda_{jkl}^{VAM}$	142	160.9633	661.02
14.	Saturated Model	$\log\mu_{ijklm} = \lambda + \lambda_i^Y + \lambda_j^V + \lambda_k^A + \lambda_l^M + \lambda_m^G + \lambda_{ij}^{YV} + \lambda_{ik}^{YA} + \lambda_{il}^{YM} + \lambda_{im}^{YG} + \lambda_{jk}^{VA} + \lambda_{jl}^{VM}$ $\lambda_{jm}^{VG} + \lambda_{kl}^{AM} + \lambda_{km}^{AG} + \lambda_{lm}^{MG} + \lambda_{ijm}^{YVG} + \lambda_{ijl}^{YVM} + \lambda_{ijm}^{YGM} + \lambda_{jlm}^{VGM} + \lambda_{ijk}^{YVA} + \lambda_{jmk}^{VGA} + \lambda_{ilk}^{YMA}$ $+ \lambda_{jlk}^{VMA} + \lambda_{mlk}^{GMA} + \lambda_{ijml}^{YVGM} + \lambda_{ijmk}^{YVGA} + \lambda_{imlk}^{YGMA} + \lambda_{jmlk}^{VGMA} + \lambda_{ijklm}^{YVGMA}$	0	$1.13\text{x}10^{-10}$	801.58

* Best fit mod

Table 3: Log-Linear Model of Patient infected with HIV/AIDs for Patients Infected with HIV/AIDs in Specialist Hospital, Yola

Coefficients:

Coefficient	**Estimate**	**Std. Error**	**z value**	**Pr(>|z|)**	**Odd Ratio**
(Intercept)	-3.47034	0.23859	-14.545	< 2e-16 ***	
Year: 2019 (Ref)					
Year 2020	0.01562	0.26015	2.751	0.00594 **	1.0157
Viral Load: Low(0-10,000) Ref					
High (10,001-100,000)	-0.09531	0.30896	-0.308	0.75771	0.9090
Extremely High (>100,000)	3.42958	0.21663	15.832	< 2e-16 ***	30.8627
Age: 0 – 20 yrs (Ref)					
21-40yrs	0.04512	0.10015	0.451	0.65233	1.0462
41-60yrs	2.20460	0.07546	29.217	< 2e-16 ***	9.0666
>60yrs	2.11223	0.07582	27.859	< 2e-16 ***	8.2666
Marital Status: Single (Ref)					
Married	2.75038	0.08479	32.439	< 2e-16 ***	15.6485
Divorced	1.91553	0.08804	21.756	< 2e-16 ***	6.7905
Widow/Widower	0.73936	0.09991	7.400	1.36e-13 ***	2.0945
Gender: Male (Ref)					
Female	0.84566	0.03549	23.831	< 2e-16 ***	2.3295
Interaction Effect					
Year*Viral Load (2019*Low VL)					
2020*High VL	-0.15600	0.38242	-0.408	0.68332	0.8555
2020*Extremely High VL	0.76277	0.26360	2.894	0.00381 **	2.1442

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Table 3 presents results of the analysis of risk factors and interaction identified in model 9. It can be seen that HIV/AIDs is most prevalent within age groups 41-60 years with an odd ratio of 9.0666. This result shows that prevalence of the disease in age group 41-60 is at least nine times that of age group 0-20 years. The National HIV/AIDs survey in Nigeria reported the highest prevalence of the disease among age group 35–39 years (FMOH, 2013). However, in Adamawa State, Nigeria, this study has shown that the disease is most prevalent for persons between 41 – 60 years of age.
For marital status, the odd ratios revealed that HIV/AIDs prevalence in married women is about 15.6485 times that of singles. The study showed that the prevalence of the disease in divorced women is 6.7905 times that of singles. The odds also showed that HIV/AIDs prevalence in widow/widower is 2.0945 times that of single patients, which is consistent with a previous study by Kposowa (2013).
On gender, a female patient with HIV/AIDs has an odd ratio of 2.3295, indicating that prevalence among females is about twice that of males. This result is similar to previous findings, where the prevalence of HIV/AIDs was higher in females than in males (NACA, 2010; FMOH, 2013; Awofala & Ogundele, 2016; Rehle et. al, 2010; UNAIDS, 2018).

CONCLUSION

The aim of study was to examine factors associated with HIV/AIDs in Adamawa State, Nigeria using Log-linear Model. For this study, secondary data was collectedfrom a total population of 3,779 patients infected with HIV/AIDs who came for treatment at Specialist Hospital, Yola, Adamawa State, Nigeria.Information on gender, age, viral load, marital status and year of occurrence of the disease were extracted from their hospital records. The R programming software version 3.6.3 was used to analyze the data. Fourteen (14) log linear models were fitted to the data where the model on independence of marital status, age, year, gender, viral load and interaction between year and viral load best fit. This study found that progression to AIDS following HIV diagnosis differed depending on the age at diagnosis, marital status, viral load and gender. Therefore, there is need to sustain efforts at reducing the prevalence of HIV/AIDs among women.

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