

## Analysis Of Drug Abuse Among the People Of Kirinyaga County Using Multiple Logistic Regression Model

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**ABSTRACT:**The main purpose for this research study was to determine the relationship between drug abuse and factors such as lack of awareness, unemployment, poverty and early child exposure to drugs and unemployment among the people of Kirinyaga Central. Data was collected from 357 respondents. The research found a high association between drugs abuse and lack of awareness, unemployment, poverty and low association with early child exposure. A child who was exposed to drugs was 0.6 times more likely to take drugs than one who was not exposed, while a person who was poor was 1.3 times more likely to indulge in drug abuse than one who was not. The odds ratio of unemployment were 1.4 meaning a person who was unemployed was 1.4 times likely to indulge in drugs than one who is employed and the odds of taking drugs due to lack of awareness were 1.4 implying a person who was unaware was 1.4 times likely to take drugs than one who was aware. The odds ratios were determined at 95% confidence intervals. The model which had the lowest value of AIC involved three variables, unemployment, lack of awareness and poverty. The government through NACADA should create more sensitization and awareness on drug abuse especially in group forums or. Unemployment rate can be reduced by sensitizing people to set their own business so that they get income, have no idle time thereby reducing poverty.

**KEYWORDS:** Akaike Information Criterion, Deviance NACADA

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### I. INTRODUCTION

The high rate of unemployment in Kenya has come up with its dose of consequences among the citizens some of which include drug abuse .Recently, the government of Kenya through various stakeholders including the county administration has been co-working to fight drugs in this country. The Kenyan media has also played a positive role in identifying drug dens and drug barons in the country which has been of great help to the government .One of the areas where drug fighting has been experienced include the Mombasa county or more generally the Coast province where lots of people mostly the young people even below 18 years are engaging in drug abuse. Of importance to note is that these people especially the young girls end up in engaging in prostitution because of unemployment. As a result, the young girls later expose their children / babies due to ignorance and negligence. This is no different from other counties and areas of the country especially Kirinyaga Central in Kenya.

Frustrations and emotional stress due to failures and sorrows also lead people to taking drugs. According to Robert Merton's theory of anti-social behavior, once an individual finds no avenue towards achievement of his goals, he may be compelled to indulge in anti-social behavior and one way of doing that is by retreating from social participation through drug addiction.

Drug abuse has become a major torn to social life and economic development among the people of Kirinyaga central and research done by NACADA and World Bank (2012) shows that the number of people affected by the drugs is increasing each day despite the effort by the government to gap the increase.This has raised big concern and the government through NACADA has tried to put more effort to ensure that the problem is curbed.

### II. LITERATURE REVIEW

[1] studied the impact / relationship between substance abuse on unemployment and vice versa. Having done one hundred and fifty relevant studies, the results showed that risky alcohol consumption which was associated with hazardous, binge and heavy drinking is more prevalent among the unemployed. Problematic

substance use is also found to decrease the chance of finding and holding down a job. Thus unemployment is a significant risk factor for drug / substance use.

[2] did a research on unemployment and substance use in young adults whether educational attainment modify the association. The study investigated whether patterns of substance use in relation to unemployment vary depending on educational level. Data was collected from 1126 community- based young adults in France and their parents. Compared to the participants who had always been employed, those who were unemployed and had no higher education were more likely to smoke tobacco with odds ratio of 2.76 at 95% confidence level, to be nicotine dependent with an odds ratio of 3.38 at 95% while those who were unemployed and had higher education were likely to abuse drugs with an odds ratio of 1.18. This showed that increase in unemployment impacts population's level of substance use, especially in young adults with low educational attainment.

Center for Suicide Research and Prevention and the Department of Social work and Social Administration, Hong Kong did a research on Drug Abuse Among youths and Family Relationships and they found that the drug prevalence for in-school adolescent is about 5% to 7% for boys and 3% to 4% for girls also parents' divorce, separation or passing away has high influence on substance abuse among adolescents and they finally conclude that influence from family on substance abuse (early age exposure) play a major role to drug abuse, a more related research was also done by [3] on Drug Abuse situation among Ethnic Minorities in Hong Kong he found that there is high average frequency of drug abuse (19.2 times per week currently and 23.9 times per six months before) they indicate that even though drug abusers realized the health risk, they remain addicted to drugs.

[4] did a research study to investigate the causes, effects and remedial measures of drug abuse among the children in Tanzania, a case study of Hananasifu ward in Koinondoni District in Dar es Salam region. The study involved a case research strategy because the investigation involved a real life problem. The data used was collected by use of questionnaires and observation of the subjects. The data obtained was presented by use of histograms and frequency polygons. It was found that drug abuse among children can start at the early years of age and could be eradicated by collaboration between families, community, government and hospitals. The researcher recommended that children roaming about should go to school, be involved in sports to avoid idling, be selective when it comes to their peers and parents should inspire them with ideals and ethics.

### III. METHODOLOGY

#### 3.1 Data Collection

This research sample was collected from four wards of Kirinyaga Central which included Kanyekini, Inoi, Mutira, kerugoya. Questionnaires were administered to appropriate respondents who could provide necessary response to the set questions. There was also use of interviews in case of aged and semi-illiterate respondents and call backs in case of missing information. No secondary data was used in this research.

#### 3.2 Review of Multiple Logistic Regression Model

Multiple logistic regression is a regression model in which the response/ dependent variable can only take two possible binary values 0 or 1, where the 0 could be absence of an attribute of interest and 1 the presence of the attribute of interest. The logistic regression equation is used to predict the probability of dependent variable taking the dichotomy / binary / categorical value 1 or 0 and more than one independent variable. Or more generally, the presence or absence of an attribute of interest and normally there are two or more measurement variables. Logistic regression analyses examines the odds of the outcome occurring (or not occurring) and by getting the natural log of the odds of the outcome as the dependent variable one is able to linearize the relationship and treat it just like multiple linear regression.

The logistic formula is usually stated in terms of probability that  $y = 1$ , which is referred to as  $\hat{p}$  and the probability that  $y = 0$  which is referred to as  $1 - \hat{p}$

[5] multiple logistic regression equation is given as;

$$\hat{p} = \frac{\exp(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k)}{1 + \exp(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k)} \quad (1)$$

Where  $\hat{p}$  is the expected probability that the outcome is present and  $x_i, i = 1, 2, \dots, k$  are the independent variables  $\beta_0$  through  $\beta_k$  are the regression coefficients.

Alternatively, the model can be re-written as

$$\ln\left(\frac{\hat{p}}{(1 - \hat{p})}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k \quad (2)$$

Where,  $\beta_i$  indicates the change in the expected log odds relative to a one unit change in independent variable  $X_i$  when all the other independent variables have been held constant. Hence therefore, the antilog of the estimated regression coefficient  $\exp(\beta_i)$  gives the odds ratio.

### 3.3 Odds ratio

It is a measure of association between certain factors in a population. It measures how strongly the presence or absence of a certain property e.g. A is associated with the presence or absence of property B in a given population. It is  $\exp(\beta_i)$ .

Hence, to calculate the odds ratio of drug abuse and poverty,

Odds of success on drug abuse is

$p/(1 - p)$ , where  $p$  is the probability of success

Odds of success on poverty is

$r/(1 - r)$ , where  $r$  is the probability of success

Hence the odd ratios are given by the following formula

$$OR = \frac{\frac{p}{1-p}}{\frac{r}{1-r}} \tag{3}$$

An odds ratio of 0.5 indicates that  $y = 1$  is half as likely with an increase of  $x$  by one unit thus indicating that there is a negative relationship between  $x$  and  $y$  while an odds ratio of 1 indicates there is no relationship between  $x$  and  $y$ .

### 3.4 Deviance

When doing logistic regression, instead of using the  $R^2$  as the statistic for overall fit of the model, the deviance is instead used. Deviance is basically a measure of how much unexplained variation there is in our logistic regression model. It is actually a quality of fit statistic. It is the fit of the observed values  $y$  to the expected values  $\hat{y}$ . The higher the difference (deviance) of the observed values from the expected values, the less accurate the model. The two formulas for the deviance are as given below

$$D_{Null} = -2 \ln \left( \frac{\text{likelihood of null model}}{\text{likelihood of a saturated model}} \right)$$

$$D_{fitted} = -2 \ln \left( \frac{\text{likelihood of fitted model}}{\text{likelihood of a saturated model}} \right)$$

(4)

The null deviance tells how well the response / dependent variable is predicted by a model that has only the intercept (grand mean) where the log-likelihood of the null model is

$$\log - \text{likelihood} = -\frac{n}{2} \log(2\pi\hat{\sigma}^2) - \frac{1}{2\hat{\sigma}^2} \sum_{i=1}^n (y_i - \bar{y})^2 \tag{5}$$

Where 
$$\hat{\sigma} = \frac{1}{n-1} \sum_{i=1}^n (y_i - \bar{y})^2. \tag{6}$$

And the log – likelihood of the saturated model is given by the following formula

$$\log - \text{likelihood} = -\frac{n}{2} \log(2\pi\sigma^2) \tag{7}$$

### 3.5 Likelihood Ratio Test

Sometimes, instead of using the deviance to judge the overall fit of the model, one can compare the the deviance with just the intercept (null model) to the deviance when the new predictor variables have been added. The difference between the two is what is called the chi- square goodness of fit.

$$\chi^2 = D_{Null} - D_{fitted} \tag{8}$$

Likelihood ratio test is therefore generally used to access the model fit by comparing the deviance of the predictor model with that of the null model on a chi-square distribution with degrees of freedom equal the number of predictor variables.

## IV. DATA ANALYSIS, DISCUSSION AND RESULTS

First, the data was checked for normality and the following normal q-q plot was obtained and it indicted the data followed the normal distribution as shown in figure 1 below

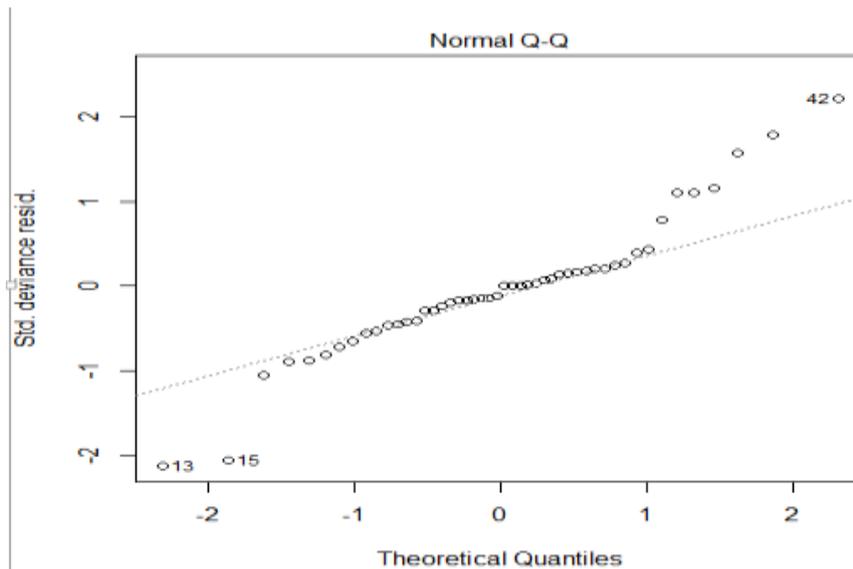


Figure 1

From the contingency table, the proportion of people who admitted taking drugs due to poverty was  $248/334 = 0.743$  implying that 74.3% of the people who indulged in drug did it due to poverty related reasons. Poverty had a correlation value of 0.7 (high correlation) with drug abuse indicating high positive association with drug abuse. The p-value for poverty was found to be  $1.167e^{-07}$  this is approximately zero implying that drug abuse is dependent on poverty.

Also, the proportion of people who engaged in drug abuse due to unemployment was  $204/286 = 0.713286713$  implying that 71.3% of the people who indulged in drug did engage in it due to lack of employment. Unemployment had a correlation value of  $0.68 \cong 0.7$  with a p-value of  $9.79e^{-08}$  still showing a high positive association between unemployment and drug abuse.

The correlation tests shows that unemployment, and poverty were strongly correlated to the response variable drug abuse with 0.68 and their 95% confidence interval was much narrower (between 0.49-0.81) this shows that the data were not dispersed.

Also, the proportion of people who said yes to drug abuse due to lack of awareness was  $\frac{231}{311} = 0.74$  implying that 74% of the population engaging in drugs engaged in it due to lack of awareness. Lack of awareness and drug abuse had a correlation value of 0.67 which is a positive association between the two and odds ratio of 1.4 implying a person who was unaware was 1.4 times likely to take drugs than one who was aware.

[6]and[7] talked of model selection to obtain the best fit for the data and unemployment, poverty and lack of awareness were the significant factors influencing drug abuse among the people of the target area.

The fitted model was as shown

$$\ln\left(\frac{\hat{p}}{(1-\hat{p})}\right) = -6.1551 + 0.4085(\text{unemployment}) + 0.3467(\text{poverty}) + 0.3251(\text{lack of awareness}) \quad (9)$$

The log odds of taking drugs is 0.4085 times higher in persons who are unemployed than those who are employed. Taking the antilog of the regression coefficients [8],  $e^{0.4085} = 1.5$ , which is actually the crude or unadjusted odds ratio. This means that the odds of taking drugs are 1.5 times higher among unemployed people compared to employed persons. Also, the odds of taking drugs are 1.4 times higher among poor people compared to those living above poverty level. The odds of taking drugs are 1.4 times higher among unaware people than those who are aware of the effects of drugs.

## v. CONCLUSION AND RECOMMENDATIONS

Based on these results and findings, the education system in the education system in Kenya should also incorporate drug abuse education into the curriculum., make the curriculum more attractive and develop joint parental activities and emphasize on the importance of family values .Also, future studies on drug abuse should be done in other counties so as to provide a more vivid picture of the prevalence of drug abuse among the people. Strategies that empower child-parent communication about substance abuse should be employed so as to create more awareness in the society. Also, the children who are at a higher risk for drug abuse can be targeted with special intervention to control drug use and exposure among the children. The administration can also create community –based involvement and neighborhood responsibility especially in poor households and at-

risk areas by having frequent friendly police patrols and white-collar drug bars. Group therapy can also be incorporated so as to help people with problems by discussing them and providing alternative solutions like employment and job creation and thus eradicate poverty in the society which leads to idleness and later drug abuse.

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