

RESEARCH ARTICLE

A Study of Causes of Teenage Pregnancy Rate in Nigeria: Statistical Modeling Approach

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ABSTRACT

One major contemporary social problem confronting most countries in the world is teenage pregnancy. From the first world countries such as the United States to the third world countries, this problem has been a source of worry for policymakers, social workers, and other human service providers due to its negative repercussions on the girl-child. This research seeks to explore the factors influencing adolescent pregnancy descriptively and to compute a multivariable linear regression to examine causal relationships and the strength of association among the several variables under study. The study used 10 years retrospective study of teenage pregnancies managed at Federal Medical Center Jalingo. The statistical tools used for analyses are multivariable linear regression analysis, Chi-square (χ^2) test, Charts and descriptive statistics of the data and R package. The information obtained were coded and transferred into a template already design for registering such information's. Variables relating to the socio-demographic characteristics of the teenagers, antenatal and during pregnancy complications, and neonatal outcomes were obtained. The study revealed the percentage prevalence of adolescence pregnancy in Taraba state, the direction and strength of association between the variables under study as well as the cause and implication of adolescent pregnancy on the education, economy, and future of the northern region and the solutions to the threats adolescent pregnancy poses to northern Nigeria.

Key words: Socioeconomic factor, variable, multivariate regression, Demographic, Teenage pregnancy and modeling

INTRODUCTION

Adolescence, according to the WHO refers to the period between the ages of 10 and 19 years in which the individual progresses from the initial appearances of secondary sexual characteristics to full sexual maturity and during which psychological and emotional processes develop from those of a child to those of an adult. Evidence shows that infant mortality among the children is sometimes 2 times higher than among those of old peers. A stronger likelihood of low birth-weight in the infant has been recorded among adolescent mothers than among older peers. This is mainly associated with poor maternal nutrition. Low birth-weight babies are 5–30 times more likely to die than babies

of normal weight. If a mother is under 18, her baby's chance of dying in the 1st year of life is 60% higher than that of a baby born to a mother older than 19. Part of this heavy toll has more to do with poor socio-economic status and lack of ante-natal and obstetric care than physical maturity alone.

Teenage pregnancy, the pregnancy that occurs to a young person between 13 and 19 years has become a major social and health problem in Nigeria in the recent times.^[1] This is because of its association with higher morbidity and mortality for both the mother and child (National Population Commission [NPC] and ICF; Ajala^[2]; Crockett^[3], Bingham *et al.*^[4] and Alika^[5]; Bamiwuye.^[6] Several studies have reported an increase in pregnancy complications associated with teenage pregnancy Alika^[5]; Bonell *et al.*^[7]; Chilman^[8] such as anemia, pregnancy induces hypertension, preterm labor,

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obstructed and prolonged labor, unsafe abortion, and high incidence of operative deliveries due to physical immaturity of the pelvis of the teenage mothers as well as low birth weight babies, and even death (Bingham^[4]; Channels^[9]). Social consequences of teenage pregnancies include cases of dropping out of school Chau-Kuang *et al.*,^[10] child abandonment, abortion, and loss of skill and opportunities to find a job due to little or no education Ekefre *et al.*^[11] among others. The incidence of teenage pregnancy is fast declining in the developed countries, with the lowest

Incidence of 3% in Sweden Ezegwui *et al.*^[12] However, in other developing countries particularly African countries; the incidence ranged from 3.7% to 22.9% of all pregnancies.^[13] Nigeria has the highest rate of teenage pregnancy in Africa. About 22.9% of the world's teenage pregnancies in 2010 were from Nigeria (NPC [Nigeria] and ICF^[14]). According to Ezegwui *et al.*, Gilda *et al.*,^[12,13] 23% of young women age 15–19 have begun childbearing; 18% have had a child while 5% were pregnant with their first child.

The incidence of teenage pregnancy varied greatly between the Northern and Southern geopolitical zones in Nigeria. Teenage pregnancy rates are higher in the Northern parts of the country than in the Southern parts: in the North, one (1) in every three (3) teenage girls, whereas in the south - one (1) out of every ten (10) girls.^[14] Among the geopolitical zones, teenage pregnancy ranges from 8% in the South West and South East to 36% in the North West.^[14,15] In addressing these variations, the Federal and State Governments have embarked on programs and strategies aimed at teaching teens how to handle peer pressure to have sex, using contraception, engaging in sex abstinence, and promoting sex education. However, achieving these aims still remains an illusion in Nigeria.

To understand causes of teenage pregnancy and childbearing in Nigeria and other parts of the world, several studies have linked teenage pregnancy with African traditional society.^[12,15] This is because women often marry at a very young age^[11] and childbearing occurred early and within marriage.^[6] In Nigeria, premarital teenage pregnancy has increased and more teenage girls are getting pregnant.^[12] Many studies have linked declining age at first menstruation (menarche), increasing age at

marriage, increasing premarital teenage sexual activity Chau-Kuang *et al.*^[10], Ezegwui *et al.*^[12] and Gilda *et al.*^[13], age at first sexual intercourse and educational levels,^[14] low or ineffective use of contraceptives^[7] as risk factors in teenage pregnancy and childbearing. Other factors associated with a high rate of teenage pregnancy in Nigeria include loss of the elders' traditional social controls over sexual behavior of the teenagers,^[8] the collapse of the extended family structure,^[11] societal approval of teenage sexual relationship and premarital pregnancy as a sign of fruitfulness before marriage,^[2] poverty,^[5] sexual abuse and rape, and the effect of globalization, modernization, urbanization and education on the sexuality.^[15] NPC Nigeria and ICF International^[14] also reported religious beliefs and ignorance. In spite of these studies; studies on factors influencing teenage pregnancy and childbearing in Nigeria have been minimal. The study therefore Aimed at modeling the socio-demographic effects of teenage pregnancy rates in the Taraba State of Nigeria.

METHODOLOGY

The study was 10 years retrospective study of teenage pregnancies managed at Government hospital in Taraba state, from January 1, 2010 to December 31, 2020. The sources of information were Antenatal, labor, and neonatal ward records, theater records, patient's records, and case notes. The information obtained will be coded and transferred into a template already design for registering such information's. Variables relating to the socio-demographic characteristics of the teenagers, antenatal and during pregnancy complications, and neonatal outcome will be obtained. R-Statistical Package (version 3.0.0) were used to determine the causal relationship between the socio-demographic characteristics under study, Microsoft Excel package (2007) was used to show a vivid picture of the trend and distribution of the socio-demographic characteristics as well as to show the direction and strength of the association between the said factors under study. The percentages were determined as well as chart to present the results. The following statistics are used in the analysis of data.

- i. Multivariable liner regression analysis.
- ii. Chi-square (χ^2) test
- iii. Charts and descriptive statistics of the data.

iv. A critical discuss analysis of the topic of research will be carefully look upon so as to give a very broad idea of the study for further research.

Multiple Linear Regression Analysis

Multiple linear regression analysis is an extension of simple linear regression analysis, used to assess the association between two or more independent (explanatory and predictor) variables and a single continuous dependent (response) variable. The multiple linear regression equation is as follows:

$$\hat{Y} = b_0 + b_1X_1 + b_2X_2 + \dots + b_pX_p$$

whereas the predicted or expected value of the dependent variable, X_1 through X_p are p distinct independent or predictor variables, b_0 is the value of Y when all of the independent variables (X_1 through X_p) are equal to zero, and b_1 through b_p are the estimated regression coefficients. Each regression coefficient represents the change in Y relative to a unit change in the respective independent variable. In the multiple regression situation, b_1 , for example, is the change in Y relative to a one unit change in X_1 , holding all other independent variables constant (i.e., when the remaining independent variables are held at the same value or are fixed). Again, statistical tests can be performed to assess whether each regression coefficient is significantly different from zero.

Chi-Square (χ^2)

The Chi-square test provides the basic for testing whether more than two populations may be considered equal or not. Chi-square test of independent constitutes a method for deciding whether the hypothesis of independent between variable in difference classification is to enable or not. The procedures provide a test of the equality of more two population properties, Chi-square test furniture a conclusion on whether asset of observed frequencies that the hypothesis under Which theoretical frequencies where derived should be rejected. When population variables are qualitative characteristics such as marital status political affiliation sex, state of heath type of treatment or kind of response the presence of

absence of independent between variables can be used to draw impartment conclusion.

The test statistics for the Chi-square is given below

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(O_i - e_i)^2}{e}$$

Where

O=the observed value

E=the expected value

Model Specification

This research study will be modeled on a simple and multiple regression model as;

Model

Statistically;

The simple linear regression model is expressed implicitly as;

$$Y = \beta_0 + \beta_1X_1 + e$$

The simple multiple regression modelsis given as;

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \dots + \beta_{12}X_{12} + e$$

Where

Y= Teenage pregnancy

e = error term

β_0 = Constant term

β_i = Coefficient to be estimated

X_1 = Islam

X_2 = Christianity

X_3 = Fulani

X_4 = Jukum

X_5 = Mumuye

X_6 = Jumjo

X_7 = Educated teenage

X_8 = Non-educated teenage

X_9 = Rich

X_{10} = middle

X_{11} = poor

$\beta_1 - \beta_{11}$ = Regression Coefficient

Analysis

Table 1 shows the number, percentage and correlation analysis of teenage pregnancy with their predictors. All the factors considered have significant effect of the teenage pregnancy since the P -value are <0.05 and 0.01 . Note that the

percentages of teenage pregnancy are taken based on the number of women sample in some selected community.

Table 2 presents regression analysis for the socio-demographic factor the estimates, standard errors, significant *P*-values and odd ratios of the parameters of contribution of the socio-demographic factor to the teenage pregnancy are presented in Table 2. It can be observed from the

Table 1: Frequency (percentage in parenthesis) distribution of number of teenage pregnancy and the predictors (socio-demographic factors)

Determinants	Factor level	No of teenage pregnancy	χ^2 P value
Religion	Islam	7250 (64.3%)	0.001
	Christianity	5366 (41.6%)	0.001
	Higher Educ.	189 (12.8%)	0.001
	Secondary	13663 (32.6%)	0.001
	Primary	4835 (46.2%)	0.001
Tribe	No Educ.	6786 (62.4%)	0.001
	Fulani	2895 (67%)	0.001
	Jukum	1728 (22.9%)	0.001
	Mumuye	1300 (47.3%)	0.001
	Jumjo	1550 (23.2%)	0.001
Level Education of Teenagers' Parents	Higher Educ.	308 (18.8%)	0.001
	Secondary	1625 (34.5%)	0.001
	Primary	2806 (58.8%)	0.000
Wealth Index	No Educ.	4848 (76.8%)	0.000
	Rich	821 (21.8%)	0.001
	Middle	2429 (36%)	0.001
	Poor	5723 (64.2%)	0.001

Table 2: Regression analysis for the socio-demographic factor

Coefficients:	Estimate	Std. error	z value	Pr(> z)	Odd ratio
(Intercept)	-2.29852	0.07040	-32.647	<2e-16 ***	
Religion	-0.03547	0.10090	-0.352	0.725188	0.96515
Education Level	0.80199	0.08519	9.414	<2e-16 ***	2.22997
Level Education of Teenagers' Parents	0.65368	0.08197	7.975	1.53e-15 ***	1.92260
Tribe	-0.49311	0.13625	-3.619	0.000295 ***	0.61072
Wealth index	0.23561	0.10543	2.235	0.025435 *	1.26568

Table 3: Model parameters estimate for the socio-demographic effects of teenage pregnancy rate

Coefficients	Estimate	Std. error	Z value	P-value	Odd ratio
(Intercept)	-1.56616	0.08642	-18.123	<2e-16 ***	
Christianity	-0.12778	0.05599	-2.282	0.02247*	0.88005
Islam	0.18883	0.06473	2.917	0.00353**	1.20784
No Education	-0.51906	0.07508	-6.914	4.72e-12***	0.59508
Primary	-0.28639	0.10965	-2.612	0.00901**	0.75097
Secondary	-0.38028	0.08704	-4.369	1.25e-05***	0.68367
Tertiary	-1.20474	0.21461	-5.614	1.98e-08***	0.29977
Fulani	0.13130	0.05300	2.478	0.01323*	1.14031
Jukum	-0.11457	0.05268	-2.175	0.02965*	0.89175
Mumuye	-0.17154	0.05866	-2.924	0.00346**	0.84237
Jumjo	0.92915	0.35559	2.613	0.008975**	2.53236
Rich	0.13130	0.05300	2.478	0.01323*	0.14031
Middle	0.31457	0.00268	-2.175	0.002965**	0.89175
Poor	0.67154	0.05866	-2.924	0.00346**	0.84237

above that each factor contributed differently to the teenage pregnancy in Nigeria. Teenage pregnancy is commonly determined by level of education of the parents followed by tribe followed by wealth index.

Table 3 shows model parameters estimate for the socio-demographic effects of teenage pregnancy rate. The interpretation are stated below:

Interpretation of the Model

Wealth index

The risk of a rich household having teenage pregnancy is smaller than the risk of a poor and middle household.

Education level

The risk of a high education level household having teenage pregnancy is smaller than the risk of a low level of education

Religion

The risk of a Muslim household having teenage pregnancy is more than the risk of a Christian household having teenage pregnancy.

Parents' education background

The risk of having teenage pregnancy from a woman whose parents has secondary education or more is smaller than that of a woman whose partner has no formal education

CONCLUSION

The study is revealed the percentage prevalence of adolescence pregnancy in Taraba state, the particular tribe that is more associated with adolescent pregnancy in the study area, the sociodemographic factors associated with teenage pregnancy in northern Nigeria, the various factors leading to teenage pregnancy in northern Nigeria, the direction and strength of association between the variables under study and the cause and implication of adolescent pregnancy on the education, economy and future of the northern region and the solutions to the threats adolescent pregnancy poses to northern Nigeria. Model selection procedure showed that not all the variables identified in this study, are significant. The effect of religion and parents' poor education and education level of girls on the teenage pregnancy in the Taraba state was significant. On the average, the risk that a Muslim household will have more teenage pregnancy is more than the risk of a Christian household having teenage pregnancy. This is so due to the religion provision of Islam that allows a man to marry at early stage of poverty. Also it is being deduced from the analysis that the more educated a household is, the lower the risk of having teenage pregnancy.

RECOMMENDATION

1. Based on the findings, the following recommendations are made:
2. The dangers of teenage pregnancy both here and hereafter should be emphasized by the religion leaders.
3. Parents should personally lecture their children on the dangers of teenage pregnancy.
4. Government should provide free education for women in the communities.
5. Further studies should be considered on danger of teenage pregnancy.

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