Regression Analysis of Some Demographic Variables Influencing the Maximum Number of Children Born by Women of Reproductive Age in Abeokuta, Nigeria

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Abstract

The aim of the study was to analyze some socio-demographic variables influencing the maximum number of children born by married women of reproductive age (15 – 49) in Abeokuta, Nigeria. Regression analysis in three functional forms of linear, semi-log and double-log models was applied on the data collected from a survey conducted in Abeokuta South local Government area of Ogun State. Two hundred married women were selected randomly. Results obtained showed that the use of contraceptives, use of condom by husbands and the level of formal education (in order of strength) have significant influence on the number of children born by the women as shown by the results obtained through the use of multiple linear regression and analysis of variance (ANOVA). Sex preference and need, income, withdrawal method and sterilization of either husband or wife had no significance influence on the number of children born by the women. The study recommended that the State and Local Governments Health Departments should emphasize use of contraceptives and condoms in their family planning campaigns. More formal-adult-basic-education of non literate women was also recommended. This will facilitate á change of attitude of women and families that prefer large number of children, and bring about increased development of the families and society.

Keywords: regression analysis, socio-demographic variables, contraceptive, reproductive age, number of children born.

1. Introduction

Nigeria and many other developing countries are experiencing an alarming rate of population increase. As a developing nation, this development calls for the nation to get enough social amenities that will take care of this teaming population. Some demographic variables that influence maximum number of children born by women are age at first effective marriage, sex preference, education attainment of the women and that of their husbands, income, contraceptives use and methods of birth control, etc. (Banerjee, 1992; Banerjee, *et al,* 2012; Osemwenkha, 2004; Yohannes *et al,* 2011; Hawken, 2014).

Erickson (1998) concluded, in his study of some developing countries, that younger married women tend to have more children than older women. Younger women (21-30 years old) were more sexually involved and have easier childbirth than older women (35 and above). He also found out that married women in polygamous families have less number of children probably due to deliberate control by their husbands. Lower number of children per woman was recommended to facilitate easier and better level and standard of living in the family (Banerjee, *et al,* 2012; Osemwenkha, 2004; Yohannes *et al,* 2011; Oyefara, 2012).

Regression analysis attempts to explain how far or strong some of the aforementioned factors influence the maximum number of children born by the women. According to Pedhazur (1992), regression analysis is a method used in analyzing the variability of a dependent variable by resorting to information available on one or more independent variables. A question usually arises: what are the expected changes in the dependent variable as a result of changes observed or induced, in the independent variables? Simple regression is used when only one independent variable is involved. However, in order to see the correlations and interactions between the independent variables and to analyze the collective and separate effects of two or more independent variables on a dependent variable, multiple regression analysis (MR) is used.

Rainwater (1995) found out that most married women engage in regular sexual intercourse which in the absence of contraception usually leads to pregnancy. When the pregnancy matures, a birth is the result. Longe *et al.* (1989) said that women that married between ages 18 to 25 years had many more children before reaching menopause when compared with women who married after 25 years. The reason for this could not be far-fetched as child delivery is easier for younger women when compared with their older counterparts (Dunlop and Erickson, 2001).

Banerjee (1992) also said that the higher the education of a woman the less the number of children born by the woman. Level of education therefore plays an important role in determining the number of children a woman gives birth to. Freedman (1993) argued that the number of children born by women is influenced by the cultural

norms of the women, the number of abortions and the method of birth control adopted by the women (Mohanty, 2011) .

In their study of factors influencing family size (Klein, 2013; Adewole and Oyerinde, 1988) found out that the more couples are educated, the more the eagerness to restrict the family size. Rainwater (1995) suggested that one should not have more children than one can support. There are so many children on the streets that are not well catered for by their parents because they could not afford to. The economic status of the couples comes into play as a factor that affect how a child born by such couple is taken care of (Hawken, 2014). In the case of developing countries like Nigeria, the social norm favour having many children. This is because it is seen as insurance for old age. This means that when parents are old and unable to support themselves, they relied on the children to provide financial support for them (Levine, 2014; Klein, 2013)).

Results of regression analysis will show which of the tested variables exert or have greater influence on the number of children born by women. This will help policy makers in formulating appropriate policies on birth and population control.

In this study, the maximum number of children born by women of reproductive age (15 – 49) years is the dependent variable, level of education, sex preference, income and types of birth control are the independent variables.

The objectives of the study were to:
1. Examine how the tested variables affect the maximum number of surviving children born by these women.
2. Determine the degree of influence of each of the tested variables.
3. Investigate which of the independent variables mostly affect the maximum number of surviving children had by
   the women.

2. Methodology

The data used for this research work was primary. A survey was conducted by using questionnaire and personal interview to obtain information from the respondents. Abeokuta south Local Government Area of Abeokuta was selected as the study are. Random sampling was used to select the 200 respondents that fit into the definition of married women of reproductive age (15 – 49) years. The Statistical Package for Social Sciences (SPSS) was used in analyzing the data. The multiple linear regression was used to model the data generated. The assumptions that the errors are independent have zero mean, constant variance and follow a normal distribution were made (Draper and Smith, 1986).

The equation for the model used is given as:

$$Y = \beta_0 + \beta_1 + \beta_2 X_2 + \ldots + \beta_7 X_7 + E$$

Where
Y = maximum number of children
X_1 = Education (in years)
X_2 = Sex preference
X_3 = Income (N'00)
X_4 = Type of birth control
X_4 = was however splitted into four variables that were used as dummy.
X_4 = withdrawal method
X_5 = Sterilization
X_6 = Use of contraceptives
X_7 = Use of condom by husband.
The use of dummy variables was well discussed by (Johnson, 1984) in his book Econometric Methods.
$X_1, X_2, \ldots, X_7$ are the explanatory variables.
β_0 is the Y – intercept while $\beta_1, \beta_2, \ldots \ldots \beta_7$, are the regression coefficients that were estimated while E is the residual or error term.
Regression analysis (stepwise) package was used for the analysis. The package removed those independent variables that were not significant at the 5% level of significance. The linear, semi-log and double-log models were then applied on the significant variables. The analysis of variance (anova) for the multiple regression was also carried out. The ANOVA table is as given:

Source of variation	d.f	SS	MS	F
Regression/ $B_1, B_2…,B_k$	$k-1$	SSR = A	$A/k-1 = C$	C/D
Residual	$N-K$	$SST - SSR = E$	$E/N - k = D$	
Total	$N-1$	SST		

Where
SSR = b^I x ^IY
ST = Y^IY
The coefficient of determination R^2 was also obtained. This coefficient provided a measure of the variation of Y explained by the explanatory variables.
R^2 is given by SSR/SST.

3. Results and Discussion

The model obtained was given as

$$Y = 5.264 - \frac{-0.112X_1}{(-3.981)} + \frac{7.54 \times 10^{-6} X_2}{(1.374)}$$
$$+ \underset{(1.161)}{0.23 X_3} - \underset{(-3.335)}{1.105X_4} - \underset{(-1.826)}{0.809X_5}$$
$$- \underset{(-2.989)}{1.086X_6} - \underset{(-1.950)}{0.779X_7}$$

Figures in parentheses indicate the standard error of the estimates.

Table 1: the least square estimates of the coefficients and comments on its significance

Variable	Estimate of βs	Value of t-statistics	Comment
*X_1	-0.112	-3.788	Significant
X_2	7.54×10^{-6}	5.58×10^{-6}	Insignificant
X_3	0.231	1.198	Insignificant
X_4	-1.086	-1.989	Insignificant
X_5	0.809	-0.443	Insignificant
*X_6	-1.105	-0.331	Significant
* X_7	-0.779	-2.551	Significant

The significant variables at 5% level of significance were asterisked.

The t-statistic was computed from

$$t = \frac{\beta_1 - \beta_0}{S_\beta} \sim t_{n-2,\alpha}$$

The results from table 1 indicated that education, use of contraceptive and use of condoms by husbands were the significant explanatory variables. The negative values in each of the significant variables indicated that the more the level of education of the women, the less the number of children they had. Also, the women that made use of contraceptives and those whose husbands made use of condoms had less number of children.

After the insignificant variables were dropped, the linear, semi-log and double-log models were applied on the three significant variables. The variables are education, use of contraceptive and use of condoms by husbands. These, were coded as:

X_1 = Education

X_2: Use of Contraceptive

X_3: Use of condom by husbands

Table 2: The β_s, t-value and R^2 for the Linear, Semi-log and Double-log Models

Model	β_0	β_1	β_2	β_3	R^2
Linear	4.6802	-0.0954	-0.5232	-0.5322	0.1150
t-value	12.109	-3.788	-1.989	-2.551	
Semi-log	7.0043	-1.4206	-0.4783	-0.4983	0.1448
t-value	8.758	-4.655	-1.846	-2.331	
Double-log	2.1729	-0.4201	-0.1705	-0.1676	0.0992
t-value	7.100	-3.598	-2.084	-1.691	

From this table, it is evident that the use of contraceptives (β_2) mostly affected the maximum number of children born by the women. From the three models used, it was found that the semi-log model had the best fit because it had the highest value of R^2 = 14.48%.

The ANOVA table for the multiple linear regression is shown in table 3.

Table 3: ANOVA table for the Multiple Linear Regression

Source of variation	d.f	SS	MS	F
Regression	7	55.3398	7.9057	4.69
Residual	192	323.455	1.6847	
Total	1990	378.795		

$F_{7,192} = 1.00$

Since the calculated F = 4.69 is greater than the tabulated F = 1.00 it is concluded that β_2 had significant effect on the maximum number of children born by the women.

3.1 Comparison of Multiple Linear Regression and ANOVA Results

Both results of analysis indicated that education, use of contraceptive and use of condom by husbands had significant effect on the maximum number of children born by women of reproductive age.

Table 4: Socio-Demographic Data of Respondents

	Frequency (%)	Average	No. of children
Age group			
15 – less than 20	4	(2)	4
20 – less than 25	61	(30.5)	7
25 – less than 30	67	(33.5)	3
30 – less than 35	28	(14.0)	6
35 – less than 40	26	(13.0)	3
40 – less than 45	14	(7.0)	7
Education			
No formal Education	37	(18.5)	7
Primary Education	68	(34.0)	6
Secondary Education	60	(30.0)	4
Tertiary Education	35	(17.5)	3
Average Annual Income (N'000)			
Less than 60	34	(17.0)	4
60 " 70	44	(22.0)	3
70 " 80	33	(16.5)	7
80 " 90	34	(17.0)	5
90 " 100	16	(8.0)	3
100 " 110	21	(10.5)	6
110 and above	18	(9.0)	5
Major Types of Birth Control			
Use of Contraceptive	58	(29.0)	3
Sterilization	2	(1.0)	4
Withdrawal	55	(27.5)	7
Use of Condom	85	(42.5)	3
Sex Preference (Need)			

Low	65	(32.5)	6
Average	84	(42.0)	5
High	51	(25.5)	6

3.2 Degree of Influence of Variables on Number of Children Born by Women

Table 2 shows that the use of contraceptive exert the strongest influence on the number of children born by women of reproductive age in Abeokuta (t = -1.989). This is followed by the use of condom by husband (t = - 2.551) and the level of education of the women (t = -3788). The average number of children born by married women of reproductive age in Abeokuta is approximately 5 (See Table 4).

4. Conclusions and Recommendations

Based on the analysis and results of this study, it was concluded that:
1. The level of education, use of contraceptives and use of condom by husbands of women of reproductive age in Abeokuta have significant influence on the number of children born by the women.
2. Sex preference, the level of income, withdrawal of male sexual organ from the female's sexual organ to prevent
   semen from flowing in, and sterilization have no influence on the number of children born by the women. The sterilization either by the woman or man, had no influence.
3. The higher the level of education, the lower the number of children born by the women. The use of contraceptives and condom help the families in controlling the number of children born into the family.
4. The use of contraceptives exert the strongest influence on the number of children born. This is followed by the use of condom and level of formal education.

The following recommendations were made based on the conclusions:
1. The State and Local Government Health Departments should increase enlightenment campaigns on family planning emphasizing the use of contraceptives and condoms.
2. The government should encourage more the formal education of girls and women. More Formal-Adult-Basic-Education (FABE) of women (who are non-literate or non-school goers) should be pursued.

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