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Community and Individual Level Factors Influencing Modern Contraceptive Use among Married Women in Nigeria

Adegoke Omolola Simiat

Department of Epidemiology and Medical Statistics, University of Ibadan, Ibadan, Nigeria

Email address
simiatgidado@yahoo.com

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Abstract: The prevalence of contraceptive use is low in Nigeria with wide variations across the different geopolitical zones. Though researchers have devoted considerable attention to the impact of individual-level factors on contraceptive use, less is known about how community characteristics affect contraceptive use in married women. The objective of this study is to assess the effects of community level variables on family planning use among Nigerian married women of reproductive age group (15-49 years). The study is based on data collected from the 2008 Nigeria Demographic and Health Survey (NDHS). Random effects multilevel logistic regression analyses of 23479 married women of reproductive age nested within 888 clusters was carried out to assess the role of selected individual (socio demographic and other family planning related factors) and community level factors (childbearing, wealth index, education, high parity, exposure to family planning messages) in the use of modern contraceptives. The regression model was fitted using the GLLAMM command in STATA-10. Level of significance was at 5%. Contraceptive use was lowest in communities which were poor, have low level of education and those who felt having more than four children was ideal. Overall, the results of this study suggest that contextual factors play an important role in contraceptive use. More attention needs to be paid particularly to contextual factors while formulating family planning policies in Nigeria so as to improve modern contraceptive use.

Keywords: Contraceptive Use, Individual-Level Effect, Community-Level Effect, Multilevel Modeling, Nigeria

1. Introduction

Nigeria has experienced a high fertility rate over the last two decades which has led to overpopulation and insufficient resources to meet the needs of the population at large. The 2006 census estimated the population of Nigeria to be 142 million and also gave an annual population growth rate figure of 3.2 percent [1]. At this growth rate it would take only 22 years for the population of Nigeria to double. According to the Nigeria Demographic and Health Survey (NDHS) 2008, Nigerian women will have an average of 6 children by the end of their reproductive years [1], despite the introduction of a National Policy on Population in 1988, which stipulated four children per woman, and eighteen years for the commencement of childbearing. The current prevalence for modern contraceptive use in Nigeria is approximately 15%. Twenty-nine percent of currently married women have used a family planning method at least once in their lifetime. Fifteen percent of currently married women are using any contraceptive method and 9.7 percent are using a modern method [1]. In addition, a high fertility rate has been seen to be associated with high maternal and infant mortality in developing counties such as Nigeria [1]. A principal effort in population control and reducing maternal mortality is family planning [2].

The low level of family planning use is a major hindrance in meeting the Millennium development goals in Nigeria and can also be a potential danger to the worldwide effort towards human development [3]. Nigeria has one of the worst maternal and child health indicators in the world with maternal mortality rate of about 545 per 100,000 in a year and infant mortality rate of about 75 per 1000 live births [4].

Unexpected or unplanned pregnancy, one of the consequences of low level of contraceptive use poses a major public health challenge in women of reproductive age, especially in developing countries [2]. It has been estimated

that of all pregnancies that occur annually worldwide, about 38% are unplanned and another 22% end in abortion [2] More than 200 million women in developing countries would like to delay their next pregnancy or even stop bearing children altogether but many of them still rely on traditional and less effective methods of contraception or use no method at all [2].

Studies on family planning use in Nigeria identified individual level factors such as age, socioeconomic class, husband's approval, access to family planning messages, desire for more children and number of living sons as factors influencing contraceptive use [5, 6, 7].

Some of the barriers to contraceptive use reported from studies in Nigeria includes lack of awareness of contraceptives, lack of access to family planning, cultural factors, religion, opposition to use of contraceptives by partners or family members, fear of health risks and side effects of contraceptives [6, 8, 9].

Cultural values held by communities could influence health related behaviors and there have been reported misconceptions concerning family planning use especially in the northern part of the country which include reducing fertility, reducing their population size and increasing promiscuity [10]. Despite community level influences on family planning use, few studies have examined these contextual effects in developing countries where family planning use is still low. In a study carried out in Mali using multilevel modeling a significant variation in contraceptive use was found between communities after adjustment for individual and community level variables [11]. The application of multi-level modelling techniques in studies of family planning use has often found that regional variations in contraceptive use remain after controlling for individual and household factors [12]. These variations could be attributed to a number of unobserved contextual factors such as cultural beliefs, provision of reproductive health services, the physical characteristics of the area, macroeconomic factors or the presence of transport routes [13]. Understanding the role of contextual or community based variables in family planning use could therefore help in planning and reaching out to meet the needs of different communities.

The objective of this study is to identify community and individual level variables influencing modern contraceptive use among married women in Nigeria using a multilevel analysis approach and to determine the variability in family planning use between communities.

2. Methods

2.1. Data

This reanalysis of the 2008 Nigeria Demographic and Health Survey (DHS) (Full report available at www.measuredhs.com) data for currently married women was done using a multilevel modeling approach. Briefly, the DHS is a cross sectional survey involving the thirty six states in Nigeria and the Federal Capital Territory, Abuja. Respondents were selected from 888 clusters, 286 in the urban and 602 in the rural areas. In the second stage of selection, an average of 41 households was selected in each cluster by equal probability systematic sampling. All women aged 15-49 years were eligible to be interviewed. The subsample included in this study consists of 23479 women who were married at the time of the survey. There was a response rate of 98 percent and no significant difference between rural and urban areas in terms of response rates.

2.2. Variables Analysed

Current modern contraceptive use was the dependent variable used in the analysis and was classified as (yes/no). Women were designated as users of modern method if they reported use of the pill, IUD, injections, the diaphragm, female or male sterilization, the male or female condom, implants and lactation amenorrhea contraception method. All other individuals were classified as nonusers of modern contraception. The independent variables used in this analysis were variables that have been shown to be associated with contraceptive use in the literature and included socio demographic and socioeconomic variables, husband related variables and other family planning related variables such as knowledge and exposure to messages about family planning.

2.2.1. Individual Level Variables

Individual level variables in this study are those specific to a woman and her husband. They include: age, educational attainment, wealth index, religion, place of residence, region, number of living children, occupation, family structure, desire for more children, decision maker for contraception, partner residency status, knowledge about contraceptive method, family planning messages received, current working status, husband's level of education, husband's approval for contraception, husband's desire for children. Educational attainment of the women and their husband was grouped into never been to school, primary and secondary or higher education. Respondents' work status was grouped into currently working or not currently working.

The NDHS wealth index score was used as the five quintiles in the DHS data. Exposure to any of the sources of information (print and electronic media, and health worker) was also derived. Partner approval for family planning was based on whether the husband knew if the wife was using a family planning method. The six geo political zones in Nigeria, three each in the northern and southern parts of the country are included in the analysis.

2.2.2. Community-Level Factors

All the community-level variables were constructed by aggregating individual-level factors at the community level (the primary sampling units). That is, the community contextual variables are actually compositional variables. The outcomes for all women in each cluster were averaged to obtain a mean or a proportion. For example, the percentage

of women that received family planning messages in each cluster was simply an average of the individual level variable for that cluster with '1' for those who received and '0' for those who did not.

The community level computation for variables with more than two categories was done similarly after dichotomizing each variable. Individual level wealth index was classified into two categories, upper (for respondents in the higher and highest wealth index) and lower wealth index (for those in the middle, lower and lowest wealth index). Using this categorization those in the upper wealth index category had a value of 1 (high) while those in the lower wealth category had a value of 0 (low) which on average gave the cluster level percentage of women in the upper wealth index. Similar computations were made for other similar variables such as level of education (divided into no formal education versus others) and ideal number of children (≤4 children and >4). The aggregate variable for number of births was the mean number of births in the woman's cluster of residence derived by averaging the total number of children ever born to women in each cluster.

2.3. Analysis

Analysis was done using STATA 10 statistical software (STATA Corporation, College Station, TX, USA).

Descriptive statistics such as means and standard deviations, frequencies and proportions were used depending on the variable type. Associations between contraceptive use and categorical independent variables were tested using Chi square tests. Variables significant at 10% level on chi square tests was entered into the multiple logistic regression model.

Similar to Pokorny et al (2003) analysis at the community level using only community level variables was also done with initial correlations between community level prevalence of modern contraceptive with the community level proportions of other derived variables [14]. Multiple linear regressions were used to identify the community level variables independently associated to show the risk factors affecting the community contraceptive prevalence. Regression coefficients and their 95% confidence intervals were reported.

Based on the hierarchical structure of the data (women nested in communities) and the binary outcome, a multilevel logistic modelling approach was adopted [11]. The model is specified as

$$\text{LogitP}\,(Yij) = \beta_1 + \beta_2 x_{2j} + \beta_3 x_{3ij} + C_j \qquad (1)$$

Where P (Y_{ij}) represents the log odds of women (i) in communities (j) using a modern method,

x_{2j} represents the Community factors, x_{3ij} represents the individual-level covariates and C_j represents the random effect.

The two level logistic model analyses was carried out using the GLLAMM module in STATA which is used for fitting generalized linear models with the adaptive quadrature option for improving estimates.

The analysis was done in four stages. In Model 1 (empty model), no explanatory variable was included, this model specifies the total variance in modern contraceptive use among clusters. In model 2, only individual-level factors were included while community level factors were included in Model 3. The final model included both individual and community-level factors.

Odds ratios (ORs) with 95% confidence intervals (CIs) were reported including estimates of the intercept variance and intra-class correlation (ICC) which measures the extent to which individuals within the same group are more similar to each other than they are to individuals in different groups. The ICC was calculated using the formula:

$$\text{ICC} = \frac{t}{t+\frac{\pi^2}{3}} \qquad (2)$$

Where t is the estimated variance and π =3.142 [15]

3. Result

Table 1. *Frequency distribution of socio demographic variables.*

Variables	Frequency	Percentage
Age		
15-19	1950	8.3
20-24	3619	15.4
25-29	5083	21.6
30-34	4071	17.3
35-39	3542	15.1
40-44	2720	11.6
45-49	2494	10.6
Educational Level		
No education	12229	52.1
Primary	4986	21.2
Secondary	4813	20.5
Tertiary	1451	6.2
Living Children		
0	2336	9.9
1-2	7232	30.8
3-4	7106	30.3
5 and above	6805	29.0
Family Structure		
Monogamous	15226	64.8
Polygamous	8115	34.6
Missing	138	0.6
Religion		
Catholic	1975	8.5
Other Christian	7556	32.4
Muslim	13317	57.1
Traditional	454	1.9
Others	32	0.1
Place of residence		
Rural	17049	72.6
Urban	6430	27.4
Geo political region		
North central	4404	18.8
North east	5123	21.8
North west	6584	28.0
South east	1874	8.0
South south	2362	10.1
South west	3132	13.3
Occupation		
Not working	7137	30.6
Professional/technical	886	3.8

Variables	Frequency	Percentage
Clerical	168	0.7
Sales and service	8241	35.3
Skilled manual	2207	9.4
Unskilled manual	36	0.2
Agricultural	4681	20.0
Wealth Index		
Lowest	6259	26.7
Second	5385	22.9
Middle	4402	18.7
Forth	3863	16.5
Highest	3570	15.2
Currently Working		
Yes	15342	65.8
No	7983	34.0
Missing	154	1.2
Desire for more children		
Yes	15665	67.2
No	5158	22.1
Don't know	2505	10.7

Table 2. *Frequency distribution of family planning and husband related variables.*

Variables	Frequency	Percentage
Decision maker for family planning		
Mainly wife	459	17.6
Mainly husband	472	18.1
Jointly	1670	64.2
Contraceptive method		
Knows modern method	14834	63.2
Knows only folk or traditional method	347	1.5
Knows no method	8298	35.3
Uses modern method		
Yes	1980	8.4
No	21499	91.6
Partner approves of family planning		
No	194	0.8
Yes	1530	6.5
Doesn't know	43	0.2
Missing	21712	92.5
Exposure to family planning messages		
Yes	8936	38.1
No	1734	7.8
Missing	12809	54.6
Husband desire for children		
Fewer children	629	2.7
Same as wife	7590	32.6
More children	7337	31.5
Don't know	7719	33.2
Husband level of education		
No education	9929	42.9
Primary	4774	20.6
Secondary	5686	24.6
Tertiary	2757	11.9
Partner residency status		
Currently lives at home	21088	90.6
Lives elsewhere	2191	9.4
Exposed to fpmsgs: Electronic media		
Yes	8074	33.4
No	15405	65.5
Exposed to fpmsgs: Paper		
Yes	1456	6.2
No	21959	93.8
Exposed to fpmsgs: Health workers		
Yes	2508	10.7
No	20971	89.3
Exposed to fpmsgs: No of media exposed to		
One or less	20748	88.6
More than one	2267	11.4

Table 3. *Means and ranges of communities level characteristics showing regional variation.*

Variable	North west		North east		North central	
	MEAN (SD)	RANGE	MEAN (SD)	RANGE	MEAN (SD)	RANGE
Mean no. of birth	4.33 (0.69)	2.23-7.08	4.48 (0.75)	2.32-6.58	3.90 (0.74)	1.64-6.39
%of women that received family planning messages	0.84 (0.20)	0.0-1.0	0.56 (0.31)	0.0-1.0	0.69 (0.29)	0.0-1.0
% of women in the upper wealth index	0.15 (0.27)	0.0-1.0	0.11 (0.23)	0.0-1.0	0.32 (0.38)	0.0-1.0
% of women with at least primary school education	0.18 (0.23)	0.0-1.0	0.25 (0.24)	0.0-1.0	0.55 (0.33)	0.0-1.0
% of women with an ideal size of≤ 4 children	0.11 (0.15)	0.0-0.76	0.11 (0.07)	0.0-0.44	0.22 (0.19)	0.0-1.0

	South west		South east		South south	
	MEAN (SD)	RANGE	MEAN (SD)	RANGE	MEAN (SD)	RANGE
Mean no. of birth	3.42 (0.72)	2.14-6.25	4.12 (0.95)	2.23-7.0	4.13 (0.98)	1.5-7.71
%of women that received family planning messages	0.96 (0.06)	0.68-1.0	0.89 (0.13)	0.4-1.0	0.9-0.15	0.22-1.0
% of women in the upper wealth index	0.68 (0.39)	0.0-1.0	0.54 (0.36)	0.0-1.0	0.55 (0.36)	0.0-1.0
% of women with at least primary school education	0.83 (0.22)	0.28-1.0	0.87 (0.19)	0.25-1.0	0.89 (0.11)	0.43-1.0
% of women with an ideal size of≤ 4 children	0.47 (0.21)	0.0-0.91	0.22 (0.17)	0.0-0.75	0.26 (0.16)	0.0-0.71

Table 4. *Linear regression of average community contraceptive use on selected community level variables.*

Variables	Correlation coefficient	P value	B coefficient	P value	95%confidence interval
Mean no. of birth	-0.326	<0.001	0.001	0.881	-0.007-0.009
%of women that received family planning messages	0.261	<0.001	0.011	0.411	-0.015-0.037
% of women in the upper wealth index	0.567	<0.001	0.055	<0.001	0.033-0.077
% of women with at least primary school education	0.576	<0.001	0.09	<0.001	0.067-0.112
% of women with an ideal size of≤ 4 children	0.574	<0.001	0.176	<0.001	0.135-0.216

Table 5. *Multilevel logistic regression identifying factors associated with modern contraceptive use by married women.*

	Model 1	Model 2	Model 3	Model 4
INDIVIDUAL				
REGION				
South east	Na	1.26 (0.82-1.59)	Na	0.99
South west	Na	2.68*** (1.86-3.22)	Na	1.74**
South south	Na	2.035*** (1.33-2.46)	Na	1.56
North central	Na	2.823*** (1.93-3.42)	Na	2.27***
North east	Na	1.542* (1.05-1.99)	Na	1.61*
North west (ref)				
NO OF LIVING CHILDREN				
0				
1-2	Na	0.057*** (0.03-0.12)	na	0.05***
3-4	Na	0.472*** (0.41-0.63)	na	0.45***
≥5 (ref)	Na	0.779** (0.69-0.96)	na	0.76**
EDUCATION				
No education	Na	0.539*** (0.41-0.64)	na	0.59***
Primary	Na	0.849 (0.73-1.02)	na	0.87
Sec or higher (ref)				
AGE				
15-19	Na	1.857* (0.96-2.91)	na	1.94*
20-29	Na	1.980*** (1.50-2.30)	na	2.02***
30-39	Na	1.725*** (1.37-1.94)	na	1.73***
≥40 (ref)				
LOCATION				
Urban	Na	1.178 (0.96-1.28)	Na	1.06
Rural (ref)				
RESPONDENT OCCUPATION				
Not working	Na	4.115 (0.56-38.22)	na	3.99
Professional/technical	Na	3.484 (0.44-27.64)	na	3.33

	Model 1	Model 2	Model 3	Model 4
Clerical	Na	2.851 (0.36-24.65)	na	2.74
Sales/service	Na	2.904 (0.37-23.27)	na	2.77
Agricultural	Na	2.360 (0.31-19.77)	na	2.30
Skilled	Na	2.668 (0.34-21.43)	na	2.58
Unskilled (ref)				
HUSBAND DESIRE FOR CHILDREN				
Both want same				
Husband wants more	Na	1.567*** (1.33-1.84)	na	1.55***
Husband wants fewer	Na	1.374** (1.13-1.66)	na	1.37**
Don't know (ref)	Na	1.847*** (1.38-2.47)	na	1.81***
RELIGION				
Catholic	Na	1.098 (0.50-2.37)	Na	1.02
Christian	Na	1.207 (0.56-2.56)	na	1.12
Muslim	Na	0.858 (0.41-1.90)	na	0.87
Others (ref)				
HUSBANDEDUCATION				
No education				
Primary	Na	1.040 (0.79-1.30)	na	1.07
Sec or higher (ref)	Na	0.997 (0.84-1.17)	na	1.00
DESIRE FOR MORE CHILDREN				
No				
Yes	Na	1.740*** (1.36-2.26)	na	1.67***
Don't know (ref)	Na	0.996 (0.78-1.28)	na	0.99
WEALTH INDEX				
Lowest	Na	0.388*** (0.26-0.55)	na	0.47***
Second	Na	0.533*** (0.40-0.69)	na	0.64*
Middle	Na	0.701** (0.56-0.86)	na	0.81
Forth	Na	0.812* (0.69-0.95)	na	0.88
Highest (ref)				
FAMILY PLANNING SERVICE RECEIVED				
No				
Yes (ref)	Na	0.551*** (0.43-0.69)	Na	0.57***
HUSBAND RESIDENCY STATUS				
Lives with wife				
Stay elsewhere (ref)	Na	0.964 (0.84-1.22)	Na	0.96
FAMILY STRUCTURE				
Monogamous	Na	1.223* (1.04-1.45)	Na	1.18
Polygamous (ref)				
CURRENT WORK STATUS				
No				
Yes (ref)	Na	0.589* (0.35-0.87)	Na	0.586*
COMMUNITY				
Mean no of birth	Na	Na	1.08 (0.98-1.20)	0.91
% of women who received family planning services	Na	Na	1.09 (0.77-1.54)	1.26
% of women in the upper wealth index	Na	Na	1.55*** (1.20-2.0)	0.969
% of women with at least primary education	Na	Na	9.68*** (7.17-13.07)	1.67*
% of women with an ideal family size of ≤4 children	Na	Na	5.25*** (3.29-8.37)	2.02**
RANDOM EFFECTS				
Estimate intercept variance (standard error)	1.878 (0.152)	0.299 (0.060)	0.41 (0.06)	0.27 (0.06)
Intraclass correlation	0.363	0.083	0.11	0.078

Na-not applicable
*=<0.05s
**=<0.01
***=<0.001
Model 1-null model
Model 2-individual only model
Model 3-community only model
Model 4-individual and community model

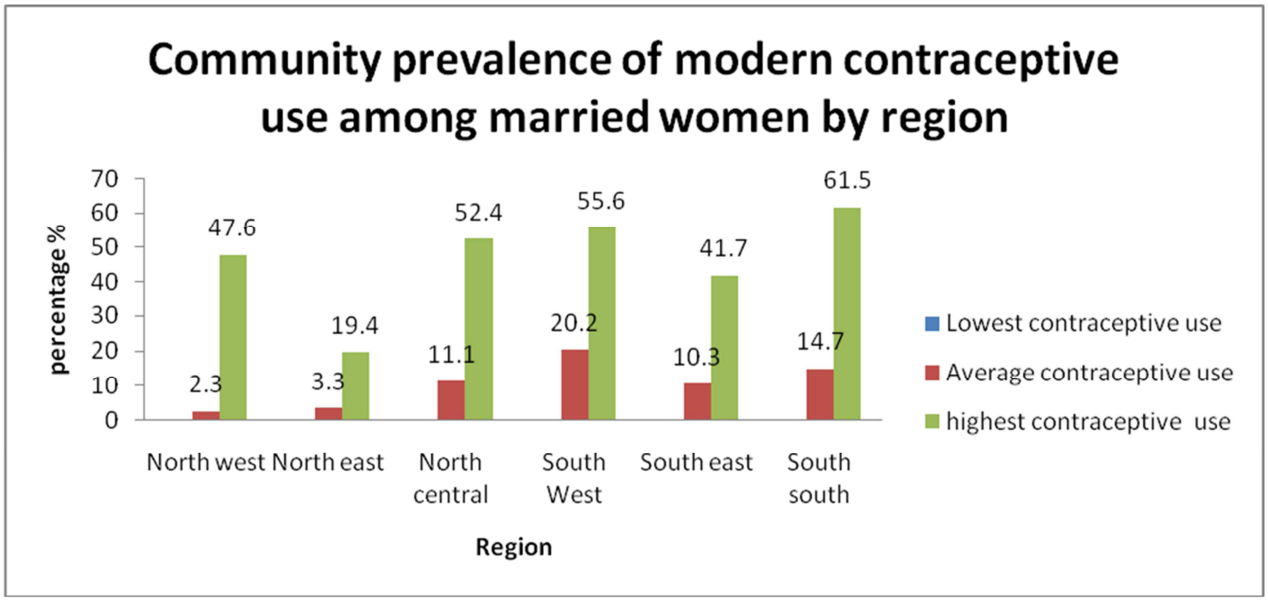

Figure 1. *Community prevalence of modern contraceptive use among married women by regions.*

3.1. Selected Characteristics of Married Women

Table 1 and 2 below shows some selected characteristic of married women in the study. The mean age of married women was 31.2 years (SD 8.8). There were more subjects between ages 25-29 (21.6%) with only 8.3% between ages 15-19 years. More than half of the women (52.2%) had no education with only 6.2% with tertiary education. About one third (30.8%) had between 1-2 children and 9.9% had no children. Majority of the women were in monogamous unions (64.8%). A larger proportion of the women (72.6%) were rural dwellers and were Muslims (57.1%). Almost half of the women were in the low wealth quantile (49.6%) with (35.3%) engaged in petty trading while 30% were not working. Many of them (63.2%) knew a modern contraceptive method but usage was very low (8.4%). The most effective means of exposure to family planning messages was electronic media (33.4%) and only 11.4% of the respondents have been exposed to more than one media.

3.2. Regional Variation in Community Level Characteristics of Married Women in Nigeria

With regards to the community level characteristics of married women across regions, table 3 shows that respondents in the southwest communities had the least mean number of birth 3.42 (0.72) ranging from 2 to about 6 children, with only a proportion of 0.2 (0.17) communities with an ideal family size of ≤4 children. More thanhalf of the communities in each region received family planning messages though thenortheast communities had the least proportion of women who were exposed to family planning messages 0.56 (0.31). The south west community had the highest proportion of women in the upper wealth index 0.68 (0.39). An average of only 0.18 (0.23) proportion of communities in the north west had at least primary school education though on an average a proportion of 0.48 of the Nigeria communities has at least primary school education. The south west communities also had the highest proportion of women with an ideal family size of ≤4 children.

3.3. Regional Differences in Prevalence of Modern Contraceptive Use Among Married Women in Nigeria Communities

Regarding the prevalence of modern contraceptive use among married women in Nigerian communities, the result from figure one shows that among communities in the northwest, the lowest prevalence ofmodern contraceptive was 0% which wasseen in about 65% of the communities in that region while the highest prevalence was 47.6%. On an average, the prevalence of modern contraceptive use in the northwest was 2.3%. In the northeast region the lowest prevalence was 0%which was seen in about 50% of the north east communities while the highest prevalence was 19.4%. On an average contraceptive use across the northeast communities was 3.3%. In the north central, about 36% of the communities did not use modern contraceptive. On an average, the prevalence of contraceptive use was 11.1% and the highest prevalence of contraceptive use in the north central was 52.4%. The highest prevalence of contraceptive use in the south west communities was 55.6%. On an average the prevalence was 20.0% and only about 11.3% of the communities in the southwest did not use modern contraceptives. The highest prevalence of contraceptive use seen across communities in the southeast was 41.7% with an average use of 10.3%. About 28% of the communities did not use modern contraceptive at all. About 11% of the south-south communities did not use modern contraceptive. The communities had an average of 14.7% and the highest prevalence of modern contraceptive use in the south-south

region was 61.5%.

3.4. Linear Regression of Average Community Contraceptive Use on Selected Community Level Variables

Regression coefficients and their confidence intervals from multiple linear regression of community contraceptive prevalence on community aggregate variables are shown in Table 4. The R^2 was 0.45. Concerning wealth index, for every unit increase in the proportion of those within the upper wealth index, the community contraceptive prevalence increases by 6%. With a unit increase in the proportion of women with at least primary school education, the community contraceptive prevalenceincreases by 9%. This is statistically significant at (95%CI=0.07-0.11). There is a statistically significant association (0.14-0.22) between contraceptive prevalence and ideal number of children. As the percentage of women with an ideal number of ≤4 children increases by a unit, the community contraceptive prevalence also increases by 20%.

3.5. Multilevel Logistic Regression Identifying Factors on Multiple Levels Associated With Use of Modern Contraceptives by Married Women

Model 1 reveals that a normally distributed random intercept of contraceptive use given that no predictor was included has a variance of 1.88. The dependency of modern contraceptive usage among women in the same cluster was 36%.

In model 2, the inclusion of individual level variable reduced the random intercept variance to 0.30 which indicates that although some of the between cluster differences are attributed to individual characteristics, unexplained variation between clusters remain. After individual level variable was controlled, respondent living in the southwest were about 2.7 times more likely to use modern contraceptive than respondent the northwest. Married women with no children are 17 times less likely and those with 1-2 children are about half time as likely to use modern contraceptiveas those with 5 children or more respectively. The odd of using modern contraceptive is about half time more likely among those without education when compared with those with secondary or higher education. Married women aged between 20-29 years are 1.9 times more likely to use modern contraceptive than those aged 40 and above. The odds of using modern contraceptive is aboutone third time more likely among those within the lowest wealth quantile when compared to respondents within the highest wealth index. Respondent who did not receive family planning messages are half time more likely to use modern contraceptive when compared with those receive family planning messages. Monogamous respondents are 1.2 times more likely to use modern contraceptives than polygamous respondent. Those that are not currently working are about half time more likely to use modern contraceptive than those that are currently working. Model 3 shows that after adding the community level variable to the null model, the variance of random intercept reduced from 1.88 to 0.41 which accounted for some of the differences between clusters. After adjusting for community variables, residing in a community with a higher proportion of women with at least primary school education was associated with higher odds of modern contraceptive use. Communities with a higher proportion of women in the upper wealth index are about 2 times more likely to use modern contraceptive than those in the lower wealth index. Women in the community with an ideal family size of four or less children are about 5 times more likely to use modern contraceptive than those with more than four children. After accounting for individual and community level variables, the variance of random intercept reduced to 0.27 which shows heterogeneity across cluster and that there are some unobserved community and individual characteristics associated with the use of modern contraceptive in married women. After adding all the variables, association between contraceptive use and individual variable remained similar apart from family structure which lost its statistical significance. However, the community level variable percentage of women with an ideal family size of≤ 4 children and percentage of women with at least primary education were significant.

4. Discussion

This study assessed the predictors of modern contraceptive use among married women of reproductive age group in Nigeria with a particular focus on the extent to which community level characteristics affect contraceptive use. The study has shown that modern contraceptive use is explained by both individual and community characteristics. The estimates obtained from the analysis show that contraceptive use is determined by the observed individual demographic, socioeconomic and family planning related characteristics of the women and by community-level covariates. Also some variability in family planning is explained by unobserved community-level effects.

From this study, it was discovered that every region has communities that do not use modern contraceptive at all and this might have an implication on the fertility rate in this regions. It is disheartening that in the northern region, there are many communities that do not use modern contraceptive at all. For example as high as two thirds of the communities in the northwest, halfof the communities in the northeast and about a thirdin the north central region have a prevalence of zero, despite the high percentage of women reporting exposure tofamily planning messages in these regions. The reverse is the case in the southern region with less than a third in the three zones. This pattern suggests that other important factors influence the use of contraceptive. Possible contributing factors may include culture and very few people with at least primary school education 18%, 25%, 55% in the northwest, northeast and north central respectively.

On the average, contraceptive use in all the geopolitical

zones is very low, with the highest prevalence seen in the south west (20.2%). This implies that knowledge about contraceptive does not necessarily transmit to its use. This might be explained by lack of access to family planning services, cost of contraceptives, fear of side effects and societal reaction. Some public health models have shown that knowledge does not always directly translate into practice change. Firstly because change is in stages (transtheoretical model) [16] which is also known as stages of change model which outlines the stages of an individual readiness to change or attempt to change towards healthy behaviors. This is because behavior change is viewed as a process and not an event, with individuals at various levels of motivation or readiness to change. Secondly, because some social gaps may need to be bridged for example access to family planning.

In this study, about 63.2% of married women knows about a modern method and only about 9% use a modern method which is in line with what was reported by Oyedokun et al in their study on determinant of contraceptive use in Osun state, where a larger percentage of the people knew about modern contraceptive but only 7.3% use modern contraceptive [5]. Of all the modern methods, the injectable was mostly used by married women.

The multiple linear regression showed that community prevalence of contraceptive was independently associated with all the community level factors studied. It has been shown that some community level factors are significantly associated with contraceptive use in the community only model. Community educational attainment, community economic status and community ideal number of children were showed to be significant predictors of contraceptive use. The significance of community educational attainment in Nigeria highlights the effect of education on modern contraceptive use beyond the individual level. Most interestingly, even married women with lower education (at least primary school) appear to benefit from the education of other women in the community, providing evidence of positive externality (spillover effect) of community-level women education in shaping contraceptive use. The significance of community wealth index in Nigeria also reflects a relationship between economic development and modern contraceptive use. This might be due to the fact that rich communities could attract some benefits. As would be expected, and has been found in a previous study [11], this study also observed a positive association between community ideal number of children and use of modern contraception. Communities with ideal family size of less than four children are more likely to use modern contraceptive than those with family size of more than four children.

Some of the effects of the other community-level variables are difficult to understand. For instance, in this study contraceptive use within a community is not significantly associated with mean number of children. It is an unexpected result and this finding is not consistent with other research [11]. The weakness of the relationship between community mean number of children and contraceptive use is probably due to the fact that the understanding of women about the use of modern contraceptive is limited to child spacing only and not limiting number of children to be born in many communities.

Among the community level variables only community ideal number of children and community educational attainment remained significant even after controlling for individual and community level variable. The individual level characteristics still remained predictors of modern contraceptive use even after controlling for community level factors.

This study found a significant variation in use of modern contraceptive between clusters even after controlling for individual and community factors. Thisfinding implies that there are unmeasured or immeasurable factors other than those included in the analysis responsible for the clustering of contraceptive use in some communities. In general, unobserved effects reflect a diversity of factors that can be broadly classified as demographic, socioeconomic, cultural, psychological, behavioral, and environmental, occurring at individual and community levels [17]. However, the change in random intercept in the community only model suggests that community factors did contribute to the variance between clusters. This large amount of variabilityexplained by the community level variables could also be attributable to some unknown or not-directly measurable characteristics whose effects are negligible if considered individually. Given a low contraceptive prevalence in Nigeria, it could be implied that the small number of women using modern contraceptive may not yet be sufficient to influence the rest even though the individual only model explained more of the variation [11].

The multilevel model indicated clustering at the community level with the ICC of 36% meaning that 36% similarity in contraceptive use within communities can be attributable to differences between clusters indicating a high intraclass correlation [15]. The 36% of variability identified in this work seems to be higher than 28% reported by Viswanathan et alin their work on contraceptive determinants [18]. Considering this, the high value of the ICC indicates the great importance of communities, per se, in predicting contraceptive use in the Nigerian context.

5. Conclusion

These findings provides a better understanding of the complex determinants of contraceptive use in Nigeria and also provides evidence that information about communities is crucial in understanding the variability in contraceptive use among geopolitical zones. The strength of the study is that it is a national representative data and the large number of clusters used helped with the precision. However, these findingsuggest that the challenge to increasing contraceptive use goes beyond addressing individual factors, and requires a better understanding of contextual factors. It is also worthwhile to emphasize the conveyance of specific messages to those communities in which the mean prevalence are significantly lower than in other communities.

It is necessary to find out the reasons why they contribute less. One of the limitations of this study is the lack of adequate measurement of community-level data (such as distance and travel time to a health facility) which has probably reduced the predictingpower of the model and hence contributed to the weakness of the community-level effects on contraceptive use observed in certain communities.

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