

The influence of socioeconomic status on women's preferences for modern contraceptive providers in Nigeria: a multilevel choice modeling

Olatunde Aremu

School of Health, Sport, and
Bioscience, Health Studies Field,
University of East London, London,
United Kingdom

→ Video abstract



Point your SmartPhone at the code above. If you have a
QR code reader the video abstract will appear. Or use:
<http://dx.doi.org/10.2147/PPA.S51852>

Correspondence: Olatunde Aremu
University of East London, Romford Road,
Stratford, London, E15 4LZ,
United Kingdom
Tel +44 77 6267 4797
Fax +44 20 8223 4965
Email olatunde.aremu@yahoo.com;
o.aremu@uel.ac.uk

Background: Contraceptives are one of the most cost effective public health interventions. An understanding of the factors influencing users' preferences for contraceptive sources, in addition to their preferred methods of contraception, is an important factor in increasing contraceptive uptake. This study investigates the effect of women's contextual and individual socioeconomic positions on their preference for contraceptive sources among current users in Nigeria.

Methods: A multilevel modeling analysis was conducted using the most recent 2008 Nigerian Demographic and Health Surveys data of women aged between 15 and 49 years old. The analysis included 1,834 ever married women from 888 communities across the 36 states of the federation, including the Federal Capital Territory of Abuja. Three outcome variables, private, public, and informal provisions of contraceptive sources, were considered in the modeling.

Results: There was variability in women's preferences for providers across communities. The result shows that change in variance accounted for about 31% and 19% in the odds of women's preferences for both private and public providers across communities. Younger age and being from the richest households are strongly associated with preference for both private and public providers. Living in rural areas and economically deprived neighborhoods were the community level determinants of women's preferences.

Conclusion: This study documents the independent association of contextual socioeconomic characteristics and individual level socioeconomic factors with women's preferences for contraceptive commodity providers in Nigeria. Initiatives that seek to improve modern contraceptive uptake should jointly consider users' preferences for sources of these commodities in addition to their preference for contraceptive type.

Keywords: abortion, contraceptive, multilevel choice, Nigeria, preference, socioeconomic disadvantaged

Introduction

Modern contraceptives have been proven to be both cost effective¹ and effective by allowing sexually active women to delay motherhood, prevent unintended pregnancies, and avert untimely deaths due to unsafe abortions.^{2,3} Despite the benefits of modern contraceptives and decades of awareness, socioeconomic disparities in modern contraceptive uptake in developing countries remains a major health policy challenge.⁴ It is estimated that about 250 million women in the developing regions of the world are still without any form of contraception,^{5,6} and are therefore at risk of unintended pregnancies.⁷ Recent years have seen a surge in the supply of, and demand for modern contraceptives among countries in sub-Saharan Africa (SSA) and South East Asia. This scenario is attributed, in part, to an increased awareness



of individuals' preferences for small families,⁸ and women's empowerment initiatives.^{9–11} Yet, disparities in access to and utilization of modern contraceptives persist between poor and wealthy households in these countries.⁴

The promotion of contraceptives in countries with high fertility rates such as Nigeria has the ability to reduce poverty and hunger.¹² According to one study,¹³ Nigeria has a contraceptive prevalence rate less than 15%. Low contraceptive prevalence rate is a precursor of high maternal and child mortality and morbidity in most low and middle income nations. It is therefore not surprising that the country ranked highly on the two indices when compared with other nations. It is well documented that individual level attributes such as household wealth,^{14–16} religion,¹⁷ social caste,¹⁸ as well as distance¹⁹ to and availability of contraceptives at local health centers, have an impact on contraceptive uptake. Equally well established is the influence of contextual level factors such as social capital^{20,21} and community normative attributes on contraceptive provisions.^{21–24}

However, the role of neighborhood socioeconomic development in hindering or shaping contraceptive provision and access has been less explored. Evidence has, however, shown that the dynamics of modern contraceptive uptake is complex, and to a large extent is influenced by a myriad of factors which operate at more than one level.^{21,25–27} The level of socioeconomic development within a neighborhood is an important determinant of access to health care and may sometimes explain key disparities in uptake of preventive care. In the context of contraceptives in Nigeria, little systemic evidence exists on the relationship between users' contextual socioeconomic characteristics and their preferences for contraceptive providers. On this basis, this research has been conducted to fill the gap in knowledge from a multilevel modeling perspective.³⁴ Multilevel modeling techniques have been used to examine contraceptive use dynamics in several countries.^{27,28} However, its application in furthering the understanding of contraceptive provision in SSA and Nigeria is lacking. The advent of multilevel modeling, as a technique for examining the effect of community level factors, allows the analysis of clustered data and the proper estimation of standard errors which varied between neighborhoods, and important for policy purposes. Therefore, the goal of this study is to examine the effects of both individual and contextual socioeconomic characteristics on current users' preferences for modern contraceptive providers in Nigeria using a multilevel analytic framework.

Materials and methods

Data analyzed in this study were sourced from the 2008 Nigerian Demographic and Health Survey (NDHS).²⁹ The NDHS was conducted by the Nigerian National Population Commission with technical assistance from ICF Macro International Inc; the United States Agency for International Development provided the financial assistance for the surveys. The survey employed a multistage sampling design in selecting a randomly stratified sample of clusters, otherwise known as enumeration areas (EAs). From each EA, which sometimes served as proxies for neighborhoods, a random sample of women aged 15–49 years and men aged 15–59 years were selected and interviewed separately. A standard questionnaire was then administered to obtain information on demographic and health characteristics from the respondents using face to face interviews. The full details of the data collection procedure and design used in NDHS surveys is published elsewhere.²⁹ This study is based on 1,834 women of reproductive age from 888 communities who participated in the 2008 NDHS.

Ethical considerations

The survey instrument used in the data collection for the NDHS was duly approved by the National Ethics Committee in the Federal Ministry of Health, Abuja, Nigeria and the institutional review board of ICF Macro Inc in Calverton, USA. Permission to use the survey data for this analysis was obtained from the ICF Macro Inc.

Study variables

Dependent variables

Three dependent variables of women's preferences for providers of modern contraceptives were considered. The sources of modern contraceptives were classified into: (1) government hospital which comprised any health care facility maintained by government at local, state, and national levels; (2) private, which comprised private clinics and hospitals owned by an individual, nongovernment or religious organization, pharmacy stores, patient medicine sellers, and hawkers; and (3) sourcing of contraceptives from friends, family, and others which was categorized as informal contraceptive provision. Contraceptives in this study referred to modern contraceptives in any form such as barriers, tablets, implants, and injectables.

Independent variables

These are various women's and household level characteristics, and are described in Table 1.

Table 1 Definitions and measures of individual and area level explanatory variables used in the study

Variables	Measures
Woman's age (years)	Categorized as 15–24, 25–34, >35 years
Woman's education	Categorized as none, primary, and secondary and higher
Woman's occupation	Categorized as not working and working
Partner's education	Categorized as no education, primary, and secondary and higher
Partner's occupation	Grouped as not working and working
Household wealth index	Household wealth index was constructed based on ownership of durable items such as radio set, refrigerator, television, motor car, and quality of dwelling such as floor type or roof type using principal component analysis. This resulting index was then categorized into five quintiles: poorest, poorer, middle, rich, and richest
Place of residence	Rural or urban
Area economic disadvantage index	Constructed using principal component analysis based on: <ol style="list-style-type: none"> 1. Proportion of respondents living in rural areas 2. Proportion of the respondents who were unemployed 3. Proportion of the respondents living below the poverty level (below 20% quintile) 4. Proportion of the respondents who were uneducated This resulting index was then grouped as either low and high level of neighborhood socioeconomic disadvantage

Community level explanatory variables

Communities were categorized basically through grouping of clusters, otherwise known as EAs, and were used as proxies for neighborhoods. The neighborhood socioeconomic disadvantage index was developed using principal component analysis.^{30,31} This comprised of four variables as follows: (1) proportion of respondents living in rural areas; (2) proportion of respondents who were unemployed; (3) proportion of respondents living below the poverty level (below 20% quintile); and (4) proportion of respondents with no formal education.

The scores generated from the continuous neighborhood socioeconomic disadvantage index have a mean value of 0 and standard deviation of 1 and were used to classify neighborhoods into two categories: most disadvantaged and least disadvantaged. If the scores are higher this implies lower socioeconomic disadvantaged neighborhoods, while lower scores indicate the least disadvantaged neighborhoods, or those with a higher socioeconomic position.

Statistical analysis

Individual preferences are behavioral attributes which are sometimes linked to utility or perceived benefits to be derived

from any goods or services. In this study, the multilevel choice modeling technique^{32–34} was considered to be the most suitable method of analysis. As a result, individual women's preferences for modern contraceptive providers were modeled as a function of their individual and contextual socioeconomic characteristics. One of the outcomes categories (informal) was chosen as the reference category. Then, a set of $t-1$ logistic regressions was estimated for the two remaining choices of providers. These were subsequently contrasted one after the other and against informal category. A two level multilevel choice regression model using the logit link function was then specified as shown in Figure 1. Based on Figure 1, a set of intercepts denoted by subscript "S", one each for all the three options, was estimated. Values of S can range from 1 to $t-1$. The π_{ij} in the equation is the probability of either choosing informal sourcing of contraceptives (from friends and family) or procuring them from a private provider i , for a current user j . Meanwhile, $\beta_{0j}^{(s)}$ is a parameter associated with the fixed part of the model. For clarity, the fixed part of the equation is interpreted as the effect of a 1-unit increase in a set of determinant variables (X) on the probability of choosing category s (any other categories) compared to the reference category t . There is, however, a likelihood that individual users within the same household are more alike to one another in their choice of provider than they are to other users from different households. Thus, intracluster correlation and median odds ratio (MOR) were used as a measure of random effects to capture variations among users in the communities.³⁵

Multilevel logistic choice regression modeling

The measures of association (fixed effects), ie, the likelihood of choosing a particular provider based on a set of the included explanatory variables, were reported as odds ratios (ORs) at their 95% confidence intervals (95% CIs). The measure of variation (random effects) was expressed as variance along with the standard errors, the intracluster correlation, and MOR. The MOR captures the unexplained heterogeneity due to clustering. The statistical significance of the explanatory variables was estimated using Wald statistics, with all results at 5% alpha level considered significant. All statistical analyses were conducted in MLwiN 2.25 software (Multilevel Modeling Centre, Bristol University, UK).

$$\text{Log} \left(\frac{\pi_{ij}^{(s)}}{\pi_{ij}^{(t)}} \right) = \beta_{0j}^{(s)} + \beta_{1j}^{(s)} X_{1ij} + \beta_{2j}^{(s)} X_{2ij} \quad (1)$$

Figure 1 Equation representing the two level multilevel choice regression model.

Results

Descriptive statistics

Of the 1,834 women whose data were analyzed in this study and who utilized modern contraceptives, 36.5% sourced their contraceptives from public facilities; most (55.3%) patronized private providers for their contraceptives and the remaining 8.2% obtained theirs through informal provision. As depicted in Table 2, among the 1,834 eligible women included in this study, the majority (54%) were aged between 25 and 34 years. More than two thirds (66%) of these women had formal education and were gainfully employed (70%). Around 45% were from economically disadvantaged neighborhoods.

Multilevel regression choice models

Random effect model

(measure of variation)

As shown in Table 3, the results of the random effect model shows that there was significant variation in the odds of women's

Table 2 Sociodemographic and economic profiles of women by choice of family planning providers according to Nigerian Demographic and Health Survey 2008²⁹

Variables	Total N (%)	Informal N (%)	Private N (%)	Public N (%)
Age (years)				
15–24	280 (15.3)	38 (25.5)	166 (16.4)	76 (11.3)
25–34	985 (53.7)	83 (55.7)	571 (56.3)	331 (49.3)
>35	569 (31.0)	28 (18.8)	277 (27.3)	264 (39.4)
Women's education				
No education	208 (11.3)	17 (11.4)	77 (7.6)	114 (17.0)
Primary	514 (28.3)	45 (30.2)	286 (28.2)	183 (27.3)
Secondary/higher	1,112 (60.4)	87 (58.4)	651 (64.2)	274 (55.7)
Partner's education				
No education	168 (9.2)	9 (6.0)	77 (7.6)	82 (12.2)
Primary	422 (23.0)	34 (24.8)	225 (22.2)	160 (23.9)
Secondary/higher	1,244 (67.8)	103 (69.2)	712 (70.2)	429 (63.9)
Woman's occupation				
Not working	545 (29.7)	45 (30.2)	289 (28.5)	211 (31.5)
Working	1,289 (70.3)	104 (69.8)	725 (71.5)	460 (68.5)
Partner's occupation				
Not working	334 (18.2)	25 (16.8)	173 (17.1)	136 (20.3)
Working	1,500 (81.8)	124 (83.2)	841 (82.9)	535 (79.7)
Place of residence				
Rural	908 (49.5)	94 (63.1)	459 (45.3)	355 (52.9)
Urban	926 (50.5)	55 (36.9)	555 (54.7)	316 (47.1)
Wealth index				
Poor	122 (6.7)	14 (9.4)	58 (5.7)	50 (7.5)
Poorer	190 (10.4)	19 (12.8)	78 (7.7)	93 (13.9)
Middle	307 (16.7)	31 (20.8)	154 (15.2)	122 (18.2)
Richer	480 (26.2)	34 (22.8)	277 (27.3)	169 (25.2)
Richest	734 (40.0)	51 (34.2)	447 (44.1)	237 (35.2)
Area economic disadvantage				
High	832 (45.4)	69 (46.3)	420 (41.4)	343 (51.1)
Low	1,002 (54.6)	80 (53.7)	494 (58.6)	328 (48.9)

Table 3 Results of the measure of association (random intercept model)

Random effect	Private (informal)	Public (informal)
Community level variance (SE)	1.505 (0.249)***	0.758 (0.290)***
ICC (%)	31.4	18.7
MOR	3.20	2.28

Note: *** $P < 0.0001$.

Abbreviations: ICC, intraclass correlation; MOR, median odd ratio; SE, standard error.

preferences for private contraceptive providers across the communities ($r=1.505$; $P<0.0001$). The intracommunity correlation coefficient, adjusted by the estimated intercept variance, shows that the 31% variability in the log likelihoods of women's preferences for private providers could be attributed to unobserved characteristics at the community level. The estimated MOR (3.20) implied the existence of high heterogeneity in the odds of patronizing private providers, compared to informal provision among women across the community. The observed heterogeneity may be attributed to geographical differences, which tend to mimic community variation. Similarly, the result shows that there was 19% variability in the log likelihood of women using public providers when compared to informal contraceptive provisions. The observed variability was statistically significant across the communities ($r=0.758$; $P<0.0001$) with high heterogeneity MOR (2.28).

Fixed effect model (measure of variation)

Private and informal provision

As reported in Table 4, women with secondary or higher education (OR 1.64; 95% CI 1.22–2.18) and at least primary education (OR 2.38; 95% CI 1.58–3.63), and those aged 25–34 years (OR 1.15; 95% CI 1.07–1.23) and 15–24 years (OR 1.13; 95% CI 1.05–1.21), had greater likelihoods of patronizing private providers for their contraceptives when compared to opting for informal provision. Similarly, increasing household wealth status, residing in a socioeconomic disadvantaged neighborhood, and living in a rural area were associated with a higher likelihood of patronizing private providers. Compared to those without occupation, women in full time employment (OR 1.10; 95% CI 1.00–1.21) had a higher likelihood of patronizing private providers.

Public providers and informal provision

Regarding the choice between public providers and informal provision, age, living in low socioeconomic disadvantaged

Table 4 Multilevel choice logistic regression model of neighborhood and individual socioeconomic determinants of choice of family planning providers according to Nigerian Demographic and Health Survey 2008²⁹

Variables	Private (informal)		Public (informal)	
	OR	(95% CI)	OR	(95% CI)
Fixed effect				
Age (years)				
15–24	1.13	(1.05–1.21)**	2.92	(1.71–4.98)***
25–34	1.15	(1.07–1.23)***	1.82	(1.34–2.45)***
>35	1.00	–	1.00	–
Women's education				
No education	1.00	–	1.00	–
Primary	2.38	(1.58–3.63)***	1.65	(1.28–2.11)***
Secondary and higher	1.64	(1.22–2.18)**	1.34	(0.91–1.77)
Partner's education				
No education	1.00	–	1.00	–
Primary	1.21	(0.97–3.56)	1.22	(0.76–1.68)
Secondary and higher	0.84	(0.25–1.43)	1.47	(1.00–2.15)*
Partner's occupation				
Not working	1.00	–	1.00	–
Working	1.07	(0.73–1.41)	1.23	(1.09–1.38)**
Women's occupation				
Not working	1.00	–	1.00	–
Working	1.10	(1.00–1.21)*	1.07	(1.00–1.14)*
Wealth index				
Poorest	1.00	–	1.00	–
Poorer	1.13	(1.00–1.27)*	0.92	(0.35–1.49)
Middle	1.65	(1.00–2.71)*	1.11	(0.57–1.65)
Richer	1.37	(1.14–1.64)**	1.15	(0.59–1.71)
Richest	2.44	(1.55–3.78)***	1.10	(1.01–1.21)*
Community level factors				
Area economic disadvantage index				
High	1.00	–	1.00	–
Low	1.28	(1.10–1.47)**	1.58	(1.25–1.97)***
Place of residence				
Urban	1.00	–	1.00	–
Rural	1.18	(1.00–1.39)*	0.84	(0.84–1.00)*

Notes: *denotes $P < 0.05$, **denotes $P < 0.001$, and ***denotes $P < 0.0001$.

Abbreviations: CI, confidence interval; ICC, intracluster correlation; OR, odds ratio; SE, standard error.

neighborhood, and women's occupations were statistically significant determinants of choice of public providers when compared to informal provision. Compared to women with no education, women who had at least primary education had a 65% higher chance of patronizing public providers. Women living in rural areas had a 16% lesser likelihood of using public providers. Women from the richest households of the wealth index, whose partners had more than secondary education, and a full time job had 10%, 47%, and 23% higher likelihoods of patronizing public providers.

Discussion

This study presents the first attempt to simultaneously examine the dual role of socioeconomic factors at both the

individual and neighborhood levels on women's preferences for modern contraceptive providers in Nigeria. The novelty of this study lies in its documentation of neighborhood effects in addition to individual level attributes on contraceptive provision among Nigerian users. Results show that there are substantive variations across communities in women's preferences for modern contraceptive providers. This finding has never been reported before. This can probably be attributed to the fact that women from the same communities tended to have similar attitudes by virtue of their exposure to common contextual influences.³⁵ These influences in turn manifest themselves in the clustering of individual women's preferences for providers in the community.

The result of the multilevel modeling analysis shows that living in a less economically disadvantaged neighborhood is associated with a high likelihood that women will prefer both private and public providers. This finding is consistent with what has been reported earlier for other preventive women's health interventions.³⁶ Research has shown that women living in a neighborhood with low levels of illiteracy would to an extent be able to avail themselves of the opportunity presented by family planning campaigns through mass media.^{21,37}

Findings from this study showed evidence of socioeconomic gradients at an individual level underlying the preference among current users for private providers. This finding was in consonance with what has been previously reported in low and middle income countries.^{38–40} Education is an individual measure of socioeconomic status and has long been recognized as a knowledgeable personal asset which enhances individuals' propensity to acquire an understanding of what is needed for good health.^{41,42} In consonance with findings from earlier studies,^{14,43,44} this study shows that women's educational attainment was significantly associated with a preference for private providers. This association also holds true for a choice of public providers among women who have at least primary education. This finding is not new and supports what was reported in the Philippines.⁴⁰ In this study, the results show that the educational attainments of women were strongly associated with the patronization of public providers. This analysis also revealed that women in full time occupations, along with their partners, had a higher likelihood of patronizing private providers. A probable reason for this is that occupation, which is evidence of their financial ability, would empower individuals to make decisions regarding their own health. There is a synergistic association between educational attainment and occupation. In developing countries like Nigeria, education improves women's chances of securing highly paid jobs.

The dearth of functional government health care facilities in most rural settings has continued to fuel the proliferation of private health care providers and unqualified care personnel, including unregistered medicine hawkers across Nigeria. Therefore, the finding observed in this study that women residing in rural areas had a higher likelihood of preferring private providers is not unexpected and has been documented in previous studies.^{38,43} On the other hand, there is a lesser likelihood that women living in rural areas prefer public providers. This finding may be attributed to the existence of user fees which are charged by most public facilities; rural dwellers, due to their poverty, would prefer to look for cheaper alternatives by patronizing nonprofessional health care providers.

This study found a strong association between women's ages and their preferences for both private and public providers. This finding lends support to what had been reported before in Nigeria,¹⁶ but differs from a similar study conducted in the Philippines,⁴⁰ where no difference in women's choice of private or public providers based on age was observed.

Study limitations and strengths

It is worthwhile to mention some of the limitations inherent in this study as well as its strengths. First among the limitations of this study is the fact that the findings were based on cross-sectional surveys and therefore the author is not able to account for the switching of providers by the users of these services. Second, use of an asset based index as a surrogate measure of household wealth may be criticized. However, the use of an asset based index as a proxy for household wealth has been shown to be reliable.^{30,45} These limitations notwithstanding, the strength of this study is in the novelty of its findings, which provide a new insight into the existing body of evidence in the research area examined. Furthermore, one of the key advantages of NDHS, compared to other existing population health surveys, is that they are nationally representative and allow for findings to be generalized across the entire country. The definition and use of neighborhood socioeconomic characteristics, which are more correlated than individual measures of socioeconomic status, further buttress the strength of this study.

Conclusion

This study adds to the existing literature by documenting the existence of neighborhood level socioeconomic effects, in addition to the already known individual level socioeconomic characteristics on women's preference for contraceptive

commodity providers in Nigeria and SSA. As it has been documented for the uptake of contraceptives, this study revealed that individual and contextual socioeconomic characteristics were associated with women's choices of family planning commodities providers. Of particular interest is the finding that most users had a greater preference for the private sector despite widespread poverty. While this might be seen as a setback to monitoring contraceptive uptake, scholars have suggested use of a subsidized approach targeted at both the public and commercial private sector supply of contraceptives.⁴⁶

Thus, there is a need for policies that seek to increase the uptake of contraceptives by improving women's standard of living through investment in education, and by increasing the existence of public advocacy, enlightenment campaigns, and economic empowerment programs. Most importantly, efforts should be made to address widespread poverty in the communities in which these women reside, which to a large extent determines their preferences, both in relation to providers and contraceptive type. Introduction of financial incentives may offer good hope for women and help to drive demand for contraceptives. This would encourage an increase in patronization of approved public and private sector facilities manned by qualified health care personnel as their main channels of procurement.

Acknowledgments

The author is grateful to the three anonymous reviewers whose comments have led to further improvement of the manuscript. Also, the generosity of the Opinion Research Corporation Macro and the Nigerian Population Commission for granting access to the use of 2008 NDHS data is duly acknowledged.

Disclosure

The author declares that there is no competing interest.

References

1. Babigumira JB, Stergachis A, Veenstra DL, et al. Potential cost-effectiveness of universal access to modern contraceptives in Uganda. *PLoS One*. 2012;7(2):e30735.
2. Ahmed S, Li Q, Liu L, Tsui AO. Maternal deaths averted by contraceptive use: an analysis of 172 countries. *Lancet*. 2012;380(9837):111–125.
3. Bongaarts J. Can family planning programs reduce high desired family size in Sub-Saharan Africa? *Int Perspect Sex Reprod Health*. 2011;37(4):209–216.
4. Creanga AA, Gillespie D, Karklins S, Tsui AO. Low use of contraception among poor women in Africa: an equity issue. *Bull World Health Organ*. 2011;89(4):258–266.
5. Gakidou E, Vayena E. Use of modern contraception by the poor is falling behind. *PLoS Med*. 2007;4(2):e31.
6. Darroch JE, Singh S. Trends in contraceptive need and use in developing countries in 2003, 2008, and 2012: an analysis of national surveys. *Lancet*. 2013;381(9879):1756–1762.

7. Tsui AO, McDonald-Mosley R, Burke AE. Family planning and the burden of unintended pregnancies. *Epidemiol Rev*. 2010;32(1):152–174.
8. Jayaraman A, Mishra V, Arnold F. The relationship of family size and composition to fertility desires, contraceptive adoption and method choice in South Asia. *Int Perspect Sex Reprod Health*. 2009;35(1):29–38.
9. Carr B, Gates MF, Mitchell A, Shah R. Giving women the power to plan their families. *Lancet*. 2012;380(9837):80–82.
10. Do M, Kurimoto N. Women's empowerment and choice of contraceptive methods in selected African countries. *Int Perspect Sex Reprod Health*. 2012;38(1):23–33.
11. Crissman HP, Adanu RM, Harlow SD. Women's sexual empowerment and contraceptive use in Ghana. *Stud Fam Plann*. 2012;43(3):201–212.
12. Izugbara CO, Ezech AC. Women and high fertility in Islamic northern Nigeria. *Stud Fam Plann*. 2010;41(3):193–204.
13. Monjok E, Smesny A, Ekabua J, Essien E. Contraceptive practices in Nigeria: Literature review and recommendation for future policy decisions. *Open Access Journal of Contraception*. 2010;1:9–22.
14. Mandara M. Family planning in Nigeria and prospects for the future. *Int J Gynaecol Obstet*. 2012;117(1):1–4.
15. Ladipo OA. Where do people in Nigeria get their contraception? *PLoS Med*. 2005;2(11):e366.
16. Oye-Adeniran BA, Adewole IF, Umoh AV, et al. Sources of contraceptive commodities for users in Nigeria. *PLoS Med*. 2005;2(11):e306.
17. Izugbara C, Ibisomi L, Ezech AC, Mandara M. Gendered interests and poor spousal contraceptive communication in Islamic northern Nigeria. *J Fam Plann Reprod Health Care*. 2010;36(4):219–224.
18. Saroha E, Altarac M, Sibley LM. Caste and maternal health care service use among rural Hindu women in Maitha, Uttar Pradesh, India. *J Midwifery Womens Health*. 2008;53(5):e41–e47.
19. Ettarh RR, Kyobutungi C. Physical access to health facilities and contraceptive use in Kenya: evidence from the 2008–2009 Kenya Demographic and Health Survey. *Afr J Reprod Health*. 2012;16(3):48–56.
20. Onwujekwe OE, Ogbonna C, Uguru N, Uzochukwu BS, Lawson A, Ndyabangi B. Increasing access to modern contraceptives: the potential role of community solidarity through altruistic contributions. *Int J Equity Health*. 2012;11:34.
21. Kaggwa EB, Diop N, Storey JD. The role of individual and community normative factors: a multilevel analysis of contraceptive use among women in union in Mali. *Int Fam Plan Perspect*. 2008;34(2):79–88.
22. Shrestha S. Increasing contraceptive acceptance through empowerment of female community health volunteers in rural Nepal. *J Health Popul Nutr*. 2002;20(2):156–165.
23. Entwisle B, Hermalin AI, Kamnuansilpa P, Chamrathirong A. A multilevel model of family planning availability and contraceptive use in rural Thailand. *Demography*. 1984;21(4):559–574.
24. Kamal N, Sloggett A, Cleland JG. Area variations in use of modern contraception in rural Bangladesh: a multilevel analysis. *J Biosoc Sci*. 1999;31(3):327–341.
25. Scublinsky D, Venarotti H, Citera G, et al. The prevalence of rheumatoid arthritis in Argentina: a capture-recapture study in a city of Buenos Aires province. *J Clin Rheumatol*. 2010;16(7):317–321.
26. Janevic T, Sarah PW, Leyla I, Elizabeth BH. Individual and community level socioeconomic inequalities in contraceptive use in 10 Newly Independent States: a multilevel cross-sectional analysis. *Int J Equity Health*. 2012;11:69.
27. Bentley R, Kavanagh A, Smith A. Area disadvantage, socioeconomic position and women's contraception use: a multilevel study in the UK. *J Fam Plann Reprod Health Care*. 2009;35(4):221–226.
28. Hossain MB. Analysing the relationship between family planning workers' contact and contraceptive switching in rural Bangladesh using multilevel modelling. *J Biosoc Sci*. 2005;37(5):529–554.
29. Nigerian Demographic and Health Surveys 2008 [webpage on the Internet]. Calverton: Measure DHS; 2012. Available from: <http://www.measuredhs.com>. Accessed October 1, 2013.
30. Vyas S, Kumaranayake L. Constructing socio-economic status indices: how to use principal components analysis. *Health Policy Plan*. 2006;21(6):459–468.
31. Wight RG, Cummings JR, Miller-Martinez D, Karlamangla AS, Seeman TE, Aneshensel CS. A multilevel analysis of urban neighborhood socioeconomic disadvantage and health in late life. *Soc Sci Med*. 2008;66(4):862–872.
32. Lindstrom M, Moghaddassi M, Merlo J. Individual and contextual determinants of self-reported poor psychological health: a population-based multilevel analysis in southern Sweden. *Scand J Public Health*. 2006;34(4):397–405.
33. Subramanian SV, Chen JT, Rehkopf DH, Waterman PD, Krieger N. Comparing individual- and area-based socioeconomic measures for the surveillance of health disparities: A multilevel analysis of Massachusetts births, 1989–1991. *Am J Epidemiol*. 2006;164(9):823–834.
34. Subramanian SV, Smith GD. Patterns, distribution, and determinants of under- and overnutrition: a population-based study of women in India. *Am J Clin Nutr*. 2006;84(3):633–640.
35. Merlo J, Chaix B, Yang M, Lynch J, Rastam L. A brief conceptual tutorial of multilevel analysis in social epidemiology: linking the statistical concept of clustering to the idea of contextual phenomenon. *J Epidemiol Community Health*. 2005;59(6):443–449.
36. Aremu O, Lawoko S, Dalal K. Neighborhood socioeconomic disadvantage, individual wealth status and patterns of delivery care utilization in Nigeria: a multilevel discrete choice analysis. *Int J Womens Health*. 2011;3:167–174.
37. Gonzalez C, Houweling TA, Marmot MG, Brunner EJ. Comparison of physical, public and human assets as determinants of socioeconomic inequalities in contraceptive use in Colombia – moving beyond the household wealth index. *Int J Equity Health*. 2010;9:10.
38. Onwujekwe OE, Enemuoh JC, Ogbonna C, et al. Are modern contraceptives acceptable to people and where do they source them from across Nigeria? *BMC Int Health Hum Rights*. 2013;13:7.
39. Khalifa M. *Choice of Family Planning Service Provider in Egypt*. Calverton: Macro International; 1995. Available from: <http://www.measuredhs.com/pubs/pdf/FA13/FA13.pdf>. November 1, 2013.
40. Mumford E. Understanding clients' choice of providers and their willingness to pay for family planning services in the Philippines. *Policy Matters*. 2000;2:1–4.
41. Galobardes B, Shaw M, Lawlor DA, Lynch JW, Davey Smith G. Indicators of socioeconomic position (part 2). *J Epidemiol Community Health*. 2006;60(2):95–101.
42. Thornton LE, Bentley RJ, Kavanagh AM. Individual and area-level socioeconomic associations with fast food purchasing. *J Epidemiol Community Health*. 2011;65(10):873–880.
43. Abiodun OM, Balogun OR. Sexual activity and contraceptive use among young female students of tertiary educational institutions in Ilorin, Nigeria. *Contraception*. 2009;79(2):146–149.
44. Adeyemi AS, Adekanle DA, Komolafe JO. Pattern of contraceptives choice among the married women attending the family planning clinic of a tertiary health institution. *Niger J Med*. 2008;17(1):67–70.
45. Aremu O, Lawoko S, Dalal K. Childhood vitamin A capsule supplementation coverage in Nigeria: a multilevel analysis of geographic and socioeconomic inequities. *Scientific World Journal*. 2010;10:1901–1914.
46. Hanson K, Kumaranayake L, Thomas I. Ends versus means: the role of markets in expanding access to contraceptives. *Health Policy Plan*. 2001;16(2):125–136.

Patient Preference and Adherence**Dovepress****Publish your work in this journal**

Patient Preference and Adherence is an international, peer-reviewed, open access journal focusing on the growing importance of patient preference and adherence throughout the therapeutic continuum. Patient satisfaction, acceptability, quality of life, compliance, persistence and their role in developing new therapeutic modalities and compounds to

optimize clinical outcomes for existing disease states are major areas of interest. This journal has been accepted for indexing on PubMed Central. The manuscript management system is completely online and includes a very quick and fair peer-review system. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <http://www.dovepress.com/patient-preference-and-adherence-journal>