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Women autonomy and demand for maternal health services in Nigeria: Evidence from the Nigeria Demographic and Health Survey

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Abstract

Improving women autonomy can be vital in determining the uptake of healthcare services, especially in a patriarchal society with gender rights concerns. Using the 2013 Nigeria Demographic and Health Survey and employing Zero Inflated Negative Binomial regression, the effect of household decision-making power with considerations to women autonomy on the demand for maternal health services in Nigeria was examined. The result of the analysis suggests that women autonomy in deciding expenditures on household healthcare services, and autonomy in deciding their income expenditures significantly increases the likelihood of demand for maternal healthcare services. On the other hand, when the husband/partner makes sole decision, as well as joint decision making concerning expenditure on household healthcare services and expenditure of woman's income reduces the likelihood of demand for maternal healthcare services in the country. This reduction was however much more when husband alone takes the decision than when decisions were taken jointly. Other socioeconomic variables like higher maternal education, and household wealth, also increased the demand for maternal healthcare services. We recommend that government should put in place policies that will help increase women's participation in household decision-making through the sensitization and capacity building initiatives such as improved educational quality for women. (*Afr J Reprod Health* 2022; 26[4]: 65-74).

Keywords: Women rights, household decision-making, maternal health services, count variables, zero-inflated negative binomial

Résumé

L'amélioration de l'autonomie des femmes peut être essentielle pour déterminer l'utilisation des services de santé, en particulier dans une société patriarcale préoccupée par les droits des femmes. À l'aide de l'enquête démographique et sanitaire de 2013 au Nigéria et de la régression binomiale négative à gonflement zéro, l'effet du pouvoir de décision des ménages en tenant compte de l'autonomie des femmes sur la demande de services de santé maternelle au Nigéria a été examiné. Le résultat de l'analyse suggère que l'autonomie des femmes dans la décision des dépenses en services de santé du ménage et l'autonomie dans la décision de leurs dépenses de revenu augmentent considérablement la probabilité de demande de services de santé maternelle. D'autre part, lorsque le mari/partenaire prend seul la décision, ainsi que la prise de décision conjointe concernant les dépenses en services de santé du ménage et les dépenses du revenu de la femme, réduit la probabilité de demande de services de santé maternelle dans le pays. Cette réduction est cependant beaucoup plus importante lorsque le mari prend seul la décision que lorsque les décisions sont prises conjointement. D'autres variables socio-économiques telles que l'éducation maternelle plus élevée et la richesse des ménages ont également augmenté la demande de services de santé maternelle. Nous recommandons que le gouvernement mette en place des politiques qui contribueront à accroître la participation des femmes à la prise de décision au sein du ménage grâce à des initiatives de sensibilisation et de renforcement des capacités telles que l'amélioration de la qualité de l'éducation pour les femmes. (*Afr J Reprod Health* 2022; 26[4]: 65-74).

Mots-clés: Droits des femmes, prise de décision au sein du ménage, services de santé maternelle, variables de comptage, binôme négatif gonflé à zéro

Introduction

Women play a crucial role in the overall development of any society, having about 50% of

the total world population¹ (World Bank 2017) and higher life expectancies, their importance in terms of labor supply and raising future generations cannot be overstated. It has been emphasized that

economic development will only be possible to the degree to which women are allowed to engage in productive activities². At the household level, the contribution of women in revenue generating activities has continued to increase, leading to increased household earnings, reduction in poverty, food security and improved household welfare and social status. Studies have found that women play a significant role in improving household economic status and food security respectively^{3,4}. This is because they stand a better chance of engaging in productive ventures, securing employment in the formal sector, and earning relatively higher incomes especially when they are educated and healthy⁵. It is worth noting though that for these potentials to be harnessed, women's health is vital. In a bid to ensure the safety and better health outcomes for women so as to increase their participation in income generating activities and offer labor services in the economy, the Millennium Development Goals (MDGs), had one of its main goals (Goal 5); to Improve Maternal Health, which the Sustainable Development Goals (SDGs) made a target for goal 3; to reduce the global burden of maternal mortality ratio to less than 70 per 100,000 live births. And since women constitute a large chunk of the population, much attraction has been given to maternal health premised on the discovery that a healthy population is prerequisite to economic development and progress. Therefore, staying healthy becomes a major goal of individuals for optimum labor productivity etcetera. In this study, we answered the question; does women autonomy in household decisions influence their ability to demand for maternal health services?

Theoretically, It has been established that health stock diminishes with time⁶ and that for individuals to stay healthy, they must demand for more health to replace the one which diminishes. However, Grossman⁶ in his model of demand for health stated that individuals actually demand health, but because health in itself cannot be accessed directly, the model states that health care must be demanded because it is one of the inputs that will be used to produce the commodity health. This is to say therefore that, health care plays an important as the state of health individuals by improving their health stock. To simply state, for women to enjoy health especially in and within their reproductive circle, maternal health care becomes highly important. But how well the women will enjoy health may largely depend on

their decision-making power in the household. Hence, this study investigates the effect of women's autonomy in household decision making on their demand for maternal healthcare services in Nigeria. Currently, there is paucity of studies on household decision making rights and women demand for health services in Nigeria. It has been found in literature that having power to make decision could influence up-take of health interventions and consequently household outcomes⁷. This was shown in the case of Indonesian women's take-up of reproductive health programs which were discovered to be largely influenced by the extent of their control over economic resources⁸. But, it is important to note that the structure and composition of the household has implications on the dynamism of intra-household resource allocation. In describing the operations of households there are different strands of models which can be broadly categorized into: Unitary models and Collective (bargaining) models. A detailed discussion on this can be found in Atsiya *et al*⁷.

The need for this study is timely particularly with respect to Nigeria, where there is high rate of mortality coupled with the inability of women to demand for, and have access to maternal health services. As at 2013, the average rate of maternal mortality in Nigeria stood at about 560 per 100,000 births, which was higher than the average rate of Sub-Saharan Africa, which was about 510 per 100,000. This high mortality figure has been linked to the poor level of utilization of maternal healthcare services⁹ and inappropriate health seeking behaviors. This poor utilization of maternal healthcare services can further be attributed to the inability to access healthcare services which has been linked to the high cost of health care. Basic statistics from the Nigeria Demographic and Health Survey (2013) revealed that due to problem of cost, about 56% of women captured in the survey could not afford the cost of antenatal care services and 8% could not deliver in a health facility. While the inability to access and utilize healthcare services may be attributed to the high cost of care and other socioeconomic factors, especially in settings where the burden of health expenditures largely lies on the individual, will the individual's demand for healthcare services be affected by a the individual's ability to make decisions independently or jointly within the framework of his/her household? This study provides an answer to this question by

investigating how women participation in decision making in the household is likely to influence their demand for maternal healthcare services.

Again, while a large number of studies have focused on what determines the likelihood of woman participating in household decision¹⁰⁻¹³ only limited studies have looked at its consequences on critical aspects of the individual and household state such as health particularly in Nigeria. One available study only investigated the factors associated with health care decision-making autonomy in Nigeria¹⁴. Also, a study in Varanasi, North Indian found that freedom of movement as an indicator of women autonomy and high economic status had a significant relationship with the use of antenatal care services¹⁵. In another study using data from the Ghanaian Demographic and Health Survey 2008, it was found that women status (reproductive right status, decision making status, and perception of violence against woman status) showed the likelihood of women with higher status having institutional deliveries. However, when other socioeconomic factors were included into the adjusted model, the effects of women status diminished¹⁶. And in Nigeria, using the 2008 Nigerian Demographic and Health Survey, it was found that dimensions of woman autonomy such as household decision-making and attitudes regarding a wife's ability to refuse sex increased the chances of institutional deliveries by the woman¹⁷.

Finally, Nigeria provides a good context for exploring this relationship due to reasons such as the prevalence of patriarchal dominance, multi-religious and autonomous societies. And as noted by⁷, gender biases in literacy rates, labour participation, and decision-making rights in Nigeria provides a good avenue for studying household issues. A good and insightful discussion of the many ways in which sources of power could vary according to the social, economic and cultural contexts has been provided elsewhere¹⁸. The study is divided into four parts; the introduction, methodology, results and discussion of findings, and lastly, the conclusion and recommendations.

Methods

Model and estimation strategy

We use the Zero-Inflated Negative Binomial (ZINB) regression, and three other estimation techniques (Poisson regression, Negative Binomial

regression (NBREG) and the Ordinary Least Squares) as test of robustness due to the nature of the dependent variable; antenatal visits, which is a count variable. A count variable is a "variable that takes on the form of non-negative integer values, where there are no upper bounds meaning the variables are strictly positive"¹⁹. The Poisson regression assumes that the conditional mean and the variance of the dependent variable be equal (equi-dispersion). When this is not the scenario, two scenarios are likely to become evident; underdispersion (a situation in which the conditional mean is greater than the variance) although this is rare, and overdispersion (a situation where the variance is greater than the conditional mean). In such situation(s), the estimates from the Poisson regression will still be consistent but inefficient because of inaccurate standard errors²⁰. To address the problem of overdispersion, the NBREG has been an efficient technique.

Again, another tenability in count variables is the distribution of data skewed with mass point at zero. The author(s) can show this. If there is mass point of zero in the dependent variable, the Zero-Inflated NBREG an efficient technique that has been used to check for and address this problem of data distribution skewed with mass point at zero. When there exist no problem of a mass point at zero in the dependent variable, the estimates from these techniques become the same with Poisson regression. The AIC, the test of the presence of overdispersion for the parameter a in the NBREG and Vuong test of ZIP were used to select the most consistent and efficient estimator for the model.

The basic regression model is which is log-linear is specified as:

$$\mu_i = E(Y_i|X_i) = \exp(\beta^T X_i) \quad 1$$

Where X_i is vector of regressors (decision on health spending, decision on woman's income spending, maternal educational level, income (household wealth status), place of residence, age at first birth, maternal age, paternal education, household head, religion and paternal age) and β is an unknown vector of regression coefficients, Y_i is the dependent variable; total number of antenatal care visits during pregnancy.

Measurement of variables

The dependent variable for the study is the number of antenatal care visits during pregnancy. The variable is a count variable, and was used to

ascertain the utilization of maternal healthcare services. It shows cumulatively how many antenatal care visits a woman has had at the course of pregnancy. . The decision variables employed are; a) Who spends the woman's income, and, b) Who decides the woman's health expenditure, which are coded 1 for the woman alone, 2 for joint decision and 3 for husband/spouse alone. We posit that the woman alone making decision shows a high level of autonomy, and low level of autonomy when the partner/husband alone makes decisions. The educational status of the woman is used with the apriori expectation higher educational status should be positively related with the three independent variables in the study. In the data set used for the study, the variable is a categorical variable (0= no education, 1= primary education, 2= secondary education, 3= higher education).

The wealth index, an index used in the survey to capture beyond income levels, all household properties is used to capture household wealth. It is also a categorical variable with five strata (1= poorest, 2= poorer, 3= middle, 4= richer, 5= richest). The apriori expectation is the same as that of the education aforementioned. Other covariates include the husband/spouse educational status which is the measured the same way as that of the woman, and his age. Also, the woman's age is also factored in with the assumption that the higher her age the higher the likelihood of having antenatal care visits. But because we expect this relationship to have a threshold at certain limit, we included a squared term for age whose sign we expect to be same with that of another covariate, woman's age at first birth. When a woman begins to produce children at an earlier age, the more likely she would have more children than when she does so at a later age. Household decision variables which show her autonomy, were also used with the apriori expectation that they will have positive and significant relationship with the dependent variable. The household head is also used in the study with male headed house coded 1 and female 0.

The data utilized for the study comes from the Nigeria Demographic and Health Survey (NDHS) of 2013, a survey conducted every five years for monitoring and generating information on the population health situation of the country. It is a nationally representative survey with a sample of 38,948 women in the selected households with the age range of 15-49.

Results

Descriptive statistics

Table 1 shows the summary of all the variables employed for the study. For instance, a large number of the women had their spouses (husbands) attained just primary education with a mean of 1.207, most households were at the mid-income quintile with a household wealth status of 3.1. It further suggests that most women had their deliveries in non-institutional health centres. The average age of women in the data is 28.8 years with the age at first birth of 19.36 years which reveals that women marry early. The average of antenatal visits among the women was five, with a maximum of thirty visits by a woman with respect to the number of children the woman has. The household health spending variable shows a mean of 2.5, revealing that most decisions in the sample were taken jointly. For decisions on household spending, the mean score was 1.4 showing that in the general sample, most decisions was taken by the woman alone. The result also showed that the mean of antenatal care visits was higher when the woman makes decisions concerning health spending with a mean score of 8.25 compared to 7.74 for joint decision making and 3.67 for Husband/Partner Alone. For decision on spending the woman's income, we find a significantly mean antenatal visit score of 7.26 for joint decision making closely followed by the woman alone making decision with a mean antenatal visit score of 5.69 and 5.44 for husband/partner alone. Generally, descriptive statistics suggest that the demand for maternal healthcare services is lower for women who the husband/partner alone makes sole decisions on the decision variables under consideration.

Women autonomy and determinants of maternal health services

In this section, the results of the estimations are presented. Table 2 shows the estimates for the Poisson regression, the negative binomial regression (NBREG), the zero-inflated negative binomial regression (ZINB) and the non-linear ordinary least square regression (OLS). The results show differentials across all estimators except for the OLS and ZINB which standard errors are similar except for the case of Age at first birth and the sterilized group for woman's desire for more

Table 1: Descriptive Statistics

Variable Name	Mean	SD	Min	Median	Max
Maternal Education	1.207	1.029	0	1	3
Income	3.115	1.391	1	3	5
Antenatal Children	5.263	6.102	0	4	30
Residence	2.546	2.464	0	2	16
Age at First Birth	0.399	0.490	0	0	1
Age	19.366	4.365	12	19	45
Maternal Desire for more children	28.862	9.686	15	28	49
Paternal Education	1.498	0.870	1	1	4
Household head	1.284	1.310	0	1	9
Wife's religion	0.817	0.386	0	1	1
Decision on Household health spending	2.392	0.683	1	2	4
Decision on Woman's Income Spending	2.535	0.616	1	3	3
	1.402	0.667	1	1	3
Variables	Woman's Income Spending	Health spending			
Mean of Antenatal Care	Mean	SD	Mean	SD	
Decision Making					
Respondent alone	5.69	6.58	8.25	6.91	
Joint Decision	7.26	6.37	7.74	6.80	
Husband/Partner Alone	5.44	5.49	3.67	4.92	

Source: Authors' computation from NDHS

children. As earlier mentioned in the previous chapter, the Poisson regression cannot be solely relied upon because of its strict assumption of the equality between the mean and variance. If this is not a case of the count, the Poisson estimate may be inefficient. Another likely problem that could be encountered is a mass point zeros in the dependent variables which could also pose questions on the credibility of Poisson estimates. These are the reasons NBREG and the ZINB estimators are also used in order to check for the credibility of the Poisson estimate, and correct for these problems when they exist.

From the results, it is evident, that the Poisson estimator is inefficient in dealing with the regressand (antenatal care visits). This is because the coefficient of the overdispersion variable (α) of the NBREG is significant at 5% suggesting that the Poisson estimates suffers from this problem. Again, the ZINB estimates further shows us that the Poisson estimates are inefficient because the young's test of zero inflation, which is reported in the appendix, is also significant at 5% level. This is the reason for the differentials across these three estimators. Since the young's test of zero-inflation was significant, the ZINB estimator is used to analyze the model. Although there have been recent arguments on the use of the young's test to compare zero-inflated models with others, the researchers still chose to use the ZINB estimates because its AIC and BIC is lower than that of the other estimators. The results of the study are

presented in terms of percentage change in odds/expected counts and Incidence Rate Ratio (IRR) which are the exponents of the coefficient (these are available in the appendix).

The variables; desire for more children, decisions on who spends respondents (woman) income and decision on health spending were analyzed by way of a reference group. This was so because the variables were categorical, and hence the need for a reference category. The result shows that women autonomy (decisions on respondent's income spending and health spending (which represent the key autonomy variables) are significant predictors of maternal healthcare services demand. The woman's age at first birth and paternal education were not significant at 5% level of significance. However, all other variables; maternal education, number of children, household wealth, age, age squared, household head desire for more children, household head, religion, were all significant.

The result in table two revealed that a woman's demand for maternal health services (proxied by antenatal care service utilization) is likely to reduce by 10% and 5% with a corresponding IRR of 0.89 and 0.94 respectively when it is the woman and her husband/partner (joint decision making), or the husband/partner alone that makes the decision compared to when the woman alone decides how to spend her income (women autonomy). Similarly, antenatal care visits is likely to reduce by 16% with an IRR of 0.85 when the

Table 2: Estimates for determinants of maternal health services

	POISSON	NBREG	OLS	ZINB
Maternal Education	0.112*** (0.0134)	0.144*** (0.0167)	0.954*** (0.0801)	0.0588*** (0.0106)
Income	0.296*** (0.00951)	0.320*** (0.0109)	1.424*** (0.0507)	0.139*** (0.00739)
Children	-0.0496*** (0.00821)	-0.0358*** (0.00940)	-0.314*** (0.0422)	-0.0521*** (0.00648)
Age at First Birth	0.00549 (0.00289)	0.0105** (0.00355)	0.0764*** (0.0165)	0.00344 (0.00233)
Age	0.0388** (0.0118)	0.0341** (0.0127)	0.278*** (0.0575)	0.0417*** (0.00880)
Desire for more children				
Wants more	-0.213*** (0.0253)	-0.239*** (0.0328)	-1.391*** (0.156)	-0.153*** (0.0206)
Undecided	-0.199*** (0.0408)	-0.268*** (0.0455)	-1.284*** (0.215)	-0.121*** (0.0300)
Wants no more (REF)				
Sterilized or Infecund	-0.300 (0.162)	-0.500*** (0.134)	-1.362* (0.589)	-0.00681 (0.107)
Age squared	-0.000475** (0.000176)	-0.000438* (0.000189)	-0.00343*** (0.000863)	-0.000482*** (0.000131)
Paternal Education	0.0323*** (0.00848)	0.0605*** (0.0114)	0.0958 (0.0492)	-0.00280 (0.00755)
Household Head	0.233 (0.178)	0.0440 (0.195)	-2.867** (0.893)	1.080*** (0.134)
Religion (Other Christian (REF))				
Catholic	-0.0857** (0.0304)	-0.0728 (0.0410)	-0.827*** (0.198)	-0.0968*** (0.0251)
Islam	-0.137*** (0.0235)	-0.163*** (0.0274)	-0.598*** (0.137)	-0.106*** (0.0171)
Traditionalist	-0.126 (0.142)	-0.262* (0.114)	-0.783 (0.515)	0.0593 (0.0882)
Decision on Health spending				
Respondent alone (REF)
Both	0.0679* (0.0342)	0.0669 (0.0461)	0.648** (0.225)	0.0703* (0.0277)
Husband/partner alone	-0.206*** (0.0356)	-0.207*** (0.0461)	-0.983*** (0.225)	-0.161*** (0.0282)
Decision on spending respondent's income				
Respondent alone (REF)
Both	-0.117*** (0.0238)	-0.0604* (0.0298)	-0.968*** (0.145)	-0.107*** (0.0185)
Husband/partner alone	-0.0337 (0.0297)	0.00940 (0.0370)	-0.548** (0.172)	-0.0531* (0.0243)
Lnalpha		-0.0718*** (0.0213)		-1.511*** (0.0252)
_cons				19.94 (14928.8)
R ²			0.643	
AIC	74919.3	55526.2	64860.8	41568.0
BIC	75050.2	55664.4	64991.7	41844.4
F			1063.1	
N	10644	10644	10644	10644

Standard errors in parentheses. **REF** (Reference Category)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author's computation from NDHS

husband alone decides on health spending but likely to increase by 7% with a corresponding IRR of 1.07 when both the husband and wife decide on health

spending compared the woman alone making the decision solely. The result revealed further that additional level of maternal education will increase

antenatal care visits by odds/expected count of 6.1% and a corresponding IRR of 1.1. A higher household wealth increases antenatal care visits by odds/expected count of 14.9% with a corresponding IRR of 1.14. Having an additional child causes antenatal care visits to reduce by an odds/expected count of 10% and IRR of 0.95. The result further suggests that antenatal visits increases by 4.3% with age and an IRR of 1.04 until 43.26 years ($-\beta_1/2\beta_2$, where $\beta_1=0.0417$ and $\beta_2 = -0.000482$) after which the likelihood of antenatal visits decreases with age showing an inverted U shaped relationship. The result also revealed that the likelihood of antenatal care visits reduces by 15% and 12% with corresponding IRRs of 0.85 and 0.88 respectively for those who want more children and those undecided compared to women who want no more children. Furthermore, compared to other Christians, the traditionalists were not significantly different. However, the Catholics and Islamite were likely to have reduced antenatal care visits by 9% and 10% with a corresponding IRR of 0.90 and 0.89 respectively.

Discussion

The need for women to access health care services cannot be overstated due to its importance on their overall health especially during their reproductive ages. There has been a call for women to be given more attention and rights in the society, which among many merits, leads to their improved welfare and wellbeing²³. These rights at macro level are reflective in issues such as political, economic and governance participation rates. However, at micro levels such as the household, they are concerned with the autonomy of the woman in terms decision making. In this study, two important women decision variables were estimated; decision on who spends her income and who determines health spendings. The 'woman (respondent) alone' was used as the reference category premised on the assumption that she will make decisions that would improve her health status. The results showed that when there is joint decision making (both the woman and her partner), or when her partner alone is left to make decision on how to spend her income, her chances of demanding health services reduces. That is those women with higher autonomy have higher chances of seeking antenatal care services than those with lower autonomy. This is plausible for instance, as some amount of time

might be lost in trying to reach an agreement on how to allocate the income across several needs, which may lead to her missing a schedule. And sometimes, because of the nature of the country where majority of the religions and ethnic groups believe in the authority of the man as the head of the household (patriarchy), and coupled with the little educational attainment of these partners, the husbands/partners may exert control over the woman's finances which leads to her inability to access health services. Other descriptive statistics although not reported suggested that 36.6% of the husbands/partners had no education as against 14.6% who possessed higher education. Besides, the mean of antenatal care visits for women whose husbands/partners had no education was lowest with average of 2 visits as against those had primary, secondary and higher educations whose wives/partners (the women) had an average of 6, 8 and 9 visits respectively. The effects of decision on who spends the woman's income maintains the same effect on her demand for maternal healthcare services in the residential (rural and urban) analysis of which the result is available on request.

On the decision regarding health spending, it is visible that when the husband/partner alone is allowed to make decisions compared to her autonomously making decisions, the chances of the woman demand healthcare services reduces. However, joint decision making increases her likelihood of seeking more care. And when the estimations were disaggregated into residential analysis, there was no significant difference between partner making decisions and the woman alone. This perhaps is possible due to the residential differentials between the urban and rural areas when we controlled for other variables. It was discovered that on an average, antenatal care is 37% higher in urban areas. Also, some post estimation descriptive statistics showed that that in urban areas, decision was taken mostly by the woman, while in rural areas, decision was taken by mostly by the husband/partners alone. We further discovered by way of a Chi-square test an association between decision on health spending and residence.

Maternal education has been a major theme in international development agenda. Beyond the role of women as economic agents who supply services to the economy, women play very important roles at the household level making their health and wellbeing paramount, which has been

tied also to their level of education, which is a measure of autonomy. Our findings show that higher maternal educational status is associated with increased demand for maternal health services. This is because more education leads to increased awareness of the importance of health services during pregnancy and the negative effects of ignoring health services. Hence, the more educated women are more disposed to seek health care. This is affirmed by²² who states that educated women are likely to utilize modern medicine with adherence to treatment more than their uneducated counterparts. Further result shows that household wealth status is associated with more antenatal care visits. This possible due to several reasons such as; more income makes individuals have more resources available to them to cater for their health needs. For instance, statistics from the NDHS (2013) reveal about 56% of women captured in the survey could not afford the cost of antenatal care services and 8% could not deliver in a health facility²⁴. The role of income on the demand for healthcare has been affirmed by several studies. For instance, it has been found that higher household assets are associated with increased demand (seeking) for prenatal care²¹. And generally, higher income has been associated with development. It has been found that development of certain nations translated into higher contraceptive prevalence and substantial improvements in antenatal care. And also higher income leads attenuation of other forms of cost such as distance to health facilities; hence the effect of household wealth status on antenatal care visits.

Fertility shows a negative relative relationship with the demand for antenatal care services which proxies maternal health services utilization. It shows that the more children a woman has, the more likely she is to miss antenatal care visits. This could be plausible since the average birth space from the survey showed thirty-nine months (about three years and four months). With this, a woman might be pregnant while having to cater for her toddlers, hence a time trade-off between child care and antenatal care visits. This result may hold true in developing countries where health education is low. Again, due to use of birth control measures which determines birth spacing, a negative relationship is possible between fertility and the use of antenatal care visits. Furthermore, it is likely that women subsequent births are less likely to have complications compared to the first

births. The importance of religion especially in developing country is non-negligible. Religion, to a great extent determines major decisions of individual, household and communities. From the result, religious differentials exist in the utilization of maternal healthcare services. It is tenable from the results compared to other Christians and Traditionalists, Roman Catholics and Muslims were likely not to seek antenatal care. This is closely backed up by the descriptive statistics which shows that the average rate of antenatal care by the Other Christians was higher than the Catholics and Muslims. This may be due to heterogeneities in beliefs on issues such as family planning and fertility, allowance for polygamy etcetera. It was found in India that religion played an important role in determining women's autonomy and decision making power which were major determinants of maternal healthcare service utilization, although the effects diminishes with the introduction of natal kinship¹⁵.

Other covariates such as the maternal age shows a direct relationship until certain age where the likelihood of demanding antenatal care services begins to diminish, that is, a non-linear effects on fertility. This may be due to maturity, cumulative number of pregnancies, and increased awareness that could occur due to increased educational attainment. Again, this result is plausible because biologically, as women get older, they approach their reproductive inactive stage and menopause also begins to approach. However, women's age at first birth was only significant, and negative in the residential analysis at the rural level. This can be alluded to the low level of utilization in the rural areas compared to the urban centres. Also women who wanted more children sought less antenatal care services compared to those declared infecund or who no longer want children. This is possible especially in post-natal care services that may involve the use of contraception which they may not utilize.

Conclusion and policy implications

This study employed data from the 2013 Nigeria Demographic and Health Survey. The data sourced for estimations was analyzed using Zero Inflated Negative Binomial. The results showed that women autonomy in decision-making within the household played a significant role in determining their demand for maternal health care services. For

instance, relative to women making decision alone on health spending, the likelihood of demanding healthcare services reduces compared to when the husband alone or both the woman and the husband make decision on health spending. Similarly, the demand for antenatal health care services reduces when the husband alone or both the woman and husband/partner makes decisions concerning the woman's income spending compared to when the woman makes income-spending decision alone. After controlling for other variables, the effect of decision-making on the demand for maternal health care services does not vary across location (urban and rural). Further findings showed that maternal education, household wealth, religion, and age all had positive and significant influence on demand for maternal health care services. But the effect of age on demand for maternal healthcare services is a threshold effect. The findings of this study have important policy implications especially as it relates to the achievement of the United Nation Sustainable Development Goals number 3 and 5 of ensuring good health and the promotion of gender rights respectively. It is therefore imperative that government puts in place policies and programs such as active-labour market laws and domestic laws that promote gender inclusiveness to increase women autonomy in decision-making in the household particularly in less developed contexts. Lastly, further studies in this area should explore spatial and geographical heterogeneities that exist in context such as Nigeria.

Availability of data and materials

The dataset used and analyzed are available upon request from the corresponding author.

Conflict of interest

The Authors declare there are no conflicting interests.

Contribution of authors

IAI, ASA, SCU, and MOU all contributed to the writing and design of the study. To be specific, ASA served as the corresponding author and also undertook the data analysis. All Authors were involved in article preparation and editing of the manuscript, and all approved the final manuscript.

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