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Household economic wealth management and antenatal care utilization among business women in the reproductive-age

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Abstract

We assessed the influence of wealth and selected socio-demographic characteristics on antenatal care (ANC) utilization among 900 women within the reproductive ages across eight rural communities in Delta State, Southern part of Nigeria. Both descriptive and predictive analyses were undertaken. The characteristics of the women were presented with the use of simple proportion and frequency. The Chi-square test was used to examine the factors that were significantly associated with a minimum of eight antenatal care contacts. Multivariate logistic regression was used to examine factors that explained a minimum of eight antenatal contacts. Women on the highest wealth quintile were 2.6 times more likely to meet the recommended number of 8 ANC visits (aOR: 2.6, 95% CI: 0.63-3.86). This finding has an implication for the free maternal care policy currently in operation in Delta State. It implies that the policy has not succeeded in redressing problems of financial barriers in access to maternal care. The lesson, therefore, is that the policy of free maternal care is not enough, but if the government desires to maximize the dividend from the policy, then it must go beyond absolving pregnant women of ANC charges to provide other form of supports. (*Afr J Reprod Health* 2021; 25[6]: 143-154).

Keywords: Wealth, antenatal care, utilization, rural communities, Nigeria, maternal care

Résumé

Nous avons évalué l'influence de la richesse et de certaines caractéristiques sociodémographiques sur l'utilisation des soins prénatals (ANC) chez 900 femmes en âge de procréer dans huit communautés rurales de l'État du Delta, dans le sud du Nigéria. Des analyses descriptives et prédictives ont été réalisées. Les caractéristiques des femmes ont été présentées à l'aide de proportions et de fréquences simples. Le test du Chi carré a été utilisé pour examiner les facteurs qui étaient significativement associés à un minimum de huit contacts de soins prénatals. Une régression logistique multivariée a été utilisée pour examiner les facteurs qui expliquaient un minimum de huit contacts prénatals. Les femmes du quintile de richesse le plus élevé étaient 2,6 fois plus susceptibles d'atteindre le nombre recommandé de 8 visites prénatales (aOR: 2,6, IC à 95 % : 0,63 à 3,86). Cette découverte a une implication pour la politique de soins maternels gratuits actuellement en vigueur dans l'État du Delta. Cela implique que la politique n'a pas réussi à corriger les problèmes d'obstacles financiers à l'accès aux soins maternels. La leçon, par conséquent, est que la politique de soins maternels gratuits n'est pas suffisante, mais si le gouvernement souhaite maximiser les dividendes de la politique, alors il doit aller au-delà de l'abstention des femmes enceintes des frais de soins prénatals pour fournir d'autres formes de soutien. Mots-clés : richesse, soins prénatals, utilisation, communautés rurales, Nigéria, soins maternels. (*Afr J Reprod Health* 2021; 25[6]: 143-154).

Mots-clés: Surveillance de la croissance, retard de la croissance fœtale, soins prénatals, qualité des soins

Introduction

According to recent evidence 295,000 women die from pregnancy-related complications annually and

developing countries bear a greater proportion of the global burden of maternal mortality^{1,2}. Nigeria is a leading contributor to global maternal mortality^{2,3}. The deplorable state of maternal health

in Nigeria is due to the fact that a sizeable number of women do not utilize modern maternal health care³. The WHO⁴ recommends that all women should attend Antenatal care (ANC) and utilize the services of skilled birth attendants (SBAs) at delivery, yet several women in Nigeria do not adhere to these recommendations⁵. Recent estimates put Nigerian ANC coverage rate of at least four visits at 57%; 61% deliveries in Nigeria was not in a health institution and only about 14% of newborns received postnatal care within two months of delivery^{5,6}.

Several studies have reported factors such as lack of money, poor quality care, transportation problem, unfriendly attitude of health care providers and spousal's disapproval as factors that hinder rural Nigerian women from utilizing evidenced-based maternal cares^{7,8}. Among all the barriers to maternal care utilization, poverty has been reported severally as a formidable barrier to women's access to evidenced-based care^{3,9}. Against this backdrop, the Federal Ministry of Health (FMOH) in 2007 recommended that all States (the second tier of government) should implement the policy of free maternal and child care services. By the end of 2010, over 50% of Nigerian States have implemented the policy of free care services to mothers and new-born babies¹⁰. Again, in recent years free maternal care services have been implemented in several parts of the country and there has been a report of improvement in ANC utilization in some of the areas with free care services for pregnant women. For instance, Akanbiemu, Olumide, Fagbamigbe & Adebowale¹¹, reported a 95% increase in ANC utilization among nursing mothers and pregnant women in selected rural and semi-urban communities in Okitipupa Local Government Area (LGA) in Ondo State, Western Nigeria.

Delta State government in an attempt to improve access to maternal and child-care services initiated the policy of free maternal and under-five child care program by the last quarter of 2007¹². The aim of the program was to remove the financial barriers to the utilization of modern care services confronting pregnant women in the State. From the available evidence, there has been a notable improvement in both maternal health and maternal care behaviours. A study by Azubuike &

Odagwe¹², which drew data from Ika South LGA in Delta State reported that maternal mortality ratio (MMR) reduced from 932/100,000 live births in 2005 to 604/100,000 live births in 2009 following the policy of free maternal care. The authors further reported that increased ANC utilization and skilled delivery were strongly connected to the fall in MMR in Delta State.

In 2016, WHO introduced a new ANC model which increased the number of contacts from four to eight^{13,14}. According to the new prescription, the first contact should be made in the first twelve weeks' gestation with subsequent contact taking place at 20, 26, 30, 34, 36, 38 and 40 weeks' gestation¹⁴⁻¹⁶. The WHO recommended that pregnant women contacts with healthcare providers should go beyond mere visits to include provision of adequate care and other forms of support¹⁵. Evidence has shown that more frequent contacts can improve both maternal and child health outcomes and are associated with maternal healthcare satisfaction^{13-14,17}. A minimum of eight ANC contacts can reduce perinatal mortality by up to 8 per 1,000 live births¹³.

Socioeconomic differentials associated with uneven distribution of wealth among households could restrict access to modern maternal care services^{15,18-19}, hence government interventions in reducing cost of access to modern maternal care services. This study explored the effect of household wealth and other covariates on a minimum of eight ANC contacts among selected households in rural part of Delta State, Southern Nigeria. The focus on rural area is due to the fact that rural Nigerian women lag behind their urban counterparts in maternal care utilization. For instance, evidence from the most recent demographic and health survey⁶ showed that while 83.6% of urban women receives ANC from skilled providers only 56.1% of rural women receive ANC from such source. Also, while approximately 62% of deliveries in the urban parts were supervised by skilled birth attendants, only 28% in rural areas were supervised by trained birth attendants^{20,21}. In the literature, it is argued that household socioeconomic status particularly household wealth has no significant impact on maternal care utilization in an era of free maternal care policy^{9,18}. Therefore, this study seeks to address the following

research questions: (i) what is the effect of household wealth on maternal care utilization among women in rural communities of Delta State, Southern Nigeria? (ii) What is the effect of other sociodemographic characteristics of household on maternal care utilization among women in rural communities of Delta State, Southern Nigeria?

The study was guided by the behavioural model of health services utilization²², and literature on demand-side factors that determine health service utilization²³. Anderson²⁴ developed a model of health care utilization which looks at three categories of determinants of health utilization: (i) predisposing characteristics (ii) the enabling characteristics (iii) the need based characteristics. The predisposing factors comprise of individual demographic and socioeconomic characteristics which include age, sex, marital status, education, occupation and family size²⁵. The enabling characteristics include resources found both within the family and community. Family resources comprise economic status and family location. Community resources incorporate access to healthcare services and the availability of healthcare professionals. By contrast, need based characteristics include the perception of needs for health services, whether individual, social or clinically evaluated perception of need²⁶. This suggests that the use of health facility for maternal care needs can be influenced by a woman's perception of the relative importance of modern maternal care services versus traditional model of care²⁵. The analysis in this study draws extensively from the predisposing and enabling factors.

Literature review on household wealth and maternal care utilization

Several studies reported strong ties between ANC and wealth^{9,18,27,28}. It is believed that women of higher socio-economic status will utilize maternal care services more than their counterparts since maternal care involves a lot of costs, particularly in places without free maternal care policy. A household with a higher level of wealth will most likely utilize evidence-based maternal health services, given that they have the resources to pay for services. Evidence from the Nigerian Demographic and Health Survey⁶ revealed a

consistent pattern between wealth quintile and the proportion of women that utilized skilled birth attendants (SBAs) at delivery. The proportion of women that utilized SBAs consistently increase as wealth status improves. For the lowest wealth quintile, only 11.7 per cent of women had their deliveries in health facilities, but for the highest quintile, it is as high as 86.9 per cent⁶. Ortiz²⁸ reported that wealthier mothers had a greater likelihood of going for first and higher numbers of ANC visits compared to poorer mothers in Colombia.

Prior to the implementation of free maternal care policy in Ghana, Abor, Abekah-Nkrumah and Sayki²⁹ reported that in reference to poorest household, women from poorer households were more likely to deliver in a health facility and in comparison, with those from poorer households those in the middle wealth quintile were more likely to utilize ANC and deliver in a health facility. Arthur¹⁸ reported that the wealth status of individuals hindered ANC utilization in Ghana even though maternal health care services were rendered free of charge. Celik and Hotchkiss²⁰ showed that household wealth is a strong predictor of the place of delivery. A study in Nigeria reported that wealth is the strongest predictors of both ANC and adequacy of ANC utilization⁹. The authors further reported that lack of income may restrict access to health care services because the utilization of maternal and child-care services involve hidden cost such as transportation and opportunity costs of time involve in travelling to health facilities and long waiting-time at health facilities may discourage women from utilizing maternal care services. Osei, Nketiah-Amponsah, and Lambon-Quayefo¹⁵ reported a positive and significant effect on ANC utilization for all wealth quintiles for women who made ≥ 8 ANC contacts, but statistically insignificant for poorer and middle quintiles for women who made 4-7 ANC contacts in Ghana. Sanogo and Yaya¹⁹, using household survey data for Gabon showed that maternal care utilization was higher for women from wealthy household index compared to lower wealth index using Lorenz curve. In a study for Benin republic, a minimum of eight ANC contacts was concentrated among wealthy households using the concentration curve¹⁶.

Method

Study settings

This study is a community-based cross-sectional study design that investigated the impact of wealth and other covariates on ANC utilization among 900 women within the reproductive ages across eight rural communities in Delta State, Southern part of Nigeria. The study setting was Ughelli North LGA. Ughelli North is one of the twenty-five LGAs in Delta State, South-South Nigeria. It lies between 9° 45 'N and 8° 43'E with a land mass of 818 square km. The population census of 2006 puts the population figure at 321,028, with a population density of 460.1 people per square km. While women constitute 49.9 per cent of the population, people within the age bracket 15-64 years constitute 57.6 per cent²⁰. Administratively, the LGA comprises 11 wards with several communities located in each ward. The primary source of maternity care in the LGA is PHCs, although several private hospitals exist in the LGA that render various degrees of maternal health care services. There are 30 public PHCs in the LGA, with 18 PHCs per 10,000 of the population³⁰. Health services by private and public health facilities complement PHCs and serve as referral system in the area. There is wide spread poverty in the area, and Agriculture is the primary source of livelihood in the study area²⁰.

Study design and sampling procedure

This study is a cross-sectional household survey that utilized a quantitative data collection technique. It assumes 50% ANC utilization rate for women in rural communities of Delta State due to lack of reliable information, an error margin of 5 per cent, critical value of 1.96 for 95% Confidence Interval, a non-response rate of 10% and design effects of 2. The sample size of 900 was estimated using the Cochran's³¹ sample size formulae for a single proportion. A multi-stage sampling technique was used in selecting respondents for the study. In the first stage, we randomly selected four political wards out of the eleven wards that made up the LGA. In the second stage, a simple random sampling technique was used to select two communities from each ward. In the final stage,

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household survey was conducted in the eight communities. Households were numbered and women within the reproductive ages counted. Households that had at least one qualified woman were recruited into the survey. Simple balloting was used to select one woman in households where more than one qualified woman was on the ground at the time of the survey. The inclusion criteria included being within the reproductive ages (15-49 years); must have given birth in the last five years preceding the survey or currently pregnant; currently married or in a consensual relationship and must have resided in the communities for a minimum of one year. Due to lack of accurate and reliable data to work out a proportional sampling, a non-proportional sampling method was used to apportion the 900 observations across the eight rural communities. The study plan proposed to sample 113 women in each of the eight communities. However, some communities have fewer qualified women while others have more, hence more observations were drawn from communities with more qualified women to make up the sample observation to 900. However, the sample observation showed that all the communities were fairly represented in the sample observations.

Research instrument

The questionnaire used in collecting data was adapted from Okonofua, Ntoimo, Ogunbangbe, Anjirin, Imonghan and Yaya², with slight modifications. The questionnaire comprised mainly close-ended questions in which respondents were provided with multiple options and only in few cases were respondents allowed to express themselves. The questionnaire elicited information from respondent on their personal characteristics, family characteristics, reproductive characteristics, antenatal care, antepartum and postnatal care experience during the course of last pregnancy and on the barriers to utilization of maternal care in PHCs. The questionnaire was pretested by administering it to 8 women in Gana -a neighbouring community which shared similar socio-economic status with research communities. The scale reliability coefficient reported as 0.70

showed that the questions were internally consistent.

Data collection procedure

The questionnaire was administered through face-to-face interview with the assistance of five trained field research assistants who were drawn from Management and Social Sciences disciplines. Research assistants were given two days training on the contents of questionnaire and ethics in administering questionnaires. The questions were either fielded in English language or Pidgin English, making it possible for research assistants to communicate with all the women in communities. During the fieldwork, research assistants were monitored by a field supervisor who performed spot check and requested re-interview where necessary. The period of data collection lasted for six months (from June, 2018 to December, 2018).

Outcome indicators

The maternal health care indicator for this study is at least eight antenatal care contacts during the course of last pregnancy. A minimum of eight ANC visits was coded 1 for participants who reported having met the minimum recommended number of eight ANC visitations ($A \geq 8$) and coded 0 otherwise (at least 7 visits and no visits). ≥ 8 visits is the new recommended number of ANC visits by WHO¹⁷

Independent variables

Drawing from the models of maternal healthcare utilization and past studies on utilization of facilities for maternal care in Nigeria, the following independent variables were included in the analyses: Maternal age, maternal education, exposure to media, religion, woman's employment status, marital status, partner's age, who pays for respondent's healthcare, spousal education difference, household wealth quintile and number of children ever given birth to. These variables were used by past studies^{3-5,9,15,16,18,21-23,25-26}. Maternal age is a continuous variable measured by the age of the mother in years. However, to subscribe to logistic regressions, we categorized

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maternal age into the following groups: 16-19, 20-24, 25-29, 30-34, 35-39 and 40-47.

Maternal education was categorized into no formal education, primary education, secondary education and tertiary education. Religion was classified into four: Catholic Christian, non-Catholic Christian, Islam and African traditional worshippers/others. Employment status is binary and categorized into working and not working women. Who pays for Respondent's health care services ascertained who between respondent and her partner that pays for healthcare services. The following response options were considered respondent alone, husband alone, respondent/husband and others. Spousal educational difference measured the difference in educational attainment between participants and their spouses. It was categorized into the following: both have no formal education, husband more educated than the wife, wife more educated than the husband, and the same level of education. Number of children ever given birth to examined the number of children the woman had given birth to. In this study, number of children given birth to was categorized into three including, 0-2 births, 3-4 births and ≥ 5 .

Household wealth quintile was constructed from data on household possession. This was based on questions on whether household possessed some items such as radios, television, bicycles and facilities such as the type of floor, piped borne water, and electricity. Each of these assets was assigned a weight and then each household received a score which was summed up for the particular household. Households were categorized into five groups: wealthiest, wealthier, average, poorer and poorest. Exposure to media index was generated by asking participants questions on the number of times they watch television (TV) and listen to the radio. Three categories of response were provided to participants. The response options were every day as opportunity allows, at least once a week and not all. The option of every day as opportunity allows is scored 2 marks; at least once a week scored 1 mark and 0 was attached to the option of not at all. The responses were aggregated to generate five categories of exposure to media index: no exposure (0%), low moderate (11-30 %); moderate exposure (31-

50%); high exposure (51- 69%) and very high exposure (70-100%).

Statistical analysis

The data analyzed in this study was obtained with pen and papers from where it was extracted into excel spreadsheet, cleansed and managed for a period of three weeks. In order to achieve the highest level of accuracy, the data was entered by three different persons and comparisons were made until all inconsistencies were resolved. The data obtained were analyzed with Stata version 13.0 for Windows. We analyzed the data at three levels of univariate, bivariate and multivariate analyses. At univariate level, we present the characteristics of the women using frequencies and percentages. At the bivariate level, chi-square test was used to examine if a significant relationship existed between the various socio-economic factors and ANC utilization. Only variables that were significant at 5% significant level were included in the multivariate analysis. The multivariate logistic regression was used to examine determinants of ≥ 8 ANC contacts. The results of the logistic regression were presented as crude odds ratio (COR) and adjusted odds ratio (aOR) with a-95% confidence interval and probability values. Statistical significance for all the statistical analysis was set at 5%.

Results

Summary statistics of the women

In this section, we present the summary statistics of the respondents. In Table 1, we present the demographic characteristics of the study population. The mean age of the pooled observation is 34.4 (± 7.2 years). The age distribution of the population revealed that majority of the respondents was within the age bracket of (35-39) years (29.9 %). Analysis of educational attainment showed that 54.4 per cent of the respondent had primary educational attainment while 21.4% had no formal education. Analysis of religion showed that non-Catholic Christians constituted the majority of respondents (49.1%). Analysis of marital status showed that majority of the respondents were married and living with their

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spouses (65.2 %). A negligible proportion of participants were widowed, separated and divorced (2.1 %). Examination of employment status revealed that 95.4% of respondents were employed and working, with only a small proportion being unemployed. Analysis of media exposure revealed that 40.9 % of the respondents had high media exposure and only 3.7% had very high media exposure. Analysis of gap in educational attainment between couples showed that 30.4% of women were more educated than their spouses, 24.3% less educated than their spouses and 36.5 per cent were equally educated with their spouses. The data showed that household health spending was disproportionately borne by husbands. In 51.8 % of the cases, husbands completely bore household health spending, in 37.4% both couples shared health care responsibilities while in 10.8% of the cases the women completely bore health care expenses. Considering household wealth quintile, 43.8 per cent belonged to the poorer household wealth quintile and 27.6 % was on the average household wealth quintile. About 20.3% ($n = 183$) reported between 0 - 2 number of children and 38.4 % between 3- 4 and 41.2% ≥ 5 children. 819 of the respondents reported that they had given birth in the last five years preceding the survey and that 76.6 % attended ANC. Also, 61.5% made < 8 ANC contacts; and 38.4% made ≥ 8 contacts.

Bivariate analysis

At the bivariate level, chi-square test was used to examine the sociodemographic characteristics that were significantly associated with ≥ 8 antenatal care contacts among the women. The results are presented in Table 2. Pearson's chi-square test is used to test whether a significant difference exists in ANC utilization by the various socio-economic variables. It can easily be seen that a significant relationship exists between ≥ 8 ANC utilization and maternal education, age at marriage, household wealth quintile, media exposure, spousal education difference, partner age and number of children ever given birth to ($p < 0.05$). Being able to meet the minimum recommended number of 8 ANC visits improves with maternal education and household wealth quintile. ≥ 8 ANC utilization is also higher among married women and those whose health bills were completely borne by their husbands. The

proportion of women that met the recommended number of ≥ 8 ANC visits increased with number of children ever given birth to. It must, however, be noted that the bivariate analysis was conducted without controlling for other variables that may influence ANC, hence in the next session, we presented the multivariate analysis that considered the impact of each predictor on ANC utilization while controlling for other variables.

Table 1: Demographic characteristics of respondents (aged 15-49 years) covered in the household survey

Characteristics	N (900)	%
Maternal age (in years):		
Mean (SD)	34.4 (7.2)	
16-19	21	2.4
20-24	81	9.0
25-29	130	14.5
30-34	176	19.6
35-39	269	29.9
40-47	223	24.6
Maternal education:		
Non-formal	193	21.4
Primary	490	54.4
\geq secondary	217	24.1
Exposure to Media:		
no exposure	177	19.6
low exposure	175	19.4
moderate exposure	147	16.3
high exposure	368	40.9
very high exposure	33	3.7
Religion:		
Catholic	368	40.9
other Christians	442	49.1
Islam	90	10.0
Others		
Women's employment status:		
Employed	41	4.6
Unemployed	859	95.4
Marital Status:		
Married	587	65.2
living together	294	32.7
Others	19	2.1
Age at marriage:		
Mean (SD)	21.8 (4.3)	
14-17	88	9.8
18-24	601	66.8
25-29	145	16.0
30-39	65	7.2
≥ 40	1	0.1
Partner's age:		
Mean (SD)	44 (7.4)	
18-24	12	1.3
25-29	18	2.0
30-34	66	7.3
35-39	98	10.9
40-44	234	26.0

45-49	278	30.9
50-54	141	15.7
55-82	53	5.9
Spousal Educational Difference:		
Both have none	76	8.4
Husband more educated than wife	219	24.3
Wife more educated than husband	274	30.4
Both equally educated but above none	331	36.8
Household Wealth quintile:		
Poorest	147	16.3
Poorer	394	43.8
Average	248	27.6
Wealthy	74	8.2
Wealthiest	37	4.1
Who pays for Healthcare bills:		
Respondent alone	97	10.8
Partner alone	466	51.8
Respondent/partner/others	337	37.4
Reproductive characteristics		
Number of children ever given birth to:		
0-2	183	20.3
3-4	346	38.4
5+	371	41.2
Recent birth (n =819)		
ANC attendance:		
No	192	23.4
Yes	627	76.6
Number of ANC contacts:		
< 8 visits	386	61.5
≥ 8 visits	241	38.4

Multivariate analysis

In Table 3, the multivariate logistic regression for determinants of ≥ 8 antenatal contacts is presented. The unadjusted model utilized only household wealth, while the adjusted model incorporates other sociodemographic characteristics as control variables. Variables included in the adjusted model were those variables that were significant at 5% at the bivariate levels.

The results for the analysis of the determinants of a minimum of eight ANC visits are presented in Table 3. For the unadjusted model, household wealth quintile has significant effect on a ≥ 8 ANC contacts. In reference to mothers drawn from the poorest wealth quintiles, those from poorer quintile (aOR=1.81; 95% CI: 0.00-0.21), wealthy quintile (AoR= 2.18; 95% CI: 0.34-3.48,) and wealthiest quintile (AoR=2.27; 95% CI: 0.56-2.98) were significantly more likely to undertake ≥ 8 antenatal care contacts. For the adjusted model,

maternal education, exposure to media, age at marriage, partner's age and household wealth quintile were the significant predictors of ≥ 8 antenatal contacts.

In reference to mothers who had no formal education, those who had primary educational qualifications (AoR= 1.76; 95 % CI: 0.97-3.21) and those who had at least secondary educational qualifications (AoR= 2.61; 95 % CI: 0.82-3.14) were **Table 2:** Factors associated with ≥ 8 antenatal care contacts among the women in the household survey

Variables	Minimum of 8 antenatal contacts		
	No	Yes	χ^2/p -value
Maternal age:			
16-19	60	30.0	$\chi^2 = 1.72$ p=0.89
20-24	32.6	67.4	
25-29	34.5	65.5	
30-34	26.6	73.4	
35-39	27.3	72.7	
40-47	30.6	69.4	
Maternal education:			
non-formal education	95.6	4.4	$\chi^2 = 39.79$ p<0.001*
Primary	31.6	68.4	
\geq secondary	20.4	79.6	
Employment status:			
Employed	28.1	71.9	$\chi^2 = 0.05$ p<0.001*
Unemployed	29.5	70.5	
Media Exposure:			
No exposure	22.2	77.8	$\chi^2 = 19.24$ p<0.001*
Low exposure	38.1	61.9	
Moderate exposure	34.1	65.9	
High exposure	25.4	74.6	
Very high exposure	51.7	48.3	
Age at marriage:			
14-17	19.8	80.2	$\chi^2 = 9.10$ p = 0.06*
18-24	28.8	71.2	
25-29	32.6	67.4	
30-39	36.6	63.4	
≥ 40	100	0.0	
Partner's age:			
18-24	50	50.0	$\chi^2 = 12.69$ p = 0.08*
25-29	20	80.0	
30-34	38.3	61.7	
35-39	37.8	62.2	
40-44	38.3	61.7	
45-49	35.8	64.2	
50-54	34.3	65.7	
55-82	33.3	66.7	
Marital status:			
Married	26.1	73.9	$\chi^2 = 3.58$ p = 0.17
living together	36.6	63.4	
Others	27.8	72.2	
Spousal education difference:			
Both have none	15.9	84.1	$\chi^2 = 44.01$ p<0.001*
Husband more educated than wife	29.5	70.5	
Wife more educated than	31.6	68.4	

husband			
Both equally educated but above none	30.6	69.4	
Household wealth quintile:			
Poorest	93	7.0	$\chi^2 = 46.28$ p<0.001*
Poorer	41.5	58.5	
Average	40	60.0	
Wealthy	28.9	71.7	
Wealthiest	22.1	77.9	
Who pays for healthcare bills:			
Respondent alone	41.7	58.3	$\chi^2 = 4.73$ p = 0.19
Partner alone	29.7	70.3	
Respondent/partner/others	34.5	65.5	
Number of children ever given birth to:			
0-2	34.4	65.6	$\chi^2 = 5.46$ P=0.007*
3-4 children	3.7	69.7	
5+	1.9	72.8	

*variables that are significant at 10% significant level

approximately 2 and 3 as likely to undertake ≥ 8 ANC contacts. Women who got married within the age bracket (18-24) years (AOR= 1.67, 95% CI :0.91-3.08) and ≥ 40 years (AoR: 2.49, 95 % CI 1.09 -5.69) were approximately two and two and half times as likely to undertake ≥ 8 antenatal contacts. In reference to women on the poorest wealth quintile, those on the poorer wealth quintile (AoR= 1.25, 95% CI: 0.77-2.03); recorded a 1.3-fold increase to undertake ≥ 8 antenatal care contacts. Those on wealthier household wealth quintile (AoR =2.24, 95% CI: 1.14-4.41) had approximately two fold increase in the odds to undertake ≥ 8 antenatal care contacts and those on wealthiest household wealth quintile (AoR= 2.57; 95% CI: 0.63-3.86) recorded approximately 3-fold increase in the odds to undertake ≥ 8 antenatal care contacts. In reference to mothers with no media exposure, those with very high media exposure (AoR=2.38, 95% CI 0.96-5.89) were significantly more likely to undertake ≥ 8 ANC contacts.

Discussion

This study investigated the impact of household wealth and other covariates on maternal care utilization via ANC among women within the reproductive age across eight rural communities in Delta State, Southern Nigeria. We tested the hypothesis that wealth has no significant impact on women's visitation at the clinic during pregnancy in the light of the ongoing free maternal health care

policy in Delta State. By the last quarter of 2007, the Delta State government initiated the policy of free maternal care as part of its health contributory scheme. It is believed that the policy would have removed all financial barriers to maternal care utilization, hence affordability is no longer an issue

in women's decisions to access pregnancy cares. Prior to now, no single study examined the impact which wealth is currently having on women's access to health care services in the light of the policy of free maternal care in Delta State.

Table 3: Logistic regression of determinants of ≥ 8 antenatal care contacts among women in household survey

Variables	COR	P-value	AOR	P-value
Household Wealth quintile:				
Poorest	1		1	
Poorer	1.81 (0.00-2.11)	0.03**	1.25 (0.77-2.03)	0.03**
average	1.96 (0.21-2.45)	0.28	1.34 (0.79-2.28)	0.28
wealthy	2.18 (0.34-3.48)	0.02**	2.24 (1.14-4.41)	0.02**
wealthiest	2.27 (0.56-2.98)	0.03**	2.57 (0.63-3.86)	0.03**
Maternal education:				
non-formal education			1	
Primary			1.76(0.97-3.21)	0.06***
\geq secondary			2.61(0.82-3.14)	0.02**
Exposure to media:				
no exposure			1	
low exposure			1.81(1.07-3.04)	0.02**
moderate exposure			1.50(0.87-2.59)	0.14
high exposure			1.00(0.62-1.62)	0.98
very high exposure			2.38(0.96-5.89)	0.06***
Spousal education difference:				
Both have none			1	
Husband more educated than wife			1.62(0.74-3.55)	0.23
Wife more educated than husband			1.49(0.62-3.65)	0.37
Both equally educated but above none			1.29(0.53-3.16)	0.56
Partner's age (in years):				
18-24			1	
25-29			0.27(0.01-5.55)	0.39
30-34			0.53(0.06-4.35)	0.56
35-39			0.34(0.04-2.74)	0.31
40-44			0.33(0.04-2.57)	0.29
45-49			0.29(0.04-2.31)	0.23
50-54			0.39(0.05-3.14)	0.38
55-82			0.39(0.05-2.29)	0.39
Number of children ever given birth to:				
0-2			1	
3-4			1.04(0.63-1.74)	0.87
5+			0.85(0.49-1.46)	0.56
Age at marriage (in years):				
14-17			1	
18-24			1.67(0.91-3.08)	0.03**
25-29			1.79(0.87-3.66)	0.11
≥ 40			2.49(1.09-5.69)	0.03**

* $p < 0.01$ ** $p < 0.05$ *** $p < 0.10$; COR: Crude odds ratio; aOR: adjusted odds ratio; CI: Confidence Interval

However, this present study has revealed that wealth remains a significant predictor of ANC among rural women of Delta State. The data revealed that women on the highest wealth quintile recorded the highest odds of the recommended number of eight ANC visits.

Women on the highest wealth quintile were 157% significantly more likely to meet the minimum recommended number of eight ANC visits. The result corroborates findings from other Nigerian studies and those conducted elsewhere^{15,18-19,27}. Therefore, government should use policy to redress socioeconomic disparity

among households, which is an important policy inputs that can encourage the use of modern maternal care services. This will go a long way in accelerating the achievements of SDGs 3.1 target of reducing maternal mortality to 70 per 100,000 live births by 2030. The estimate showed that despite the policy of free maternal care the wealth remains a significant determinant of ANC utilization in rural parts of Delta State, showing that the policy has not succeeded in redressing disparity in access to modern maternal care services. We can, therefore, infer that even though maternal care services are rendered free of charge in Delta State; there are other indirect charges that put burden on poor women, particularly those of them living in the rural part of the State, thereby limiting their access to maternal care services. The lesson, therefore, is that the policy of free maternal care is not enough, but if the government desires to maximize the dividend from the policy then it must go beyond absolving pregnant women of ANC charges to provide other form of supports. Such supports include free transportation, subsidization of transportation costs, family outreach services, free drugs and other ancillary services.

The study also noted that maternal education improves the odds of meeting the minimum recommended number of eight visits. This shows that female literacy is a strong predisposing factor that can influence maternal care utilization in the study area^{3,9,18,24,29,32-35}. The result on education corroborates other findings both for Nigeria and elsewhere, and showed that female education is key in improving individual-level, populational health indicators and accelerating the achievement of the SDGs goals^{16,19,22}. The estimate showed that even primary education is even better than non-formal education in improving child and maternal health in the study area, thereby confirming the reports made by some Nigerian studies^{5,25}. Also, the study reported that media exposure significantly impacts on ANC utilization. Women with high and very high media exposure were reported to have higher odds of attending up to 8 times. The Delta State Education Board should encourage the use of mass media to educate pregnant women on the benefit of ANC utilization. For women who can neither read nor write, programs on television and radio that use

local languages can be used to motivate rural women to go for ANC checkup. The use of family outreach services that involve the use of community health volunteers can also be encouraged in the rural part of Delta State, Southern Nigeria.

Strength and limitations

The strength of the study is its community research design approach which enables 900 women to be recruited in rural parts of the Delta State, Nigeria. Given the similarity in most rural Nigerian communities, the research findings can be generalized to cover most rural Nigerian communities. Also, the study made the following contributions to the literature: (i) it is the first study to examine the effect of wealth on ANC utilization in rural parts of Delta State, hence providing a litmus test on the effectiveness of free maternal care services in redressing disparity in access to maternal care services in the State (ii) It is among the foremost study that examined the coverage and determinants of eight ANC contacts in Nigeria. (iii) It is the first study to examine the effect of wealth on a minimum of eight ANC contacts. Despite the contributions of this study to knowledge, it has some noteworthy limitations: (i) Because of the cross-sectional nature of the data, we could not establish cause and effect relationship as only association could be established.

Ethical consideration and consent approval

Approval to conduct the study was obtained from the Ethics Review Committee of the University of Benin Teaching Hospital. Permission to undertake the Survey was sought from the leaders of the various communities where the survey was conducted. Also, consent was obtained from the Heads of individual Households where participants were drawn from. Finally, informed consent was obtained from participants. Participants were informed of the purpose of the study and were assured of confidentiality. They were educated that they had the choice to discontinue the study if they had wish without consequences. Finally, participants were made to sign a consent form

which showed that they understood very well what was explained to them and that they also give their consents to partake in the Survey. No names or specific contact information was obtained from participants as they were identified by unique numbers.

Conclusion

In this study, we investigated the role which wealth plays on ANC utilization among 900 women within the reproductive ages across eight rural communities in Delta State, Southern Nigeria. We hypothesized that wealth had no significant impact on women's attendance at the clinic for ANC given that Delta State has long implemented the policy of free maternal and under-five cares. Contrary to expectation, wealth is reported as a significant predictor of ANC utilization which suggests that affordability remains a challenge despite the free maternal care policy which must have created inequalities to health and possibly marginalized poor rural women. The study recommends a reprogramming of the policy to include other forms of support for rural women. We also reported that maternal education significantly improves the odds of being able to meet the recommended number of eight visits. Rural women should be encouraged to attain a minimum of primary education in order to be able to access health information and be efficient in health promotion and production. Furthermore, more communication using the vehicles of mass media to enlighten women in the study area on the importance of the new WHO's antenatal care guidelines will be helpful in facilitating behavioural changes.

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Availability of data and materials

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The dataset used and analyzed during the current study is available from the corresponding author on a reasonable request.

Conflict of interest

The author declared no conflicts of interests.

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Contribution of authors

YF, RRA,MKA,RO,MA and AHE were involved in the design of the study. RRA gathered the data and undertook the data analysis. All authors were involved in preparation and editing of the manuscript and approved of the manuscripts. RRA played the role of correspondence.

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