MASS MEDIA EXPOSURE AND ANTENATAL CARE VISITS IN NIGERIA

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ABSTRACT

The Nigeria high maternal mortality ratio of 917 per 100,000 live births despite international and domestic health actions will require identifying the major contributors to maternal mortality and investigating their determinants. Low utilization of antenatal care is considered a major contributor to maternal mortality. In this study, we investigate the role of mass media exposure on the decision of women to have antenatal care visits, frequency of care, and timeliness of care using the 2018 Nigeria demographic health survey data. We discovered that women that are exposed to mass media are more likely to have at least one antenatal care visit. They are also likely to meet the recommended four and eight antenatal care visits recommended by the World Health Organization. We identified other predictors of having at least one, four and eight antenatal care visits to include women health autonomy, education, parity, wealth index and living in rural area. These factors (except for mass media exposure) were identified as predictors of having one visit in the first trimester. The design of any effective antenatal care programme will require adequate publicity and specific targeting of poor women urban women with parity but low education

Keywords: Mass Media Exposure, Antenatal Care Visits, Nigeria.

INTRODUCTION

The reduction in maternal mortality was adopted as an International Development Goal by the United Nations (UN), the Organisation for Economic Cooperation and Development, the International Monetary Fund, and the World Bank (OECD, 1996; 2000) and endorsed by 149 heads of state at the Millennium Summit in 2000 (The millennium declarations, 2000). The vision 'no woman should lose her life when giving birth' reflects the human rights perspective on maternal mortality and would require that 90% of maternal deaths, when diagnosed and treated in a timely manner, be avoided, making maternal mortality a potential target for an elimination strategy (Houston, et al., 2013). More precisely, maternal mortality ratio is expected to be significantly lowered to about 30 per 100,000 by 2030, a level when it ceases to be a public health burden (Gilmore and Gebreyesus, 2012). But Nigeria has a high maternal mortality ratio of 917 to 100,000 live births according to the WHO (2019). The potential of care during the antenatal period in improving maternal and child health was recognized by the World Summit for Children in 1990 where antenatal care was adopted as a specific goal stated as "Access by all pregnant women to prenatal care, trained attendants during childbirth and referral facilities for high-risk pregnancies and obstetric emergencies".

Subsequently, similar aims have been mentioned in major international conferences including the International Conference on Population and Development in 1994, the Fourth World Conference on Women in 1995, and the United Nations General Assembly Special Session on Children in 2002 (United Nations General Assembly, 2002). Perhaps the emphasis on antenatal care is supported by findings on its effectiveness in reducing maternal mortality. For instance, some studies indicate that antenatal care can reduce maternal mortality by 20% given good quality and regular attendance (Prual, et al. 2000; Testa, et al., 2002).

Women die from complications during and following pregnancy and childbirth. Other complications may exist before pregnancy but are worsened during pregnancy, especially if unattended to as part of maternal care. These complications which include severe bleeding, infections, high blood pressure during pregnancy, complications from delivery, and unsafe

abortion (Say, et al, 2014) are preventable if women have access to quality care in pregnancy, and during and after childbirth. For instance, information on good hygiene practice and how to prevent unwanted pregnancies can reduce infection after childbirth and maternal deaths in general. Further, eclampsia-related deaths can be averted if women are encouraged to measure their blood pressure in order to identify women at risk of eclamptic convulsions, so that measures can be taken to reduce blood pressure whenever possible. The mass media can be a useful channel to disseminate such health information aim at influencing behaviour of females towards adopting healthy lifestyle and taking-up interventions meant to improve maternal health.

The mass media can be used to disseminate health messages aim at influencing the behaviour of health professionals and individuals/patients by health stakeholders (Freemantle, 1994). The objective of this study is to investigate the role of mass media in promoting the utilization of health care services by pregnant women. The mass media may play several important functions in the society, including providing information, entertainment, articulating and creating meaning, setting agendas for individual and societal discourse, and influencing behaviour. Health information, which can be convey through the radio, television, newspapers, magazines, leaflets, posters and pamphlets, may influence the use of health services such as screening for high blood pressure, cancer, HIV and sexually transmitted infections and uptake of family planning interventions by women. Effectively, the mass media may influence individual health seeking behaviour, health care practices, health policy, and health care utilization (Flay, 1987; Warner, 1987).

Investing in maternal health has both cost and health benefits. Healthy women can work more productively and apply the skills they have learned through training (Victora et al. 2008). This makes it possible for them to improve their own lives and contribute positively to the economy. Conversely, poor maternal health can influence economic growth adversely. It is estimated that maternal and new-born mortality leads to US$15 billion in lost potential productivity globally every year (USAID, 2001). Politically, improvement in maternal and

child health has been associated with peace and social stability– perhaps because it indicates how well a society treats its most vulnerable members. It is also an indicator of the performance of the health system of a country. A robust health system with good emergency care for women will produce lower maternal mortality. Importantly, there is the need for the timely dissemination of information about existing health services to the target population. More precisely, information on the availability of health interventions can influence uptake. Thus, utilization of health services can be undermined where information on availability is limited.

There are studies on the effectiveness of mass media campaign on immunization coverage (Macdonald and Roder, 1985; Paunio, et al., 1991; Hornik, et al. 2002), smoking cessation (Flay, 1987; Warner, 1987; Bala, Strzeszynski, and Cahill, 2008)), alcohol drinking (Moreira, Smith, and Foxcroft, 2009; Anderson, Chisholm, and Fuhr, 2009), HIV testing (Turner and Mutton, 1987; Joshi, et al., 1988), nutrition (Pomerleau, et al., 2005), birth rate reduction (Hornik, and McAnany, 2001), and timely initiation of breastfeeding (McDivitt, et al.,1993). However, there appear to be a paucity of information on whether health messages through mass media influences health behaviour among pregnant women in Nigeria.

This study differs from Khanal and Singh et al in three ways. First, we use a nationally representative sample from a demographic health survey dataset to investigate the role of mass media exposure in antenatal visits. We draw on the representative nature of the dataset to make conclusions with implied external validity since countries in Sub-Saharan Africa share similar health profile. Second, we measure mass media exposure differently from Khanal and Singh et al where the effects of different types of mass media were assessed. We construct a composite index that considers the exposure to all forms of mass media by the respondents. We consider such an index to be more informative especially in a setting where people are more likely to move between different type of mass media. Finally, we test the hypothesis that women health autonomy impacts on the decision to go on antenatal visits.

Nigeria is considered an ideal case for this study for several reasons. Of the 295, 000 women that died during and following pregnancy and childbirth in 2017, 94% occurred in low-income countries with SSA accounting for about two-third (196,000) (WHO, 2019). These deaths are higher in countries classified as "very high alert" or "high alert" by the fragile state index and have inequalities in access to quality health services. Nigeria fits the above description and will provide rich external validity for SSA countries. Further, women in Nigeria have, on average, more pregnancies than women in SSA countries given the fertility rate in Nigeria, and their lifetime risk of death from pregnancy is higher.

Methods

Data

The Nigerian Demographic and Health Survey (NDHS) dataset is used for this study. Specifically, the NDHS 2018, which is the sixth in the series of demographic and health surveys conducted so far in Nigeria with previous surveys conducted in 1990, 1999, 2003, 2008, and 2013 is used to assess the impact of mass media in influencing prenatal visits amongst pregnant women. At present, it is the current dataset available. The NDHS is a national sample survey that provides information on fertility levels, marriage, fertility preferences, awareness and the use of family planning methods, child feeding practices, nutritional status of women and children, adult and childhood mortality, awareness and attitudes regarding HIV/AIDS, female genital mutilation, and domestic violence. We use the women file which is a sample of 41,821 women that are between the ages of 15-49 years. The survey was conducted in conjunction with the United States Agency for International Development (USAID), the United Nations Population Fund (UNFPA), the United Kingdom Department for International Development (DFID) (through the Partnership for Transforming Health Systems Phase II [PATHS2]), and the government of Nigeria (through the National Population Commission).

Variables

The outcome variable, antenatal visits (anc_1), is considered a count variable since it has a spike at zero counts which is indicative of zero-inflation in the histogram in Figure 1. In other words, about 6000 women had zero visits with a few having above 10 visits. In the NDHS, women respondents of reproductive age (15-49 years) who had their last birth in the last five years were asked whether and from whom they received antenatal care, the number of visits, and the content of the visits. In this study, we considered the questions of "whether they saw anyone for antenatal care during the pregnancy" and for those who respond "yes" the woman is then asked about many visits she had in total during the pregnancy. In effect, we create a variable which comprises a simple count of the number of antenatal care visits. In effect, the antenatal care visit variable is recorded as a minimum of at least one visit in the first instance. In line with the literature, this was varied to 4 visits (Villar, et al., 2001; Villar, Bergsjo, Carroli, and Gulmezoglu, 2003), and subsequently, 8 visits (WHO, 2016).

The main independent variable, mass media exposure(emm), is constructed as a three-level categorical variable (no media exposure=0, irregular media exposure=1, and regular media exposure=2) indicating the extent of exposure to mass media by women. Formally, while a woman is considered as irregularly exposed to mass media if she watches television or listen to radio or read the newspaper at least once a week, she is regularly exposed to at least two of any of the media outfits within a week. The inclusion of other predictors of a woman's decision to seek antenatal care is guided by the WHO (2003). As outlined by the WHO, urban or rural residence, age, number of births, level of education, and household wealth. Wealth Index (wealth)which is derived from a principal components' analysis of the flooring material toilet facilities, cooking fuel, water source, electricity, ownership of radio, television, and bicycle adjusted by the number of household members, categorizes households into five groups-poorest, poorer, middle, richer and richest-each representing 20% of the total population. Education (Edu. Women), measured as the highest educational level attained, is categorized as (a) No education (b) Primary (c) Secondary (d) Higher; (iii) Locality of

residence (residence) is measured as: (a) Urban (b) Rural; (iv) Age (age at birth) is measured in relation to age at first birth of a woman and is categorized as: (a) less than 20 years (b) 20-34 years (c) 35 years and above. Finally, number of births (parity) is measured as the number of children ever born by the woman. For women that have ever given birth, the range of number of children varies from 1 to 17. We recoded the variable into: (a) No child (b) parity 1 (c) parity 2. In this study, We tested the hypothesis that women autonomy impacts on antenatal visit using an index (wha) that measures three decisions making rights in relation to women health: person who usually decides on respondent's health care, decision maker for using contraception, and person who usually decides how to spend respondent's earnings. we control for the religion (religion) of the woman which is measured as a categorical variable:(a) Christian (b) Islam (c) Others. Also, we constructed a geopolitical zone variable (region) for split analysis. Nigeria can be divided into six geopolitical zones expressed as (a) North Central (b) North East (c) North West (d) South East (e) South-South (f) South West. We include the health insurance status (insure) of woman as a predictor of her use of antenatal care.

In Table 1, we present summary statistics of the data using both univariate and bivariate methods. A univariate method (using frequency distribution), is used to describe the characteristics of the sample respondents across a set of socio-demographic characteristics. The basic intuition is to compare data of women who report at least four visits and women reporting no visit at all. In bivariate analysis, percentages of the variables are obtained for each category of the predictors and use to examine the unadjusted but statistically significant relationship between women with, and women with no antenatal visits by socio-demographic factors. The statistical significance is tested using a z-test (two-sample test of proportions). A 5% alpha level is considered statistically significant.

From Table 1, at the time of birth of the child, most women (99.4%) were age 35 and below, of which 57% are less than 20years. Also, most of the women (97.7) are without any form of health insurance cover, are in male headed households (89.6%), reside in rural areas (64.98%), had parity 2 (82.97) but have at least basic education (55%), are exposed to

mass media (59%), with health autonomy (68%) and husbands having basic education (62%). However, this varies significantly amongst women who did not attend antenatal care and those with at least one visit. More precisely, there are statistically significant differences between women with no antenatal visits and those with at least one visit amongst the categories of women: aged 35 years and above (86.23% vs 13.77%), with health insurance (92.5% vs 7.42%), with regular mass media exposure (88.05% vs 11.95%), and health autonomy (82.13% vs17.87%). Further, a wealth pattern in the use of antenatal care is apparent from Table 1. The proportion of women with at least one antenatal visit increases with their wealth quintiles. For instance, while about half (52%) of the women within the poorest quintile attended at least an antenatal clinic, almost every woman within the richest quintile (96%) had at least one visit. Similar pattern exists in relation to locality of residence. Urban women are more likely to embark on antenatal visits than rural women (89.18% vs 67.37%).
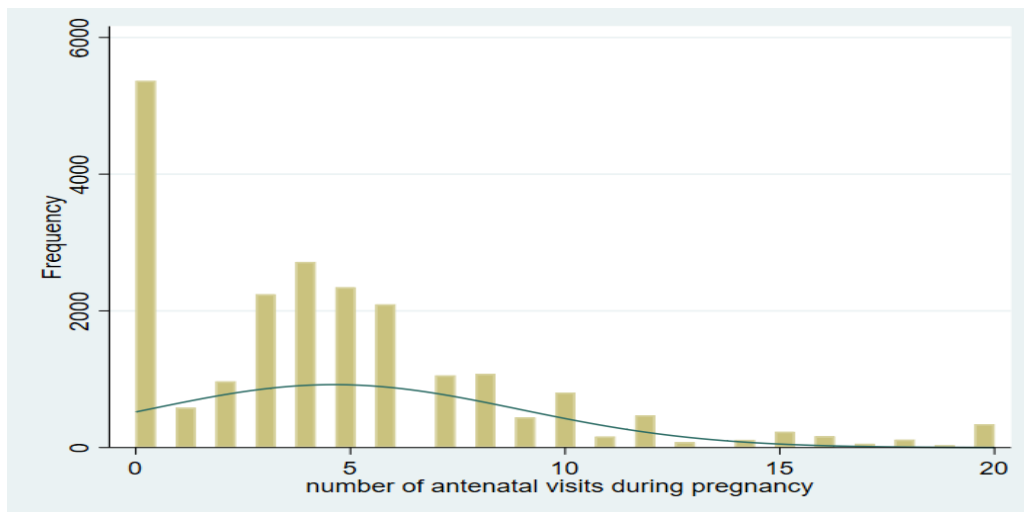

Figure 1. Histogram of the number of antenatal visits during pregnancy.

Statistical Analysis

We estimate a negative binomial regression model that expresses antenatal care visits as a function of mass media exposure, health insurance, health autonomy, education, wealth index, parity, and age at first birth. The choice of a negative binomial regression model is based on

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the assumption of the zeros in the data (Bhaktha, 2018). In Figure 1, we can see that most women do not attend any prenatal visit during their last pregnancy as indicated by a spike at zero counts in the histogram-zero inflation. We assume that the zeros observed in the data due to a count distribution (negative binomial) are sampling zeros. In other words, the number of visits is zero for some respondents because they did not attend antenatal care during their last pregnancies and not that they might not attend antenatal care at all-structural zeros. That is, since we are interested in modelling the total number of antenatal care visit reported by women within reproductive age during their last pregnancies, it is possible to argue that the only source of zero counts from the data could be sampling zeros where all zero visits are due to none visits to antenatal care clinics. Said differently, we assume that the response variable is over-dispersed –over dispersion in the data takes no identifiable shape-and does not have an excess number of zeros, hence we use the negative binomial model.

Effectively, we perform the negative binomial model to obtain estimated regression coefficients for the model. The conditional mean, $E(Y|X)$, is modelled as:

$$\log(E(Y_i|X_i)) = log(\mu_i) = \beta_0 + \beta_1 * emm_{1i} + \beta_\rho * X_{pi}$$

Where Y_i is the outcome variable (anc_1), emm_{1i} is the exposure to mass media and X_{pi} is a vector of predictor variables associated with Y. We interpret β_1 as: using no exposure as the reference category, if $\beta_1 > 0$-the coefficient for the irregular mass media exposure category-, the difference in the logs of expected counts is considered to be positive and higher for women with irregular exposure to mass media holding other variables constant in the model. Finally, we calculate the risk ratios (RRs) and the corresponding 95% confidence interval for each category of the predictors. The Stata/MP 16.0 statistical package was used for the analysis.

Table 1. Summary Statistics

Variable	Antenatal care visits			
	Total	No visit	At least one visit	z-score
Age at Birth				
Less than 20years	12,261(57.12)	3,872(31.58)	8,389(68.42)	0.0000
20-34years	9,066(42.23)	1,474(16.24)	7,592(83.74)	0.0000
35 year Above	138(0.6)	19(13.77)	119(86.23)	0.0000
Insurance Coverage				
Not insured	20,980(97.74)	5,329(25.40)	15,651(74.60)	0.0000
Insured	485(2.26)	36(7.42)	449(92.58)	0.0002
Mass media Exposure				
No Exposure	8,468(39.45)	3,399(40.14)	5,069(59.86)	0.0000
Irregular	4,864(22.66)	994(20.44)	3870(79.56)	0.0000
Regular	8,133(37.89)	972(11.95)	7,161(88.05)	0.0000
Sex of HH Head				
Male	19,238(89.6)	4,975(25.86)	14,263(74.14)	0.0000
Female	2,227(10.37)	390(17.51)	1,837(82.49)	0.0000
Religion				
Islam	12,606(59.00)	4,130(32.76)	8,476(67.24)	0.0000
Other	8,758(40.99)	1,187(13.55)	7,571(86.45)	0.0000
Health Autonomy				
No Autonomy	6,396(32)	2,621(40.98)	3,775(59.02)	0.0000
Autonomy	13,653(68)	2,440(17.87)	11,213(82.13)	0.0000
Education (Woman)				
No education	9,491(44.21)	4,091(43.10)	5,400(56.90)	0.0000

Contd…				
Primary	3,340(15.56)	576(17.25)	2,764(82.75)	0.0000
Secondary	6,894(32.11)	678(9.83)	6,216(90.17)	0.0000
Higher	1,740(8.1)	20(1.15)	1,720(98.85)	0.0000
Education (Husband)				
No Education	7,120(35.87)	3,421(48.05)	3,699(51.95)	0.0010
Primary	2,853(14.37)	525(18.4)	2,328(81.6)	0.0000
Secondary	6,907(34.80)	904(13.09)	6,003(86.91)	0.0000
Higher	2,965(14.94)	140(4.72)	2,825(95.28)	0.0000
Parity				
Parity1	3,655(17.03)	714(19.53)	2,941(80.47)	0.0000
Parity2	17,810(82.97)	4,651(26.11)	13,159(73.89)	0.0000
Wealth Index				
Poorest	5,011(23.34)	2,396(47.81)	2,615(52.19)	0.0020
Poorer	4,871(22.69)	1,599(32.83)	3,272(67.17)	0.0000
Middle	4,518(21.04)	825(18.26)	3,693(81.74)	0.0000
Richer	3,946(18.38)	421(10.67)	3,525(89.33)	0.0000
Richest	3,119(14.53)	124(3.98)	2,995(96.02)	0.0000
Residence				
Urban	7,516(35.02)	813(10.82)	6,703(89.18)	0.0000
Rural	13,949(64.98)	4,552(32.63)	9,397(67.37)	0.0000

Results

In this section, we present the empirical results of the negative binomial modelling of antenatal visits as a function of mass media exposure and other covariates. First, we estimate the total effect of mass media exposure, test the hypothesis that women autonomy impacts on antenatal care visits, and check for the robustness of the effect of mass media exposure by controlling for other confounding factors. Second, we use different measure of antenatal care visit in line

with the WHO recommendations. The WHO, based on a randomised WHO Antenatal Care Trial (WHOACT) in 2001, recommended that pregnant women with uncomplicated pregnancies should receive minimum of four antenatal care visits, with the first visit occurring before 14 weeks of gestation (Villar, Bergsjo, Carroli, and Gulmezoglu, 2003). This was later revised to at least eight contacts: one contact in the first trimester, two contacts in the second trimester, five contacts in the third trimester (WHO, 2016). In effect, we investigate whether the slope of the relationship between antenatal care visits and mass media exposure differ by number of visits. Third, we investigate the determinants of the quality of antenatal care visits using the probit model. We measure the quality of antenatal visit using a variable that indicates whether a woman was receiving assistance from a medically trained provider which includes doctor, nurse, midwife/auxiliary midwife, and community/health extension worker. Finally, we investigate within the predictors of quality of antenatal care visit, the drivers of the place of delivery for women.

Mass Media exposure, Women autonomy, and antenatal visits

Table 2 answers the questions whether women with media exposure are more likely to have at least one antenatal care visit than women with no media exposure, and whether women health autonomy influences the decision to have at least one antenatal care visit. We discover that mass media exposure increases the chances of women having at least one antenatal visit and the effect is greater if women are regularly exposed to mass media. Also, we discover that women autonomy influences the decision of women to have at least one antenatal visit. In general, our model identifies mass media exposure, women autonomy, mothers' and fathers' educational level, wealth quintile, locality of residence, parity and religion as statistically significant predictors of frequency of antenatal care visits among women in Nigeria.

In column 1, we use the specification that regress only mass media exposure on antenatal visit to assess the total effect of mass media on having at least one antenatal care visit amongst 21,145 women. In other words, we estimate the negative binomial regression coefficients comparing the different levels of exposure to mass media. We discover that, while

women with irregular mass media exposure compared to women without mass media exposure, have 28% more chances of having at least one antenatal care visits, women with regular mass media exposure compared to irregular mass media exposure, have higher chances (38%) of having at least one antenatal care visits. In column 2, we investigate whether women autonomy impacts on antenatal visits. We discover that women with health autonomy have 24% higher chances of having at least one antenatal care unit compared to women without health autonomy.

We control for socio-demographic factors in column 3. We discover that the effects of mass media exposure and women autonomy were robust (though with reduced effect sizes) to the inclusion of other factors. To be clear, the relationship between mass media exposure and having at least one visit is strong and positive but the chances are only 7% higher for women with irregular mass media exposure compared to women with no mass media exposure. For women with irregular media exposure compared to those with regular exposure, the chances for having an antenatal visit are 8% higher. Similarly, women with health autonomy have 15% higher chances of having at least one antenatal visit compare to women without health autonomy controlling for other factors in column 3. Also, we discover that women education is positively associated with having at least one antenatal visit. Women with primary education compare to those without any form of education are 14% more likely to have at least one antenatal visit and this is comparable for women with secondary and tertiary education. Similar positive but stronger relationship exists for women having at least one antenatal visits and husband education. For instance, the chances that a woman will have at least one antenatal visit if the husband has primary education compare to husbands without any form of education is 25%. Wealth status of women appear to matter in the decision to have antenatal visit in the study area. Indeed, while women within the poorest quintile compared to poorer women are 14% more likely to have at least one antenatal visit, women in the richest group compared to those in the poorest group are 19% more likely to have at least one visit. Further, a negative statistically significant relationship exists between having antenatal visits

and parity. Women with higher parity have 3% lower chances of having at least one antenatal visit compare to women with lower parity. Finally, we discover that the place of residence of women can influence their decision on whether the visit an antenatal care clinic or not. More precisely, rural women have 5% lower chances of visiting an antenatal care clinic, at least once, compare to urban women.

Further, we investigate among women with the WHO recommended number of antenatal visits, the factors that determine their extent of compliance. In Table 3, we present results of the predictors of having at least, 4 and 8 antenatal visits. We discover that exposure to mass media, women health autonomy, education, wealth index, locality of residence, religion and parity are statistically significant predictors of the extent of compliance with WHO number of recommended visits. However, health insurance appears not to matter in determining the level of compliance with respect to 4 visits and 8 visits respectively. Similarly, older women (35 years and above) compared to women within the age bracket of 20-34 years, are likely not to comply with the WHO recommendations. Also, while parity is statistically significant in predicting whether women will have at least 4 visits, it is associated with having at least 8 visits in a statistically insignificant relationship.

Mass Media, Women Health Autonomy and Timing of Antenatal visits

Maternal health care programmes are designed to ensure that women present themselves for antenatal care early in pregnancy-at least a visit within the first trimester (WHO, 2016). This is to allow sufficient time for essential diagnosis and treatment regimens such as treatment of sexually transmitted infections and management of anaemia. Basically, we investigate whether exposure to mass media and women health autonomy predict early initiation of antenatal care using logistic regression. Our result in Table 4 fails to reject the hypothesis that mass media exposure does not matter in influencing timely antenatal care in Nigeria. This is in contrast with findings from Uganda where lack of awareness about antenatal care was associated with late initiation of antenatal care visits (Kisuule, et al., 2013). Women autonomy was found to be positively associated with timely antenatal care initiation. More precisely, women with

health autonomy were discovered to be 1.14 times more likely to present for antenatal care visit in their first trimester than women without health autonomy (OR=1.14, (95% CI: 1.01-1.29)).

Further, findings from Table 4 suggest that women are likely to present for antenatal care visit in the first trimester if they are: educated, reside in rural areas, older and having lower parity. In effect, we found that higher levels of education are positive associated with increased number of times women are more likely to present for antenatal care visit in their trimester. For instance, women with higher education compared to women without formal education are 2.30 times more likely present for antenatal care visit in their first trimester (OR=2.30, (95%CI: 1.85-2.86)). In addition, women that are 35 years and above are 2.11 times more likely to present for antenatal care visit in their first trimester than women that are below 20 years (OR=2.11, (95% CI:1.19-3.74)). Two interesting findings were made from the regression results in Table 4. First, rural women are more likely to present for antenatal care visit in their trimester compared to urban women (OR=1.15, (95% CI: 1.00-1.33)). While the reason for the seemingly counterintuitive result is unclear, it is plausible to suggest that women residing in urban areas are likely to be more confident in managing early pregnancies given their exposure to health education. Second, exposure to mass media and husbands' education appear not to matter in influencing the decision for early antenatal care visit. Though mass media exposure impacts on the chances of having at least one antenatal care visits (see Table 2), it is unclear why it does not matter in determining whether women present for early antenatal care visit. The relationship between wealth index and the early presentation for antenatal care visit appear to be mix. While poorer women compared to women in the poorest quintile are 1.19 times more likely to present for early antenatal visit, the relationship is not statistically significant with respect to middle and richer quintiles (OR=1.19, (95% CI: 1.00-1.43). It is, however, significant when the poorest quintile is compared with the richest quintile (OR=1.53, (95% CI:1.00-1.33)).

Discussion

Findings from this study suggest that mass media exposure is strongly associated with women decision to have antenatal care visits and the extent of their compliance with WHO recommendations of antenatal visits in Nigeria. Similar findings have been reported in Bangladesh (Shahjahan, et al., 2013), India (Nimbalkar, 2008) and Uganda (Edward, 2011). It is possible that women that are exposed to mass media are more likely to receive health information from messages through the television, radio or the newspaper. Such messages encourage women to attend antenatal clinics where they are educated on their wellbeing as well as that of their foetuses and how to detect any pregnancy complications (danger signs and symptoms) and necessary measures to take. In effect, the media can influence women's health behaviour in respect of having antenatal care visit. We discover that the mass media is important in determining the extent of compliance with the WHO recommended number of antenatal care visits for women. It was statistically significant in influencing the decision of women to have the recommended 4 or 8 antenatal care visits. Specifically, the mass media is identified as a predictor of achieving compliance with the minimum level of recommended antenatal visits contained in the WHO Antenatal Care Trial (WHOACT) of 2001 or the revised 2016 WHO Antenatal care guidance. An implication of our finding is that to increase ANC attendance, reaching women using the mass media is essential and translating health information into local languages may be a useful way to increase readership of newspapers or television/radio audience.

Women with health autonomy were discovered to have higher chances of having at least one antenatal care visit. Also, we discovered that women with health autonomy used antenatal care for their last birth to a greater extent than women without health autonomy. We describe health autonomy in terms of the ability of women to participate in decision making over health care, the use of contraceptives, and finances. Women with autonomy are more likely to initiate the decision to have antenatal visit and decide on its frequency as well. This

finding has support in the literature (e.g., Bloom, Wypij, & Das Gupta, 2001; Rahman, Mostofa, & Hoque, 2014; Upadhyay & Hindin, 2005)

Among other factors identified as determinants of having at least one antenatal care visits and having the recommended standards of frequency, women levels of educational attainment were found to have positive association with having at least one antenatal care visits as well as the frequency of antenatal care visits in Nigeria. Similar findings were made in Bangladesh (Islam and Masud, 2018) and china (Nwaru, Wu, & Hemminki, 2012). This is because, educated women are more likely to have knowledge about maternal health care and will be less willing to take risk with their pregnancies. Hence, the extent of utilization of health care services and consequently, the frequency of antenatal care visits, is expected to be high amongst educated women. It is also possible that income earning ability of educated women and their increased likelihood to have autonomy will interact to influence their maternal health seeking behaviour. Additionally, we discover that husbands' education is positively associated with having at least one antenatal care visit as well as with the greater use of four or eight antenatal care visits. A policy implication of these findings is that improving maternal health through increase use of antenatal care visits can be achieve with robust interventions that encourage school enrolment and completion especially of females. Also, findings from this study showed that household wealth quintiles of women are positively associated with both having at least one antenatal care visit and the frequency of antenatal care visits. In other words, household wealth status could impact on the maternal health seeking behaviour of women. Thus, economic empowerment programme targeting women within the reproductive age could be a viable way of improving maternal health. Women living in rural areas were found to be less likely to have antenatal care visit compared to their urban counterparts. Rural women are more likely to be faced with issues of poor accessibility to health facility and are likely to have lower socio-economic conditions which can interact and impact on their decision to use antenatal care. Finally, we discover that higher parity reduces the chances of having antenatal care visits as well as the recommended frequency of antenatal care visits.

Said differently, women are less likely to have antenatal visits with increased number of children. The increased use of antenatal care associated with lower parity has been attributed to anxiety from possible complications especially with the first or second pregnancy. With higher parity, such anxiety is likely to wane (Bloom, Lippeveld, and Wypij, 1999).

However, women autonomy was found to be significant and positively associated with early initiation of antenatal visits. Cultural factors, gender roles and expectations are likely to constraint decision making power of women on seeking early antenatal care. Such barriers and how they influence health seeking behaviour of women is documented in the literature (e.g., Reta and Reta, 2015). Also, we discover the woman educational level, wealth index, and whether she resides in rural area will positively impact her decision to initiate early antenatal care visit. Further, we identify the age of women at first birth and the number of children she has deliver to be associated with the decision to seek antenatal care in her first trimester.

CONCLUSION

The high maternal mortality of Nigeria (917 per 100,000 live births) can be reduced to meet the international target of 30 per 100,000 live births by 2030 through effective interventions. Findings from this study show that exposing women to mass media has the potential to influence their maternal health seeking behaviour in Nigeria. It is effective in determining whether women will have antenatal visit and the frequency of antenatal care. Health messages conveyed through the mass media can alter the pattern of health behaviour of women. Effectively, information about existing or new antenatal care programmes by government and non-government organization as well as awareness campaigns can be achieved using the mass media. In designing effective antenatal care programmes, identification of drivers of the decisions to use antenatal care, the frequency, and the timeliness of care use will be crucial. This study identified health autonomy, education, wealth status, low parity, and living in rural area to be associated with the decision whether to have antenatal care, having recommended number of antenatal care visits and timeliness of antenatal care visits. The findings of having health autonomy, and the decision to have antenatal visit, its frequency and timeliness suggest

that policies to enhance the bargaining power of women is needed and this can be achieved through economic empowerment. Micro-credit programmes have shown to be important in enhancing the socio-economic status of women and this can interact with multiple predictors of antenatal care. Similarly, achieving the recommended number of antenatal care visits will require policies that target poor urban women with high parity but low education.

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