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What Does Mass-media have to do with Contraceptive Uptake among Nigerian Women? Evidence from Performance Monitoring and Accountability 2020

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Authors' contributions

This work was carried out in collaboration among all authors. All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

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ABSTRACT

Background: Mass media plays an important role in information dissemination in Nigeria and studies have shown that the interrelationship that exists between reproductive health behaviour and mass media campaigns on the use of modern contraceptives have resulted in the improvement of reproductive health outcomes. There is a need to examine the differentials in mass

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media-related behaviour change communication for family planning among Nigerian women of reproductive age with respect to their wealth index and educational status using nationally represented sample.

Methods: We used data from the most recent round of publicly available data from Performance Monitoring and Accountability 2020 (PMA2020) in Nigeria with nationally representative samples. The prevalence of lifetime contraceptive use was computed to provide the context in which birth dynamics are occurring across all variables and to examine the statistical significance of cross-tabulation results. We then conducted multivariable logistic regression to determine the factors associated with contraceptive use.

Results: The proportion of women in low wealth quintile were slightly higher (53%) than the rich women (47%). The mass media related behaviour change communication showed that women who had heard of family planning on radio were 60.7%, television, 38.2%, and on newspaper/magazine was 18.2%. Also, use of mass media in receiving information about family planning increases by increasing level of women's education. Women from lowest household wealth quintile, and have heard about family planning on television were 1.63 (OR= 1.63; 95%CI: 1.13, 2.34) times as likely to use any contraceptive method, compared with those who did not hear about family planning on television.

Conclusion: Our findings revealed that Radio, followed by the television, were reportedly the main sources of family planning messages. Also, the use of mass media and socioeconomic status are associated with contraceptive utilization, and leads to increased use of a FP product.

Keywords: Performance monitoring and accountability 2020; contraceptive use; Education; Wealth; PMA 2020.

1. BACKGROUND

Population growth of any country is determined by her fertility rate. The more the population of a country grows, the more the need to provide basic infrastructural amenities and social services to the people [1] however, modern family planning utilization is fundamental and a very essential tool to improve a population's quality of life [1-5]. Precisely, an estimated 29% reduction in pregnancy related deaths worldwide had been associated with family planning, and its use had prevented over 200,000 maternal deaths in 2010 globally [3].

Improving quality of life by reducing maternal mortality among women who play important role in the population growth of any country has been the main issue of discussion of world leaders [6] and these had led to the resolution to reduce the maternal mortality by 75% by 2020 [6-7]. To achieve the global goal of 75% reduction in pregnancy related deaths, The Family Planning 2020 (FP2020) launched an essential campaign to support the rights of additional 120 million women of reproductive age to freely decide for themselves whether, when, and how many children they want to have by using modern family planning [7] as this is vital in meeting Goal 3 and 5 of the Sustainable Development Goals (SDGs), which relates to health, gender equality and women empowerment [6-7].

Although, fertility desire continue to be on the increase among couples in Nigeria [8-9] millions of women of reproductive age still desire to delay or stop childbearing, nevertheless they are not using any family planning method which among many other factors increases unwanted pregnancies and pregnancy-related complications that is responsible for the high maternal deaths most especially in developing countries [10].

Despite successive program implementations, the utilization of any family planning method to delay or prevent unplanned pregnancy is still very low [8,11–13]. This poor level of utilization had been associated to the educational level and socioeconomic status of the couples [5,13,14]. Studies have shown that unexpected or unplanned pregnancies, unsafe abortion, neonatal death and maternal mortality due to pregnancy-related complications are the direct and indirect consequences of the low level of family planning usage [8,15]. The significant reduction of unexpected or unplanned pregnancies and unsafe abortions which will thereby reduce the burden of maternal mortality among sexually active women of reproductive age in Nigeria will depend on the effective utilization of modern contraceptive [16] To increase the level of family planning usage, couples and sexually active individuals must

have access to the right information as regards it usage and benefits either through interpersonal tutoring or the mass media.

Mass media play an important role in information dissemination in Nigeria. The traditional mass media such as television, radio and Newspaper had been an important tools in promoting not just product advertisement, entertainment but also public health issues [1,4,17,18]. Also, it is a reliable source of information that raises awareness, increase knowledge (on benefits and side-effect), and impact on the populace behaviour towards family planning usage [17]. Studies have shown that mass media campaigns on the use of modern contraceptives have resulted in the improvement of reproductive health behaviours [1,4,17,18]. Evidence abound in learned literatures on the dynamic interrelationship between mass media and reproductive health behaviour as regards the use of family planning method [1,4,17,18]. These dynamics were also found to negatively influence sexual behaviours such as promotion of non-use of contraceptives, domestic violence, and enculturation of foreign lifestyles especially within the context of entertainments [1,17,18].

However, with respect to the benefits of family planning usage and the mode of information dissemination utilized, there are differentials in the response rate of couples and sexually active individuals [17]. These differentials in response rate of couples and sexually active individuals can be attributed to educational level and socioeconomic status of the couples, marital status, and spousal relationship that influence people's attitude to family planning usage [5,13,14,17]. Despite increased level of awareness about family planning usage, there is low level of adoption of modern family planning methods by rural community dwellers in Nigeria [17]. This low level adoption can be implicated on the increasing desire for large family size, and the desire for male children [8,9,17]. Also, differentials in modern family planning method utilization with respect to socioeconomic status, religion, location and educational level also exist in some literature [8-14,19–22], other factors of modern family planning method utilization in Nigeria include ethnicity, spousal approval and communication with spouse [17].

Furthermore, since literatures have established the interrelationship between mass media and reproductive health behaviour [1,4,17,18], the role of mass media towards the improvement of maternal and reproductive health in Nigeria cannot be over emphasised. Since studies have shown that mass media has the ability to influence couples and sexually active individuals' behaviour towards the adoption of modern family planning method, there is need to examine the differentials in mass media-related behaviour change communication for family planning among Nigerian women of reproductive age with respect to their wealth index and educational status using recent nationally represented sample. The findings from this study will be valuable in identifying ways mass media can be used in improving the effective utilization of modern family planning methods in Nigeria.

2. METHODS

2.1 Data Source

We used data from publicly available data from Performance Monitoring and Accountability 2020 (PMA2020) in Nigeria with nationally representative samples. The data was collected in 2017. PMA2020 uses female resident enumerators to conduct surveys of households and women aged 15 to 49 years. The sampling procedure was based on probabilistic multi-stage cluster random sampling design using urban/rural and/or region as the strata. The PMA2020 project was implemented by local partner universities and research organizations with technical support and direction provided by the Bill and Melinda Gates Institute for Population and Reproductive Health in the Department of Population, Family and Reproductive Health at the Johns Hopkins Bloomberg School of Public Health. The major focus of PMA2020 data is the utilization of contraceptive methods by women of reproductive age, childhood nutrition and unintended pregnancies [23].

2.2 Measurement of Variables

The outcome and explanatory variables used for this study are shown in Table 1.

Table 1. Variables selection and measurement

Variable	Categories	Description
Outcome variables		
Contraceptive use	• Currently use of any contraceptive method • Currently use of modern contraceptive	These categories were measured dichotomously (Yes/No) to determine the level of contraceptive utilization among women of reproductive age.
Explanatory variables		
Age (years)	15-19/20-24/25-29/30-34/35-39/40-44/45-49	The current age of respondents were re-grouped in 5 years interval.
Zone	North Central/North East/North West/South East/South South/South West	This is the geopolitical zones of origin of respondents. Nigeria has six geopolitical zones
Place of residence	Urban/Rural	Respondents were grouped by place of residence.
Religion	Catholic/Other Christians/Islam/Traditionalist/Other religion	The religious affiliations of respondents were categorized as prevalent in Nigeria.
Heard about family planning on radio	Yes/No	The prominent media of family planning information were measured dichotomously
Heard about family planning on television	Yes/No	
Read about family planning on newspaper/magazine	Yes/No	
Number of children ever born	Nil/1-2/3-4/>4	Total number of children ever born was used to measure fertility rate of respondents.
Ever given birth	Nulliparous/Parous	The parity of respondents was measured dichotomously on whether a woman had ever given birth or not.
Marital status	Never married/married	This variable describes the type of relationship of each respondent.
Highest level of school attended	No formal education/Primary/Secondary/Higher	Educational attainment was determined by the level completed
Total unmet need	No unmet need/unmet need (limiting or spacing)	Total unmet need was measured in binary form
Wealth index	Lowest (Poorest)/Lower (Poorer)/Middle/Higher (Richer)/Highest (Richest)	PMA2020 include questions about household assets including type of floor, roof, walls; source of water including open well, stream, or piped system; other assets including radio, fan, automobile, electricity, television, refrigerator, cooking fuel, furniture. Using these indicators, economic status was measured by computing a 'wealth index' using principal component analysis. The factor loadings and z-scores were calculated. For each household, the indicator values were multiplied by the loadings and summed to produce the household's wealth index value. The standardized z-score was used to disentangle the overall assigned scores to quintiles.

2.3 Data Analysis

PMA2020 used complex sampling design that involved clustering of households. Hence, we applied sampling weights to account for differentials in probabilities of selection. We computed the prevalence of contraceptive use across socioeconomic status to provide the context in which birth dynamics are occurring and across all variables to examine the statistical significance of cross-tabulation results. The collinearity testing method utilized the variance inflation factor of 10 to detect interdependence between variables. A cut-off of 10 and above was used to examine the multicollinearity, known to cause major concerns. Therefore, the variable; ever given birth was retained in the logistic regression model [24]. We then conducted multivariable logistic regression to determine the factors associated with contraceptive use. Analyses were conducted using Stata Version 14 (StataCorp 2014). Statistical significance was determined using an alpha of less than or equal to 0.05 and 95% confidence intervals (CIs).

3. RESULTS

The distribution of respondents' characteristics was presented in Table 2. The majority of respondents were from North West geopolitical zone (40.6%), next was North Central zone (16.2%), while the least was from North East zone (7.2%). Women aged 15-19 years accounted for about 21.3% of the respondents, those aged 20-24 years and 25-29 years were 17.6% and 17.5% respectively. The religious background of respondents showed that Catholics were 13.7% while other Christians accounted for 36.1%. Women from Islamic faith were accounted for approximately 48.1%. For the marital status, women who were currently married or living with a partner and those who had ever given birth accounted for about two-third each of total respondents respectively, while those who were never married were 28.1%. Those who never had formal education were approximately 22.7%, while those with higher formal education were about 14.9%. The lowest and lower wealth quintiles were 29.6% and 23.4% respectively. While women in the middle, higher and highest wealth quintiles summed up to 47%. This showed that proportion of women in low wealth quintile were slightly higher than the rich women. The mass media related behaviour change communication showed that women who had heard of family planning on radio were 60.7%, those who heard on television were 38.2%, read about family planning on newspaper/magazine was 18.2%, received call or text about family planning on mobile phone was 9.3%, read about family planning in a brochure, leaflet, or flyer was 14.5% and those who had seen a poster or billboard with a family planning message were approximately 29.6% respectively. See Table 2 for details.

The percentage of women who had used family planning services was presented in Fig. 1. For current use of any contraceptive method, about 19.0% of Nigerian women of reproductive age responded positive. Furthermore, women who current use modern contraceptive method were approximately 14.2% respectively. See details in Fig. 1.

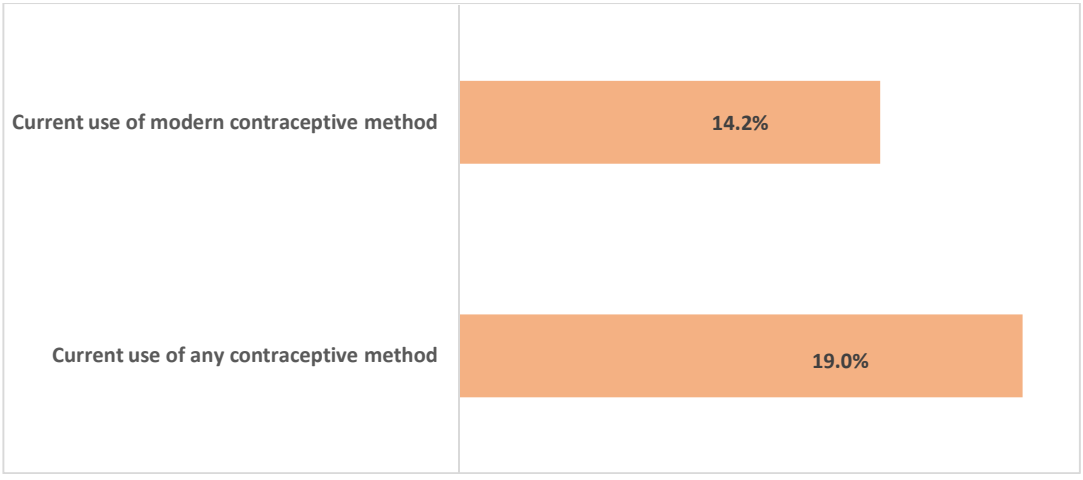

Fig. 1. Percentage of contraceptive use among women aged 15-49 years

Table 2. Percentage distribution of respondents; n= 11,380

Variable	Count (n)	Percent (%)
Geographical zone		
North Central	1846	16.2
North East	818	7.2
North West	4615	40.6
South East	1403	12.3
South South	1163	10.2
South West	1535	13.5
Place of residence		
Urban	5338	46.9
Rural	6042	53.1
Age (years)		
15-19	2427	21.3
20-24	1999	17.6
25-29	1991	17.5
30-34	1836	16.1
35-39	1401	12.3
40-44	965	8.5
45-49	761	6.7
Religion		
Catholic	1560	13.7
Other Christian	4103	36.1
Islam	5459	48.1
Traditionalist	108	1.0
Others	122	1.1
Marital status		
Currently married	7627	67.1
Formerly married	550	4.8
Never married	3199	28.1
Ever given birth		
Yes	7723	67.9
No	3650	32.1
Highest level of school attended		
Never	2587	22.7
Primary	2140	18.8
Secondary	4953	43.6
Higher	1697	14.9
Wealth index		
Lowest	3369	29.6
Lower	2661	23.4
Middle	1950	17.1
Higher	1758	15.5
Highest	1642	14.4
Heard about family planning on radio		
Yes	6901	60.7
No	4459	39.3
Heard about family planning on television		
Yes	4338	38.2
No	7020	61.8
Read about family planning in newspaper/magazine		
Yes	2068	18.2
No	9273	81.8
Received call or text about family planning on mobile phone		
Yes	1052	9.3
No	10285	90.7
Read about family planning in a brochure, leaflet, or flyer		
Yes	1644	14.5
No	9700	85.5
Seen a poster or billboard with a family planning message		
Yes	3365	29.6
No	7995	70.4

Results from Table 3 showed differences in the proportions of mass media-related behaviour change communication methods across wealth quintile levels. Overall, use of mass media in receiving information about family planning increases by increasing level of wealth quintile. This showed that the proportion of women from disadvantaged household were least to receive information about family planning irrespective of the method. The methods; heard about family planning on radio, television, read about family planning on newspaper/magazine, in a brochure, leaflet, or flyer and seen a poster or billboard with family planning message were considered in this study. See Table 3 for details.

From Table 4, there were differences in the proportions of mass media-related behaviour change communication methods across educational levels. In general, use of mass media in receiving information about family planning increases by increasing level of women's education. This showed that the proportion of women with no formal education were least to receive information about family planning irrespective of the method. The methods; heard about family planning on radio, television, read about family planning on newspaper/magazine, in a brochure, leaflet, or flyer and seen a poster or billboard with family planning message were considered in this study. The details of the results are presented in Table 4.

The results from Table 5 showed that among women from lowest household wealth quintile, women who heard about family planning on television and saw a poster or billboard with a family planning message were 1.63 (OR= 1.63; 95%CI: 1.13, 2.34) and 3.46 (OR= 3.46; 95%CI: 2.67, 4.49) times as likely to use any contraceptive method, compared with those who did not hear about family planning g on television or seen a poster or billboard with a family planning message respectively. Similarly, among women from lower and middle household wealth quintile, those who heard about family planning on television were 1.69 (OR= 1.69; 95%CI: 1.31, 2.18) and 1.65 (OR= 1.65; 95%CI: 1.27, 2.14) times as likely to use any family planning method, compared with those who did not hear about it on television. Furthermore, among women in higher household wealth quintile, those who received call or text about family planning or seen a poster or billboard with family planning message were 1.43 (OR= 1.43; 95%CI: 1.06, 1.93) and 1.41 (OR= 1.41; 95%CI: 1.10, 1.81) times as likely to use any contraceptive method when compared with those who did not receive call or text and those who did not see a poster or billboard with family planning message. Among women in the highest wealth quintile, those who read about family planning in a brochure, leaflet, or flyer and those who saw a poster or billboard with family planning message were 1.78 and 1.77 times as likely to use any contraceptive method, compared with women who did not read about family planning in a brochure, leaflet, or flyer and those who did not see a poster or billboard with family planning message.

Among women from lowest household wealth quintile, those who heard about family planning on television or seen a poster or billboard with a family planning message were 2.15 and 3.60 times as likely to use modern contraceptive methods when compared with those who did not hear about family planning on television or saw a poster or billboard with family planning message. Similarly, among women from lower household wealth quintile, those who heard about family planning on television were 2.15 (OR= 2.15; 95%CI: 1.45, 3.17) times as likely to use modern contraceptive methods, compared with those who did not hear about family planning on television. In addition, for women in middle wealth quintile, those who heard about family planning on television were 2.05 times as likely to use modern contraceptive when compared with who did not hear about family planning on television (OR= 2.05; 95%CI: 1.52, 2.76). Among women of higher and highest household wealth quintile, those who saw a poster or billboard with a family planning message were 1.88 and 1.53 times as likely to use modern contraceptive when compare with women who did not see a poster or billboard with family planning message. More so, women from higher wealth quintile who received a call or text about family planning were 1.48 (OR= 1.48; 95%CI: 1.07, 2.05) times as likely to use modern contraceptive method, compare with those who did not receive a call or text about family planning.

In Table 6, we presented the results by educational level. Among women with no education, women who heard about family planning on television, received call or text about family planning and saw a poster or billboard with a family planning message were 2.29, 2.35 and 3.46 times as likely to use any contraceptive method, compared with women who did not hear about family planning on television, received call or text about family planning on mobile phone or

Table 3. Wealth inequalities mass media related behaviour change communication for contraceptive use

Contraceptive use	Household wealth quintile	Heard about family planning on radio	Heard about family planning on television	Read about family planning in newspaper/magazine	Received call or text about family planning on mobile phone	Read about family planning in a brochure, leaflet, or flyer	Seen a poster or billboard with a family planning message
Current use of any contraceptive method	Lowest (%)	52.8	17.0	4.7	4.4	4.4	36.1
	Lower (%)	64.0	44.0	16.3	9.6	14.4	32.0
	Middle (%)	74.3	63.1	31.6	18.4	25.9	44.0
	Higher (%)	78.0	70.9	38.4	21.1	31.3	52.4
	Highest (%)	75.6	74.6	41.9	22.5	40.0	55.0
Current use of modern contraceptive method	Lowest (%)	54.3	19.9	5.7	4.3	4.6	37.2
	Lower (%)	64.1	45.3	16.6	9.7	13.7	31.6
	Middle (%)	75.0	66.9	31.3	18.7	26.6	44.5
	Higher (%)	76.9	71.2	37.7	21.8	31.0	54.4
	Highest (%)	75.7	75.0	43.8	24.8	41.4	57.7

Table 4. Education inequalities mass media related behaviour change communication for contraceptive use

Contraceptive use	Education	Heard about family planning on radio	Heard about family planning on television	Read about family planning in newspaper/magazine	Received call or text about family planning on mobile phone	Read about family planning in a brochure, leaflet, or flyer	Seen a poster or billboard with a family planning message
Current use of any contraceptive method	No formal education (%)	57.7	23.9	3.0	6.8	4.3	32.9
	Primary (%)	66.1	40.7	12.2	7.6	12.0	36.9
	Secondary (%)	70.5	60.1	28.5	17.6	24.2	42.5
	Higher (%)	76.8	73.4	49.0	22.2	42.9	59.3
Current use of modern contraceptive method	No formal education (%)	59.9	26.2	2.7	7.0	3.7	32.6
	Primary (%)	66.1	42.8	12.8	7.6	10.6	38.5
	Secondary (%)	70.0	60.9	27.7	17.8	23.9	42.9
	Higher (%)	75.7	72.7	50.6	23.4	43.6	60.6

saw a poster or billboard with a family planning message. Among women with primary education, those who heard about family planning on television and saw a poster or billboard with a family planning message were 1.79 (OR= 1.79; 95%CI: 1.34, 2.38) and 2.24 (OR= 2.24; 95%CI: 1.76, 2.85) times as likely to use any contraceptive method, compared with women who did not hear about family planning on television and did not see a poster or billboard with a family planning message. Furthermore, among women with secondary education, those who heard about family planning on television, received call or text about family planning on mobile phone, read about family planning in a brochure, leaflet, or flyer and saw a poster or billboard with a family planning message were 1.57, 1.60, 1.26 and 1.26 times respectively as likely to use any contraceptive method, compared with women who did not use any of the mass media channels. In addition, among women with higher education, those who heard about family planning on television and saw a poster or billboard with a family planning message, were 1.28 (OR= 1.28; 95%CI: 1.01, 1.62) and 1.29 (OR= 1.29; 95%CI: 1.04, 1.60) times as likely to use any contraceptive methods, compared with those who did not hear about family planning method on television or saw a poster or billboard with a family planning message.

More so, among women who had no formal education, those who heard about family planning on television, received call or text about family planning on mobile phone and saw a poster or billboard with a family planning message, were approximately 2.51, 2.39 and 3.12 times as likely to use modern contraceptive method, compared with those who did not utilize any of the mass media channels. Among women who had primary and secondary education, those who heard about family planning on television were 2.03 (OR= 2.03; 95%CI: 1.49, 2.76) and 1.65 (OR= 1.65; 95%CI: 1.37, 2.00) times as likely to use modern contraceptive methods, compared with those who did not hear about family planning on television. Similarly, among women with primary and secondary education, those who saw a poster or bill board with a family planning message were 1.94 and 1.28 times respectively as likely to use modern contraceptive method, compared with those who did not see a poster or billboard with a family planning message. Among women with secondary education, those who received call or text about family planning on mobile phone were 1.59 (OR= 1.59; 95%CI: 1.26, 2.02) times as likely to use modern contraceptive method, compared with women who did not receive call or text about family planning on mobile phone.

The results presented in Table 7 showed that women who heard about family planning on television, received call or text about family planning on mobile phone and saw a poster or billboard with a family planning message, had increase in the odds of use of any contraceptive method and use of modern contraceptive methods, compared with women who did not hear about family planning on television, did not receive call or text about family planning on mobile phone and did not see a poster or billboard with a family planning message after adjusting for household wealth quintile and education. See Table 7 for the details of results.

4. DISCUSSION

In this study, we used data from PMA2020 where respondents were drawn from the six geopolitical regions of the country. Majority of the women were currently married/living with a partner, which makes them most likely to be sexually active and relevant in the subject of birth control, child spacing and prevention of unintended pregnancies. Considering that above one-fifth of the women were aged 15-19 years, this points to the fact that early marriage is still common in Nigeria. Very young women in marriage are conventionally less empowered to take decision, especially about their family planning choices. The major finding in this study is low uptake of modern contraceptive methods, which is consistent with reports from previous population-based surveys [25-26] showing that in spite of interventions, family planning uptake by women seem to have plateaued over the years, without any significant improvements in Nigeria compared with other countries in sub-Saharan Africa and the rest of the world where prevalence of use of contraception is 23% and 64% respectively [27–29]. These variation of contraceptives utilization could be attributed to potential differentials in terms of access and knowledge in rural areas as well as hard-to-reach areas in Nigeria.

Prominently, radio was reportedly the main source of family planning messages, followed by the television. These two channels have been the major sources of health information and their acquisition is been promoted at household level, health programmes as well as in many

Table 5. Household wealth inequalities in mass media related factors of contraceptive use among women of reproductive age

Contraceptive use	Household wealth quintile	Odds ratio (95%CI)	Heard about family planning on radio	Heard about family planning on television	Read about family planning in newspaper/magazine	Received call or text about family planning on mobile phone	Read about family planning in a brochure, leaflet, or flyer	Seen a poster or billboard with a family planning message
Current use of any contraceptive method	Lowest	Unadjusted OR (95%CI)	1.24 (0.99-1.55)	2.32 (1.70-3.17)	1.83 (1.06-3.17)	2.63 (1.46-4.72)	2.44 (1.36-4.36)	3.71 (2.90-4.74)
		P-value	0.059	<0.001*	0.031*	0.001*	0.003*	<0.001*
		Adjusted OR (95%CI)		1.63 (1.13-2.34)	0.77 (0.40-1.49)	1.89 (0.99-3.56)	0.81 (0.41-1.58)	3.46 (2.67-4.49)
		P-value		0.008*	0.436	0.051	0.531	<0.001*
	Lower	Unadjusted OR (95%CI)	1.42 (1.15-1.75)	1.96 (1.59-2.41)	1.81 (1.35-2.41)	1.67 (1.17-2.40)	1.79 (1.32-2.42)	1.61 (1.29-2.01)
		P-value	0.001*	<0.001*	<0.001*	0.005*	<0.001*	<0.001*
		Adjusted OR (95%CI)	0.99 (0.78-1.28)	1.69 (1.31-2.18)	1.19 (0.85-1.67)	1.09 (0.73-1.62)	1.12 (0.78-1.62)	1.26 (0.97-1.62)
		P-value	0.991	<0.001*	0.314	0.682	0.539	0.081
	Middle	Unadjusted OR (95%CI)	1.31 (1.03-1.67)	1.81 (1.45-2.26)	1.42 (1.12-1.79)	1.67 (1.25-2.23)	1.56 (1.21-2.01)	1.45 (1.17-1.81)
		P-value	0.030*	<0.001*	0.004*	0.001*	0.001*	0.001*
		Adjusted OR (95%CI)	0.95 (0.72-1.26)	1.65 (1.27-2.14)	0.97 (0.72-1.30)	1.30 (0.93-1.80)	1.17 (0.85-1.61)	1.14 (0.88-1.48)
		P-value	0.741	<0.001*	0.838	0.120	0.323	0.305
	Higher	Unadjusted OR (95%CI)	1.55 (1.21-1.98)	1.72 (1.37-2.15)	1.50 (1.20-1.87)	1.83 (1.39-2.41)	1.64 (1.30-2.08)	1.75 (1.42-2.17)
		P-value	0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*
		Adjusted OR (95%CI)	1.17 (0.88-1.56)	1.30 (0.99-1.70)	0.99 (0.76-1.30)	1.43 (1.06-1.93)	1.18 (0.89-1.56)	1.41 (1.10-1.81)
		P-value	0.273	0.054	0.990	0.019*	0.264	0.006*
	Highest	Unadjusted OR (95%CI)	1.47 (1.15-1.87)	1.57 (1.24-2.00)	1.25 (1.01-1.56)	1.54 (1.18-2.01)	1.78 (1.42-2.32)	1.77 (1.43-2.20)
		P-value	0.002*	<0.001*	0.047*	0.002*	<0.001*	<0.001*
		Adjusted OR (95%CI)	1.15 (0.86-1.54)	1.23 (0.92-1.65)	0.84 (0.65-1.09)	1.23 (0.92-1.64)	1.40 (1.07-1.85)	1.42 (1.10-1.83)
		P-value	0.339	0.154	0.185	0.173	0.016*	0.006*
Current use of	Lowest	Unadjusted OR	1.32 (1.03-	2.84 (2.06-	2.28 (1.32-3.97)	2.44 (1.29-	2.52 (1.36-	3.79 (2.91-

Contraceptive use	Household wealth quintile	Odds ratio (95%CI)	Heard about family planning on radio	Heard about family planning on television	Read about family planning in newspaper/magazine	Received call or text about family planning on mobile phone	Read about family planning in a brochure, leaflet, or flyer	Seen a poster or billboard with a family planning message
modern		(95%CI)	1.68)	3.91)		4.62)	465)	4.93)
contraceptive		P-value	0.027*	<0.001*	0.003*	0.006*	0.003*	<0.001*
method		Adjusted OR	0.82 (0.62-	2.15 (1.45-	0.91 (0.47-1.78)	1.60 (0.80-	0.72 (0.35-	3.60 (2.69-
		(95%CI)	1.08)	3.17)		3.21)	1.47)	4.81)
		P-value	0.158	<0.001*	0.784	0.187	0.365	<0.001*
	Lower	Unadjusted OR	1.41 (1.12-	2.03 (1.63-	1.82 (1.34-2.47)	1.66 (1.13-	1.61 (1.16-	1.55 (1.22-
		(95%CI)	1.76)	2.54)		2.43)	2.24)	1.97)
		P-value	0.003	<0.001	<0.001	0.010	0.004	<0.001
		Adjusted OR	0.97 (0.74-	1.83 (1.39-	1.23 (0.86-1.76)	1.09 (0.71-	0.99 (0.67-	1.23 (0.93-
		(95%CI)	1.26)	2.40)		1,66)	1.48)	1.62)
		P-value	0.801	<0.001*	0.261	0.696	0.994	0.994
	Middle	Unadjusted OR	1.35 (1.02-	2.12 (1.65-	1.36 (1.05-1.77)	1.64 (1.19-	1.57 (1.19-	1.45 (1.14-
		(95%CI)	1.77)	2.74)		2.25)	2.08)	1.85)
		P-value	0.035	<0.001	0.022	0.002	0.001	0.003
		Adjusted OR	0.91 (0.66-	2.05 (1.52-	0.88 (0.63-1.21)	1.27 (0.88-	1.21 (0.85-	1.11 (0.83-
		(95%CI)	1.24)	2.76)		1.82)	1.72)	1.48)
		P-value	0.550	<0.001*	0.428	0.196	0.292	0.476
	Higher	Unadjusted OR	1.38 (1.05-	1.66 (1.29-	1.38 (1.08-1.77)	1.82 (1.35-	1.53 (1.18-	1.83 (1.44-
		(95%CI)	1.83)	2.15)		2.46)	1.99)	2.33)
		P-value	0.022	<0.001	0.010	<0.001	0.001	<0.001
		Adjusted OR	1.05 (0.76-	1.33 (0.98-	0.93 (0.69-1.25)	1.48 (1.07-	1.10 (0.81-	1.56 (1.18-
		(95%CI)	1.43)	1.80)		2.05)	1.51)	2.06)
		P-value	0.779	0.065	0.612	0.019*	0.543	0.002*
	Highest	Unadjusted OR	1.41 (1.06-	1.54 (1.16-	1.34 (1.04-1.73)	1.71 (1.27-	1.77 (1.37-	1.88 (1.46-
		(95%CI)	1.87)	2.04)		2.30)	2.29)	2.42)
		P-value	0.019*	0.003*	0.022*	<0.001*	<0.001*	<0.001*
		Adjusted OR	1.09 (0.78-	1.18 (0.84-	0.91 (0.68-1.23)	1.36 (0.98-	1.30 (0.95-	1.53 (1.14-
		(95%CI)	1.53)	1.65)		1.88)	1.77)	2.04)
		P-value	0.626	0.347	0.547	0.065	0.104	0.005*

**Significant at p<0.05*

Table 6. Education inequalities in mass media related factors of contraceptive use among women of reproductive age

Contraceptive use	Educational level	Odds ratio (95%CI)	Heard about family planning on radio	Heard about family planning on television	Read about family planning in newspaper/magazine	Received call or text about family planning on mobile phone	Read about family planning in a brochure, leaflet, or flyer	Seen a poster or billboard with a family planning message
Current use of any contraceptive method	Never	Unadjusted OR (95%CI)	1.46 (1.11-1.92)	3.01 (2.16-4.19)	2.55 (1.10-5.91)	4.99 (2.71-9.19)	6.50 (2.92-14.50)	4.23 (3.12-5.72)
		P-value	0.006*	<0.001*	0.029*	<0.001*	<0.001*	<0.001*
		Adjusted OR (95%CI)	0.90 (0.66-1.23)	2.29 (1.55-3.38)	0.55 (0.19-1.63)	2.35 (1.18-4.69)	1.76 (0.61-5.07)	3.46 (2.47-4.85)
		P-value	0.523	<0.001*	0.284	0.015*	0.297	<0.001
	Primary	Unadjusted OR (95%CI)	1.51 (1.19-1.91)	2.25 (1.78-2.85)	2.08 (1.44-3.00)	1.92 (1.22-3.01)	2.42 (1.66-3.52)	2.24 (1.76-2.85)
		P-value	0.001*	<0.001*	<0.001*	0.005*	<0.001*	<0.001*
		Adjusted OR (95%CI)	0.99 (0.76-1.30)	1.79 (1.34-2.38)	1.09 (0.70-1.71)	1.05 (0.63-1.75)	1.26 (0.81-1.98)	1.75 (1.34-2.30)
		P-value	0.949	<0.001*	0.698	0.857	0.308	<0.001*
	Secondary	Unadjusted OR (95%CI)	1.51 (1.30-1.75)	1.94 (1.69-2.23)	1.60 (1.37-1.87)	2.19 (1.80-2.65)	1.89 (1.59-2.23)	1.70 (1.48-1.96)
		P-value	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*
		Adjusted OR (95%CI)	1.05 (0.88-1.25)	1.57 (1.32-1.86)	0.96 (0.80-1.16)	1.60 (1.29-1.98)	1.26 (1.03-1.55)	1.26 (1.07-1.49)
		P-value	0.579	<0.001*	0.688	<0.001*	0.024*	0.005*
	Higher	Unadjusted OR (95%CI)	1.17 (0.92-1.49)	1.35 (1.07-1.70)	1.10 (0.89-1.35)	1.01 (0.79-1.30)	1.23 (0.99-1.52)	1.35 (1.10-1.67)
		P-value	0.201	0.010*	0.380	0.911	0.053	0.005*
		Adjusted OR (95%CI)		1.28 (1.01-1.62)				1.29 (1.04-1.60)
		P-value		0.041*				0.022*
Current use of modern contraceptive method	Never	Unadjusted OR (95%CI)	1.60 (1.18-2.17)	3.36 (2.36-4.78)	2.16 (0.83-5.64)	4.76 (2.48-9.12)	4.86 (2.02-11.72)	3.97 (2.85-5.53)
		P-value	0.002*	<0.001*	0.115	<0.001*	<0.001*	<0.001*
		Adjusted OR (95%CI)	0.98 (0.69-1.38)	2.51 (1.67-3.76)		2.39 (1.16-4.93)	0.90 (0.33-2.44)	3.12 (2.16-4.52)
		P-value	0.901	<0.001*		0.019*	0.834	<0.001*

Contraceptive use	Educational level	Odds ratio (95%CI)	Heard about family planning on radio	Heard about family planning on television	Read about family planning in newspaper/magazine	Received call or text about family planning on mobile phone	Read about family planning in a brochure, leaflet, or flyer	Seen a poster or billboard with a family planning message
	Primary	Unadjusted OR (95%CI)	1.49 (1.15-1.92)	2.42 (1.88-3.12)	2.16 (1.47-3.17)	1.85 (1.14-2.99)	1.92 (1.27-2.91)	2.36 (1.83-3.05)
		P-value	0.002*	<0.001*	<0.001*	0.013*	0.002*	<0.001*
		Adjusted OR (95%CI)	0.91 (0.68-1.23)	2.03 (1.49-2.76)	1.22 (0.76-1.95)	0.99 (0.58-1.71)	0.91 (0.55-1.48)	1.94 (1.46-2.59)
		P-value	0.536	<0.001*	0.410	0.975	0.692	<0.001*
	Secondary	Unadjusted OR (95%CI)	1.43 (1.21-1.70)	1.94 (1.66-2.27)	1.46 (1.23-1.74)	2.08 (1.68-2.58)	1.76 (1.46-2.12)	1.66 (1.42-1.95)
		P-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
		Adjusted OR (95%CI)	0.99 (0.82-1.21)	1.65 (1.37-2.00)	0.88 (0.71-1.09)	1.59 (1.26-2.02)	1.21 (0.97-1.52)	1.28 (1.06-1.54)
		P-value	0.951	<0.001*	0.251	<0.001*	0.094	0.009*
	Higher	Unadjusted OR (95%CI)	1.07 (0.82-1.40)	1.25 (0.97-1.62)	1.17 (0.93-1.48)	1.11 (0.84-1.46)	1.25 (0.99-1.58)	1.40 (1.11-1.77)
		P-value	0.627	0.090	0.174	0.478	0.064	0.005*
		Adjusted OR (95%CI)						
		P-value						

**Significant at p<0.05*

Table 7. Mass media related factors associated with contraceptive use among women of reproductive age

Variable	Current use of any contraceptive method				Current use of modern contraceptive method			
	Unadjusted odds ratio (95%CI)	P-value	Adjusted odds ratio (95%CI)	P-value	Unadjusted odds ratio (95%CI)	P-value	Adjusted odds ratio (95%CI)	P-value
Heard about family planning on radio	1.63 (1.48-1.81)	<0.001*	1.03 (0.92-1.16)	0.603	1.55 (1.39-1.74)	<0.001*	0.98 (0.86-1.12)	0.782
Heard about family planning on television	2.47 (2.24-2.72)	<0.001*	1.47 (1.30-1.67)	<0.001*	2.36 (2.12-2.62)	<0.001*	1.62 (1.41-1.86)	<0.001*
Read about family planning in newspaper/magazine	2.03 (1.82-2.26)	<0.001*	0.91 (0.79-1.05)	0.200	1.85 (1.63-2.09)	<0.001*	0.91 (0.78-1.06)	0.243
Received call or text about family planning on mobile phone	2.23 (1.94-2.57)	<0.001*	1.27 (1.09-1.48)	0.003*	2.12 (1.82-2.47)	<0.001*	1.30 (1.10-1.54)	0.003*
Read about family planning in a brochure, leaflet or flyer	2.32 (2.06-2.62)	<0.001*	1.13 (0.97-1.31)	0.110	2.06 (1.81-2.34)	<0.001*	1.06 (0.90-1.24)	0.497
Seen a poster or billboard with a family planning message	2.26 (2.05-2.49)	<0.001*	1.52 (1.35-1.70)	<0.001*	2.19 (1.96-2.44)	<0.001 *	1.56 (1.37-1.77)	<0.001*
Educational level								
Never	1.00		1.00		1.00		1.00	
Primary	2.10 (1.76-2.50)	<0.001*	1.63 (1.36-1.95)	<0.001*	2.13 (1.76-2.58)	<0.001*	1.70 (1.39-2.07)	<0.001*
Secondary	2.67 (2.30-3.11)	<0.001*	1.50 (1.25-1.79)	<0.001*	2.34 (1.98-2.76)	<0.001*	1.46 (1.20-1.78)	<0.001*
Higher	4.34 (3.67-5.15)	<0.001*	1.80 (1.46-2.23)	<0.001*	3.53 (2.92-4.26)	<0.001*	1.76 (1.39-2.23)	<0.001*
Household wealth quintile								
Lowest	1.00		1.00		1.00		1.00	
Lower	1.81 (1.56-2.11)	<0.001*	1.37 (1.16-1.61)	<0.001*	1.79 (1.52-2.11)	<0.001*	1.34 (1.13-1.61)	0.001*
Middle	2.47 (2.12-2.89)	<0.001*	1.52 (1.27-1.82)	<0.001*	2.13 (1.79-2.52)	<0.001*	1.29 (1.05-1.57)	0.014*
Higher	3.25 (2.79-3.79)	<0.001*	1.84 (1.52-2.22)	<0.001*	2.62 (2.21-3.11)	<0.001*	1.46 (1.19-1.80)	<0.001*
Highest	3.54 (3.03-4.13)	<0.001*	1.83 (1.50-2.23)	<0.001*	2.52 (2.12-3.01)	<0.001*	1.28 (1.02-1.60)	0.030*

*Significant at p<0.05

communities. The importance of radio and television in promoting health care-seeking behaviour through behaviour change communication have well been previously reported in several studies [30-33]. Other sources of family planning messages included; poster or billboard, newspaper/magazines, brochure, leaflet or flyer and mobile phones calls or text messages. Several studies have proven that right information helps to positively change the attitude and behaviour of individuals [34–37]. It is important that when planning activities for the behaviour change communication of family planning messages, different mass media channels are carefully considered in order to effectively improve access to family planning messages. Therefore, radio and television could be most preferred in the context of poor resource settings.

Also, our findings revealed that the use of mass media and socioeconomic status are associated with contraceptive utilization. When women of differing socioeconomic class are exposed to family planning messages through different mass media channels, they are likely to use one form of family planning method or the other due to increased awareness and knowledge level [38-41]. Therefore, family planning messages are crucial in health programmes/interventions that seek to reduce fertility rate and improve contraceptive uptake among different classes of women. It is noteworthy that access to family planning messages is directly proportional to increased household wealth and education level. The higher the household wealth and educational level, the more likely the access to family planning messages [42–44]. The long term effect of these disparities in accessibility to mass media channels could be that women of higher socioeconomic class are more likely to limit their family size. Again, this implies that women who are disadvantaged educationally and economically would have poor access to family planning messages [38,45]. These could be part of the critical reasons why unmet need for family planning is higher among poor and educationally disadvantaged families than rich and educated households.

Based on the findings from this study, mass media exposure has major response effect on people in terms of utilizing either any or modern contraceptives. Though most family planning messages are disseminated through the radio, television and newspapers, positive behaviour change towards the use of contraceptive is also possible with other mass media channels such as posters or billboards and mobile phones. The disproportionate accessibility between women of lower household wealth and those of higher status, suggest that disadvantaged women would have reduction in adopting family planning messages when disseminated through mass media. Similarly, the role of maternal education on contraceptive uptake is not different in patterns to the household wealth index. Here, we have identified that increasing socioeconomic status of women enhances their access to family planning messages leading to higher uptake of contraceptives. Notably, there could be other factors that limit the accessibility of family planning messages by disadvantaged women including; rural residence, cost, husband or partner support, fear of side effects, religious beliefs, limited supplies amongst others [46-47]. Thus, the current family planning programs should re-adjust their strategies and streamline social mobilization through mass media for improved utilization of contraceptives across levels and settings in Nigeria.

5. CONCLUSION

The use of radio and television for behaviour change communication on family planning will create more awareness than other mass media channels across all wealth index groups and all levels of education. There is a need for a more aggressive and sustained approach to the use of radio, television for behaviour change communication on family planning. This should be followed/ backed by strategies to raise the wealth index of Nigerians, as a major factor that can affect the success of the television use is ability to afford a television set, or lack of funds for subscription to cable or satellite network. Also, Nigeria will benefit from policies to encourage higher levels of education, and where such policies already exists, for example free primary and secondary education, regular monitoring and evaluation should be done to ensure that the people actually benefit from them. These will to a great extent help to reduce unwanted pregnancies, unsafe abortions and maternal mortality.

STRENGTH AND LIMITATION

This study utilized nationally representative dataset. However, this study relied on the recall of participants to determine the impact of mass-media on family planning messages. The use of secondary data limited the choice of variables. In

addition, the use of cross-sectional study design is inadequate to establish causality.

CONSENT AND ETHICS

Ethical approval was sought from the Nigeria National Health Research ethics committee by the data originators and granted before starting the survey. Also, informed consent was received from the participants before interviewing them. We obtained the approval from PMA2020 - Centre for Research, Evaluation Resources and Development (CRERD), Bayero University Kano (BUK), and the Johns Hopkins Bloomberg School of Public Health (JHSPH) to use the data. CRERD implemented PMA2020 in Nigeria.

AVAILABILITY OF DATA

The PMA2020 dataset used in this study is publicly available at https://www.pma 2020.org/data.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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