Original Research Article

Determinants of Maternal Health Service Utilization in North West, Nigeria: Analysis of the 2018 Nigeria Demographic Health Survey

Abstract

Aim: This study evaluated the determinants of maternal healthcare services utilization in the Northwest regions of Nigeria.

Study design: This study is a secondary data analysis of 2018 Nigeria Demographic and Health Survey (NDHS) data. The 2018 NDHS used a cross-sectional study design.

Duration of study: The study was conducted from November to December 2021.

Methodology: The data used in this study was extracted from the 2018 Nigeria Demographic and Health Survey (NDHS) data. The study was carried out in the Northwest regions of Nigeria with 6390 women of reproductive age group (15-49). Data were analyzed using SPSS for windows version 25.0.

Result: Most of the respondents were less than 35 years (73.2%) and uneducated (85.4%). Most of them were married (97.4%) and of low socio-economic class (65.9%). Muslims accounted for 95.4%, 75.7% lived in rural areas and. 95.3% wanted their last pregnancy. Women of reproductive age with secondary/higher education were 4.87 [95% CI- 3.60-6.58; *P*<0.001] times more likely to use ANC than uneducated ones. Similarly, respondents in urban areas were also 1.43 [95% CI- 1.22-1.70; *P*<0.001] times more likely to attend ANC than those in rural areas. Also, Christians were 2.92 (95% CI- 1.94-4.40:P<0.001) more likely to use ANC services than Muslims. In the socio-economic class, middle AOR 2.42 (95% CI- 2.07-2.85:*P*<0.001) and upper AOR 4.20 (95% CI- 3.28-5.39:*P*<0.001) were more likely to attend ANC than women of low socioeconomic status.

Conclusion: These findings underscore the need for stakeholders to improve ANC uptake and skilled birth attendant utilization in Northwest and the entire country.

Keywords: Maternal, Antenatal care, Skilled birth attendants, Pregnancy

Introduction

The World Health Organization (WHO 2018) defines the maternal health and well-being of a woman as she passes through the stages of pregnancy (prenatal), during delivery, and after delivery (postnatal). Maternal health also entails a woman's physical, mental, emotional, and social health during and after pregnancy [1]. Maternal health is a critical global development concern in Africa, accounting for over half of all maternal deaths worldwide, with little or no progress toward maternal mortality reduction [2]. Each stage of a woman's maternal health should be positive, ensuring that the woman and her infant reach their total health and well-being potential. Maternal health requires stakeholders' attention because it is vital in nation-building and economic development. One significant way of improving maternal health is through quality and affordable antenatal care (ANC) services. However, most underdeveloped and developing countries fall behind in the aspect of ANC services. Maternal health concerns women's health during pregnancy, delivery, and the postnatal period; each phase requires maximum attention to achieve good health for mothers and their children [3]. Additionally, maternal health is mainly concerned with the uptake of ANC services with no impediments like patriarchal issues, lack of finance, or geographical constraints, which could negatively affect women's overall health and the capability to exert the reproductive right of the family [4].

Over 70% of maternal deaths worldwide are caused by five main complications, which include: "direct obstetric risks, haemorrhage (25%), infection (15%), unhealthy abortion complications (13%), hypertension (12%), and obstructed labour (8 percent)" [5]. This complication can happen during pregnancy or delivery, frequently without warning and often necessitating an urgent need for emergency obstetric services for treatment [6]. It has been shown that 74% of maternal deaths could be avoided if all women had access to therapies/interventions that resolve

pregnancy and childbirth risks, including emergency obstetric treatment [7]. ANC offers a way of guiding pregnant mothers, treating chronic social and health problems, and screening risk factors [8].

Nevertheless, receiving ANC alone is insufficient since most fatal complications occur shortly after childbirth; hence, pregnant women must receive professional obstetric care during delivery [5]. However, most developing countries are inhibited due to several cultural, social, economic, and demographic factors in utilising these services [9, 10]. For example, maternal mortality in Nigeria is still a primary concern for women of reproductive age [10, 11]; there are several challenges facing women of reproductive age in accessing ANC. For example, "obstetric haemorrhage, eclampsia, sepsis, and complications from unsafe abortions are the primary reasons for maternal death in Nigeria, as they are in many other Sub-Saharan African countries" [12, 13]. Similarly, studies in Nigeria have demonstrated that factors such as "age, education, prenatal care, parity, domestic violence, and social autonomy" are determinants of maternal mortality [13–15].

Northwest mortality rate is about six times higher than the southwest region; the rural areas have a higher maternal mortality rate than the urban with a low mortality rate. [16]. According to NDHS, conducted in 2018, There is a wide variation in women who receive ANC from a trained medical practitioner across the country, ranging from 89% in the South East to 54% in the North West. While North West women are much less likely to have four or more ANC visits (42 percent) than South East and South West women (83 percent and 78 percent, respectively) [18]. Such changes in results across study areas indicate the disparities in the factors influencing the utilisation of various components of MHS. The NPC & ICF (2019) report highlights the

importance of conducting local surveys to produce data appropriate for designing and implementing public health programs to account for unique regional characteristics.

This study aims to point out factors that influence maternal health care services usage in Northwest Nigeria and suggests practical strategies and policies that will improve ANC service utilisation and, as a result, lower maternal mortality rates.

Methodology

Study Design

This study is a secondary data analysis of 2018 Nigeria Demographic and Health Survey (NDHS) data. The 2018 NDHS used a cross-sectional study design. Data derived from the 2018 NDHS involved extracting variables relevant to the study objectives. ANC uptake is the dependent variable, while the independent variables are sociocultural, perceived needs, and accessibility-related factors.

Study Location

Nigeria is divided into 36 states and one federal territory (FCT). These states are classified geographically into six geopolitical zones: the North East, the Northwest, the North Central, the South East, the South-South, and the South West. The NDHS data used in this analysis encompasses all 36 states and six zones. However, the study analysed only data from the Northwest.

Study Population

This study population includes all women of reproductive age (15-49 years) in northwest Nigeria who were either pregnant or had given birth at least once within five years before the survey (2014-2018).

Sample Selection

The Population and Housing Census of the Federal Republic of Nigeria (NPHC), conducted in 2006 by the National Population Commission, was estimated to serve as the sampling frame for the 2018 NDHS. For the 2018 NDHS, the primary sampling unit (PSU), also known as a cluster, is defined using EAs from the 2006 EA census frame with an estimated measure of size factored into its use. Although the 2006 NPHC did not include the number of households and population for each EA, population estimates for 774 LGAs were published.

The NDHS 2018 sample was chosen using a stratified, two-stage cluster design. First, each of the 36 states and the Federal Capital Territory was stratified into urban and rural areas. Second, each area was subdivided into units where respondents were randomly selected.

Sample size

A total of 6390 women of reproductive age (15-49 years) in the Northwest region met the inclusion criteria, and these women formed the study sample size.

Data Analysis

Secondary data analysis was used for the study. The data were analysed using SPSS for windows version 25.0. Descriptive analysis was undertaken. Association among variables was established using Chi-Square statistics, and $P<0.05$ was considered significant. Further data analysis involved binary logistic regression in assessing the association between dependent and independent variables.

Inclusion and exclusion criteria

Women of childbearing age (15 to 49 years) who are pregnant and women who had given birth at least once in the last five years were included.

Women that are not within the 15-49 years age group, not pregnant, nor have given birth in the last five years were excluded.

Result

The study comprised 6309 women of reproductive age 15-49 years with a mean age of 29.17±7.56 years, and the most frequent age was 25 years.

Socio-demographic characteristics of the respondents

Table 1 shows the socio-demographic profiles of women of reproductive age who have given birth in the last five years. Most of them were below 35 years (73.2%), did not attain more than secondary education (85.4%), were married (97.4%), of low socioeconomic class (65.9%), lived in rural areas (75.7%), and Muslims (95.3%). The majority have had one (45.4%) or two (46.4%) in the last five years, and 95.3% said their previous pregnancies were planned and wanted.

Table 1: Sociodemographic characteristics of the respondents

Parameter	Response	Frequency (n=6309)	Percentage
Age category	< 35 years	4617	73.2
	≥ 35 years	1692	26.8
Education	Below secondary	5388	85.4
	Secondary & above	921	14.6
Marital status	Currently married	6144	97.4
	Not currently married	165	2.6
Socioeconomic class	Low	4156	65.9
	Middle	1146	18.2
	Upper	1007	16.0
Number of births in the last five years	One	2867	45.4
	Two	2927	46.4
	Three or more	515	8.2
Religion	Christianity	252	4.0
	Islam	6018	95.4
	Traditional	39	0.6
Place of residence	Urban	1533	24.3
	Rural	4776	75.7
Wanted the last pregnancy	Yes	6013	95.3

	No	296	4.7

ANC attendance

Figure 1 illustrates the prevalence of ANC utilisation among women of reproductive age in Northwestern Nigeria. About three-fifths (62.9%) of the women attended ANC services during their previous pregnancies, while (37.1%) did not.

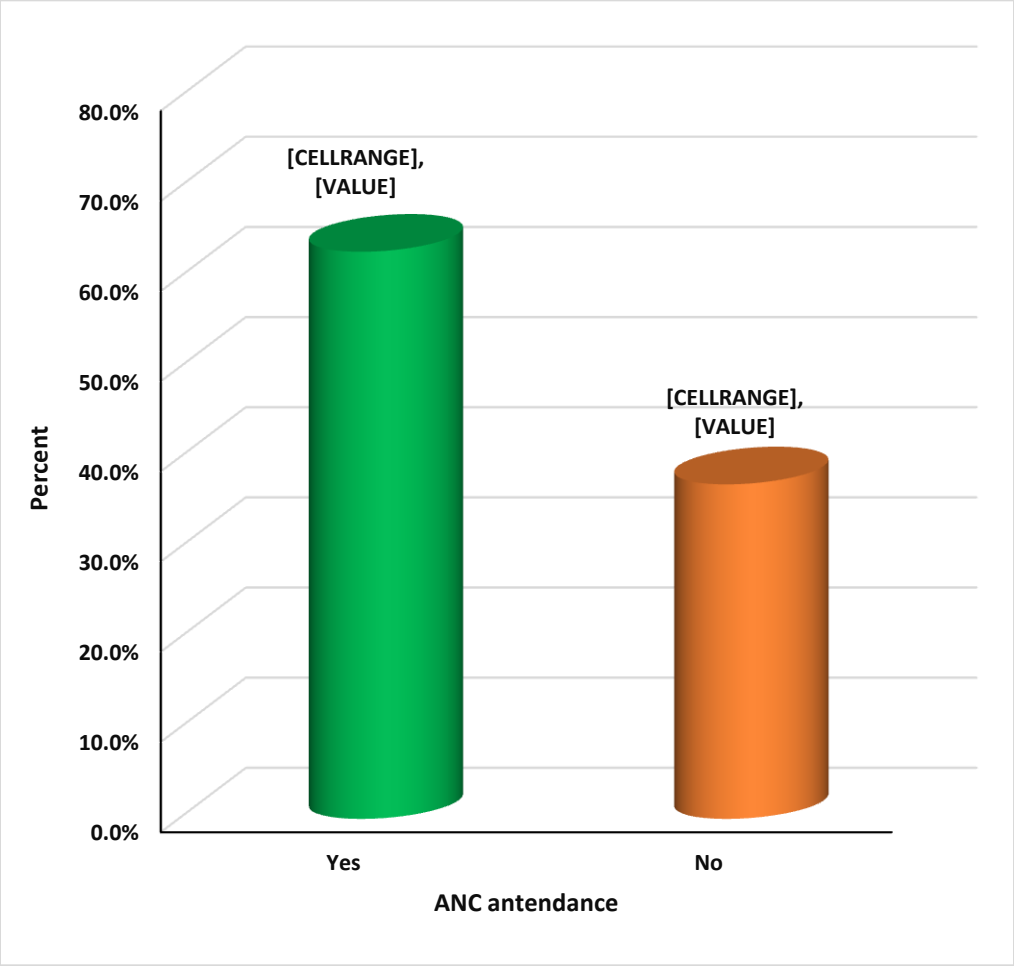

Figure 1: ANC attendance during the last pregnancy

Socio-demographic use of ANC attendance among women of reproductive age in North-West, Nigeria

The use of ANC was significantly higher among women less than 35 years (63.9%) than women aged 35 years and above (60.2%) ($p<0.05$). Also, women that were not married attended ANC (69.7%) than married women (62.7%) ($p>0.05$). A higher percentage of women with secondary/higher education used ANC (94.2%) compared to women with less than secondary education (57.5%) ($p<0.001$). Also, more women of reproductive age in the urban areas used ANC (80.9%) than women in the rural areas (57.1%) ($p<0.001$). Similarly, the majority of Christian women used ANC (88.1%), followed by traditionalists (69.2%), while Muslim women used the least (61.8%) ($p<0.001$). Women in the upper (90.7%) and middle (77.1%) socioeconomic classes attended ANC than those in the low-socioeconomic class (52.2%) ($p<0.001$). Women with unintended pregnancies slightly used ANC (64.9%) than women who planned their last pregnancies (62.8%) ($p>0.05$).

Table 2: Demographic distribution of ANC use among women of reproductive age in Northwest Nigeria

Characteristics	Response	Use of ANC Attendance			
		Yes (n=3966)	No (n=12343)	X^2	P-value
Age category	<35 years	2948 (63.9)	1669 (36.1)	7.204	0.007*
	≥ 35 years	1018 (60.2)	674 (39.8)		
Marital status	Currently married	3851 (62.7)	2293 (37.3	3.390	0.066
	Not married	115 (69.7)	50 (30.3)		
Level of education	Below secondary	3098 (57.5)	2290 (42.5)	454.959	<0.001*
	Secondary & higher	868 (94.2)	53 (5.8)		
Place of residence	Urban	1240 (80.9)	293 (19.1)	281.815	<0.001*
	Rural	2726 (57.1)	2050 (42.9)		
Religion	Christianity	222 (88.1)	30 (11.9)	72.511	<0.001*
	Islam	3717 (61.8)	2301 (38.2)		
	Traditional	27 (69.2)	12 (30.8)		
Socio-economic class	Low	2170 (52.2)	1986 (47.8)	634.118	<0.001*
	Middle	883 (77.1)	263 (22.9)		
	Upper	913 (90.7)	94 (9.3)		

Number of children in the last 5 years	One	1824 (63.6)	1043 (36.4)	2.370	0.306
	Two	1832 (62.6)	1095 (37.4)		
	Three or more	310 (60.2)	205 (39.8)		
Wanted the last pregnancy	Yes	3774 (62.8)	2239 (37.2)	0.533	0.465
	No	192 (64.9)	104 (35.1)		

* Significant at level 0.05

Multivariate logistics analysis of the determinants of ANC attendance

Multivariate analysis of age, education, residence, religion and socioeconomic classes as predictors of ANC attendance is shown in Table 3. Respondents below 35 years were 1.16 [95% C.I-1.02-1.315; P=0.02] times more likely to attend ANC than the older women. Also, those with secondary/higher education were 4.87 [95% CI- 3.60-6.58; P<0.001] more likely to attend ANC than women with lower education levels. Respondents in urban areas were also 1.43 [95% CI- 1.22-1.70; P<0.001] times more likely to attend ANC. Christians women had an AOR of 2.92 (95% C.I- 1.94-4.40; P<0.001), traditional women had AOR 2.36 (95% C.I- 1.19-4.67; P=0.014) for ANC utilization than the Muslims. Respondents in middle AOR 2.42 (95% CI- 2.07-2.85; P<0.001) and upper AOR 4.20 (95% CI- 3.28-5.39; P<0.001) socioeconomic classes were more likely to attend ANC than those in the low category.

Table 3: Binary Logistic regression showing the odds ratios of predictors of ANC utilisation

	ANC attendance				
Variable	Yes	No	COR (95% CI)	AOR (95% CI)	P-value
Age category					
<35 years	2948	1669	1.17 (1.04-1.31)	1.16 (1.02-1.31)	0.020*
≥ 35 years	1018	674	1	1	
Education					
Below secondary	3098	2290	1	1	
Secondary & higher	868	53	12.11 (9.13-16.06)	4.87 (3.60-6.58)	<0.001*
Place of residence					

Rural	2726	2050	1	1	
Urban	1240	293	3.18 (2.77-3.66)	1.43 (1.22-1.70)	<0.001*
Religion					
Islam	3717	2301	1	1	
Christianity	222	30	4.58 (3.12-6.73)	2.92 (1.94-4.40)	<0.001*
Traditional	27	12	1.39 (0.70-2.76)	2.36 (1.19-4.67)	0.014*
Socioeconomic class					
Low	2170	1986	1	1	
Middle	883	263	3.07 (2.64-3.57)	2.42 (2.07-2.85)	<0.001*
Upper	913	94	8.89 (7.13-11.09)	4.20 (3.28-5.39)	<0.001*

* Significant at level 0.05

Use of skilled birth attendants

Figure 2 shows various birth assistants used by women of reproductive age in Northwest regions of Nigeria. Skilled birth assistants like doctors were the least used (1.7%). The use of Nurses/midwives was also relatively low (15.9%) compared to traditional birth assistants (33.9%) and relatives/friends (30.9%). About one-fifth did not use any birth attendants (20.3%).

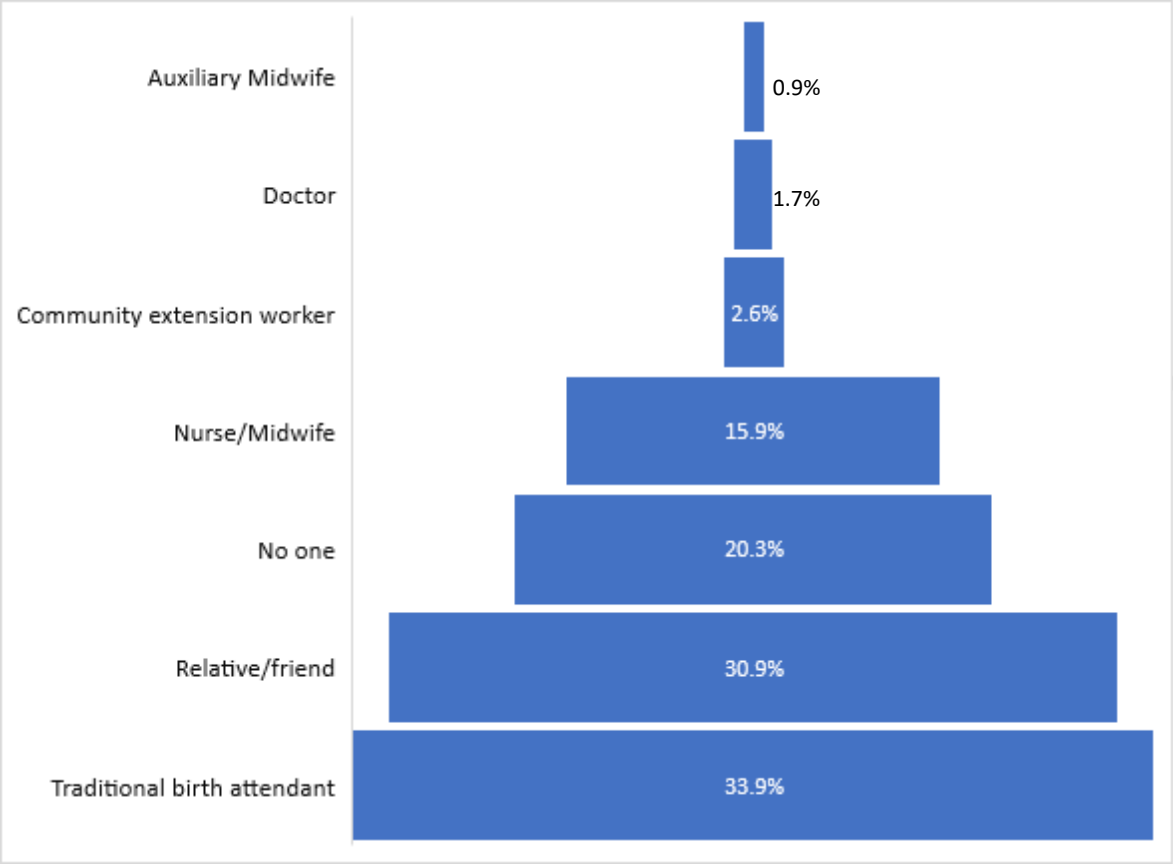

Figure 2: Use of skilled and unskilled birth attendants Used by Women of reproductive age

Table 4 outlines the use of skilled birth attendants in different settings. The general use of skilled birth attendants among the respondents was 16.7%. Age was not significantly associated with professional birth attendant utilisation ($p>0.05$). Unmarried respondents used skilled birth attendants (28.5%) than the married ones (16.4%) ($p<0.001$). Respondents with secondary and higher education used skilled birth attendants (51.4%) more than respondents without secondary or lower school education (10.8%) ($p<0.001$). Also, more respondents in the urban areas used skilled birth attendants (35.0%) than those in rural areas (10.9%) ($p<0.001$). Christian women were the highest group that used skilled birth attendants (45.2%) than other religions ($p<0.001$). Respondents in the upper socioeconomic class (49.2%) used skilled birth attendants than those in the middle (22.1%) and low (7.4%) classes ($p<0.001$).

Table 4: Demographic distribution of skilled birth attendant's utilisation among respondents

Characteristics	Response	Use of skilled birth attendants			
		Yes	No	X^2	P-value
Age category	<35 years	773 (16.7)	3844 (83.3)	0.000	0.987
	≥ 35 years	283 (16.7)	1409 (83.3)		
Marital status	Currently married	1009 (16.4)	5135 (83.6)	16.776	<0.001*
	Not married	47 (28.5)	118 (71.5)		
Education	Below secondary	583 (10.8)	4805 (89.2)	927.421	<0.001*
	Secondary & higher	473 (51.4)	448 (48.6)		
Place of residence	Rural	519 (10.9)	4257 (89.1)	486.161	<0.001*
	Urban	537 (35.0)	996 (65.0)		
Religion	Islam	942 (15.7)	5076 (84.3)	158.787	<0.001*
	Christianity	114 (45.2)	138 (54.8)		
	Traditional	0 (0.0)	39 (100.0)		
Socio-economic class	Low	308 (7.4)	3848 (92.6)	1042.226	<0.001*
	Middle	253 (22.1)	893 (77.9)		
	Upper	485 (49.2)	512 (50.8)		
General use		1056 (16.7)	5253 (83.3)		

Multivariate Analysis of Use of Skilled Birth Attendants

As shown in Table 5, using the binary logistic regression model, unmarried respondents were 2.03 (95% CI- 1.44-2.86; P=0.306) more likely to use skilled birth attendants than the married. Respondents with secondary and higher education were AOR 3.00 (95% CI- 2.49-3.62; P<0.001) times more likely to use skilled birth attendants. Urban respondents were 1.57 (95% CI- 1.31-1.88; P<0.001) more likely to use skilled birth attendants than rural respondents. Also, Christian respondents were AOR 2.96 (95% CI- (2.17-4.04; P<0.001) more likely to use skilled birth attendants than Muslims. Similarly, the odds of using skilled birth attendants was 2.54 (95% CI- 2.08-3.08; p<0.001) among women in upper socioeconomic class AOR 5.23 (95% CI- 4.20-6.53; p<0.001) among middle-class women than low-class ones.

Table 5: Binary Logistic regression showing the odds ratio of predictors of skilled birth attendants utilisation

	Use of skilled birth attendants				
Variable	Yes	No	COR (95% CI)	AOR (95% CI)	P-value
Marital status					
Currently married	1009	5135	1	1	0.306
Not married	47	118	2.03 (1.44-2.86)	1.24 (0.83-1.84)	
Education					
Below secondary	583	4805	1	1	
Secondary & higher	473	448	8.70 (7.45-10.16)	3.00 (2.49-3.62	<0.001*
Place of residence					
Rural	519	4257	1	1	
Urban	537	996	4.42 (3.85-5.08)	1.57 (1.31-1.88)	<0.001*
Religion					
Islam	942	5076	1	1	
Christianity	114	138	4.45 (3.44-5.76)	2.96 (2.17 – 4.04)	<0.001*
Traditional	0	39	-	-	-
Socioeconomic class					
Low	308	3848	1	1	
Middle	253	893	3.54 (2.95-4.24)	2.54 (2.08-3.08)	<0.001*
Upper	495	512	12.08 (10.20-14.31)	5.23 (4.20-6.53)	<0.001*

Discussion

Maternal health is an essential component of public health that requires stakeholders' attention because it is vital in nation-building and economic development. One of the significant ways of improving maternal health is through quality and affordable ANC services. However, most underdeveloped and developing countries fall behind in the aspect of ANC. There are several challenges facing women of reproductive age in accessing ANC in Nigeria. This study was carried out to evaluate maternal health service utilisation determinants in Northwest regions of Nigeria.

Factors influencing the Uptake of ANC

This study highlights age as one of the factors influencing the uptake of ANC. It showed that most women under 35 years were more likely to use ANC than 35 years and above. This finding may be due to low parity and lack of adequate experience and exposure among younger women. Some studies have identified younger women of reproductive age as inexperienced because many are nulliparous, which increases their possibility of being cautious [19–21]. As a result, younger women are more likely to take adequate precautions and are more mindful of their child's health hence the high use of ANC. However, this finding contradicts a previous study conducted in Nigeria that the probability of ANC utilisation was higher among older women, 35 years and above [22]. The variation found between several studies further proves that the influence of maternal age on ANC utilisation is uncertain, inconsistent, and varies. The inconsistent use of ANC, especially among older women in the current study, might be due to other confounding factors such as parity, previous negative experiences, and uneventful pregnancies that make women perceive ANC as unnecessary. However, as documented in some studies, low use of ANC among younger women might be due to inadequate information on the importance of ANC or unintended pregnancies. The current study also revealed that ANC utilisation decreases with the number of pregnancies; therefore, some women with more than one live birth without complications feel safer not using ANC.

This study found a significant association between educational attainment and uptake of ANC among women of reproductive age in the Northwestern regions of Nigeria. Women with secondary and higher education utilise ANC more than women with less education. This result indicates that educated people are more exposed to information and can use the knowledge acquired to improve their health status. Several studies have reported the relevance of a higher level of maternal education in ANC utilisation, and its importance cannot be overemphasised

[11, 23, 24]. Education improves one's life in all spheres. Women with a higher level of education are more likely to live in urban cities where adequate healthcare services are available and accessible. Educated women are more likely to have paid jobs, increasing their affordability of healthcare services and contributing to household expenditure and consumption. Education provides them with the autonomy that may also influence their decision-making ability in family matters that may concern their utilisation of ANC services [22].

Also, place of residence plays a significant role in ANC utilisation among women of reproductive age in North-West Nigeria. This study found a higher rate of ANC utilisation among respondents in urban areas than those in rural regions. This result may be due to the accessibility and availability of medical infrastructure in urban areas than in rural communities (Matsuoka *et al*., 2010; Titaley, 2010). Women in metropolitan cities are more exposed to numerous healthcare services. Also, most healthcare facilities in rural areas are resource-limited, less efficient, and in most cases, lack adequate medical personnel. Also, people of upper and middle socioeconomic classes are more likely to live in urban cities, live a comfortable life, and hence have access to adequate medical infrastructure.

In contrast, people of lower socioeconomic classes are less likely to afford satisfactory ANC services. Some studies reported how limited the availability of medical facilities is in rural areas and pregnant women having to line up and wait for long hours due to the limited number of medical personnel [27, 28]. Situations like this continue to restrict the number of women attending ANC in rural areas.

This study also shows that ANC utilisation was higher among women who were not married than those who were married. Married women had an ANC utilisation rate of 62.7%, while unmarried women had a higher rate of 69.7%. Some studies supported this result that marriage negatively

affects ANC utilisation [29]. Begum *et al*. (2015) showed that over 53% of married women requested permission from their husbands before attending ANC. Some studies also found that the dominance of a male figure in decision-making can significantly influence the attendance of ANC of expecting mothers (Fagbamigbe & Idemudia, 2015; Yadufashije *et al*., 2017). Contrarily, specific reports have found that single mothers are less likely to utilise ANC due to the lack of economic and social support from partners or family members; some of them may even suffer depression and neglect [33, 34].

Religion was also a significant determining factor in ANC utilisation in this study. Christians were the most likely to utilise ANC (88.1%), followed by Traditionalists at a 69.2% rate, then Muslims were less likely to use ANC (61.8%) than others. Many Christian doctrines are not against accessing ANC during and after pregnancy, explaining the high rate of ANC utilisation among this group [35]. At the same time, the traditionalist often utilises the ancient methods during pregnancy, which are usually risky and outdated. Thus, effective use of ANC among the traditionalist may be due to the understanding that the world is evolving. Besides, complications could occur without medical personnel's help. There are many reasons why ANC utilisation is less than others for Muslims. According to a study in eastern Ethiopia, Islamic doctrines are very particular about women's nudity exposure to men other than their husbands [36]. Also, a study in rural Kano, a northwestern state in Nigeria, strengthens this reason, stating that the purdah restrictions limit ANC use by most Muslim women compared to other religions (Adamu *et al*., 2002).

This study shows that respondents with unintended pregnancies utilised ANC (64.9%) more than women with planned pregnancies (62.8%). ANC utilisation among women with unplanned pregnancies might be due to negligence from their partners or families; with nobody to support,

the only available option is to seek medical assistance. Another reason might be that the number of respondents with unwanted pregnancies was far lesser than women with wanted pregnancies. This finding is not consistent with the report of a previous study that ANC utilisation among women with intended pregnancy was higher than those with unintended pregnancy (Karkee *et al*., 2014). This explanation is understandable because if a pregnancy is planned, there is a higher possibility of getting all the required medical attention like ANC than women with unwanted pregnancies. Adewuyi *et al*. (2018) also noted that unintended pregnancy was insignificant to ANC in Nigeria's urban and rural areas.

Use of Skilled Birth Attendants

This study found low use of skilled birth attendants (doctors, nurses, or midwives) in the northwest regions of Nigeria (16.7%). Poor professional birth attendant utilisation was similar across most socio-demographic profiles of the respondents (age, marital status, socioeconomic class, place of residence, and religion). However, education was a significant predictor of birth attendant utilisation; more than half of secondary and higher education use skilled birth attendants.

As found in this study, age has been an insignificant determinant in skilled birth attendants in some previous studies [22, 40, 41]. This claim reflects in the finding that all respondents in both age categories (<35 and ≥35) recorded the same level of skilled attendant utilisation (16.7%). This result may be due to many nulliparous women in the current study. Women with no birth experience, particularly the younger ones, who just began childbearing, tend to utilise skilled birth attendants more due to the fear of pregnancy and delivery-related complications during home deliveries [42]. Although skilled birth attendants' utilisation was low among married and unmarried respondents, more unmarried women use skilled birth attendants (28.5%) than the

married ones (16.4%). This finding might be because most single women in this study were educated, lived in urban areas, and were of high socioeconomic classes. This finding aligns with a report from southern Tanzania that single, educated, and women of higher socioeconomic status are more likely to make intelligent decisions about their health [42]. Contrary to this result, a study in Uganda found that when women and their spouses jointly decide the location of childbearing, they are more likely to be assisted by skilled birth attendants than when the woman solely makes this decision [43].

Similar to the results of this study, education has been a significant variable in determining the use of skilled birth attendants in many studies (Adamu, 2002; Adewuyi *et al*., 2018; Kabakyenga *et al*., 2012b; Karkee *et al*., 2014). Education, upper socioeconomic class, and urban residency greatly influence a woman's knowledge and accessibility to skilled birth attendants [42]. In this study, the use of skilled birth attendants (51.4%) among educated respondents was significantly higher than among respondents with below secondary education (10.9%). This finding implies that the low utilisation of skilled birth attendants among women of reproductive age in northwestern Nigeria is primarily due to the high level of illiteracy [44]. In addition, education offers a better grasp of health messages, empowering women to improve their health and their families by enabling them to make intelligent decisions [45]. In addition to education, this study has established that living in urban areas and being within middle or high socioeconomic classes also influence the utilisation of skilled birth attendants. Similar to this finding, a study conducted in Ghana reported a significant association between education and ANC visits (Dimbuene *et al*., 2018). However, this association was only found among middle and high socioeconomic groups living in urban areas, not in low class and rural residents. In addition, urban residents are more likely to access and afford skilled birth attendants' services; hence, the high rate of urban users

than rural users. Some studies have also found that educated women with educated spouses are more likely to use skilled birth attendants [38].

Another determinant of the skilled birth attendants' utilisation was religion. Although Muslims predominantly populate the Northwestern part of Nigeria, which explains the high number of Muslim respondents (95.4%) recorded in this study. Despite many Muslim respondents in the current study, Christians still recorded a significantly higher use of skilled birth attendants (45.2% vs 15.7%). Several studies have referred to Islamic doctrines as a significant limitation for professional birth attendant utilisation. For example, Henry *et al*. (2012), Fagbamigbe & Idemudia (2015), and Omer *et al*. (2014) all reported a similar finding that faith-related factors significantly hindered Muslim women's utilisation of maternal health services, including skilled birth attendants. It was found that Muslim women had to request permission from their spouses, parents, or religious leaders before attending ANC. Also, due to these Islamic doctrines, male medical personnel are unwilling to manage Muslim women and vice versa [47]. This claim was also supported by studies in the Middle East and North Africa where women require the presence of their spouses or a male relative when outdoor (Fagbamigbe & Idemudia, 2015; Remien *et al*., 2009). This dynamic may result in women having less freedom and decision-making power over their health, affecting their usage of maternal health services. Geographical distance and transportation were also one of the limitations in using skilled birth attendants. These impediments were more reflected among Muslims than Christian women in studies carried out in Nigeria (Fagbamigbe & Idemudia, 2015; Remien *et al*., 2009). All Traditional respondents did not use skilled birth attendants, making this demographic less significant than the rest.

This study found that most respondents (33.9%) used traditional birth attendants to replace skilled birth attendants. Several studies have also documented the high use of traditional birth

attendants instead of skilled birth attendants, particularly among Muslim women [51–53]. Traditional birth attendants have been reported to be affordable, accessible, and provide home delivery services to women [51–53], which may explain their high utilisation in this study. Also, a similar study found that Muslim women prefer traditional birth attendants to other skilled birth attendants [36]. According to Perez *et al*. (2008), traditional birth attendants were reported to understand and respect religious doctrines, which may explain why this study recorded a low utilisation of skilled birth attendants among Muslim women.

Limitation of the study

The deadline for completing the research work limited the amount of time available for the study. In addition, the researcher could not get the data early because of the processes required to obtain them from the NDHS database.

Conclusion

The study has highlighted the importance of maternal health and ANC utilisation among women of reproductive age. The majority of the respondents in this study utilised ANC though less than 20% used skilled birth attendants. However, high utilisation of ANC and skilled birth attendants were recorded among highly educated respondents, middle and upper socioeconomic classes, and urban residents. Conversely, religious beliefs, illiteracy, rural locations, and low socioeconomic class were significant impediments to utilising ANC and skilled birth attendants. These findings underscore the need for stakeholders to improve ANC uptake and skilled birth attendant utilisation in the Northwest and the entire country.

Ethical consideration

Permission to use the 2018 National survey data was obtained through email request. After obtaining permission to use the data, the NDHS electronic data management system was downloaded. As a result, data extracted from the larger NDHS data pool was analysed to determine the predictors of ANC utilisation among women of reproductive age in Northwest Nigeria.

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