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Awareness and Utilization of Antenatal Care Services among Women in Northern Nigeria

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Abstract **Original Research Article**

Background: Utilization of antenatal care is paramount in achieving the MDG goal, and is a resultant effect of knowledge, and attitude of the women to the services [20-25]. There are expedient factors that have been reported in literatures as affecting the utilization of ANC such as religion, education, cultures and traditions of the people, cost etc. Lack of antenatal care and its underuse can result in a variety of unfavorable pregnancy outcomes, including intrauterine growth restriction, low birth weight, and mother and infant death. This study was done to determine the awareness and utilization of ANC in Sokoto State, Nigeria as part of an effort to achieving the millennium development goal. ***Materials and Methods***: This was a descriptive cross-sectional study, adopting the simple random sampling technique and an interviewer administered semi-structured questionnaire. ***Results and Discussions***: The study finds, after assessment, the percentage of Good utilization, Good knowledge and Good Attitude towards ANC services as 52.3%, 72.6% and 67.0% respectively. Crude percentage of utilization of ANC services was 87.0%. Factors influencing utilization identified were marital status and income, with odds ratio of 6.2 (95%CI: 0.88 – 43.39) and 5.4 (95%CI: 1.60 – 18.30) respectively and having p-values of 0.068 and 0.007. Although the women in Sokoto have knowledge of ANC services, their utilization of ANC services is relatively poor. ***Conclusion***: Out of the 87.0% of uptake of ANC, only 52.3% were assessed to have Good utilization score. There is need for interventions to improve utilization of ANC services among women in Sokoto.

Keywords: Awareness, Utilization, Antenatal care, Women, North.

INTRODUCTION

Every pregnant woman should have at least eight antenatal checkups, according to the WHO [1], in order to identify and address any issues and administer vaccinations. Contrary to popular belief, many pregnant women do not obtain the recommended eight visits to the antenatal clinic [2]. The number of antenatal appointments pregnant women receive, as well as the treatment and information provided at each visit, are all poorly supported by data [2, 3]. It has been recommended that mothers who are carrying low-risk babies undergo fewer prenatal appointments [3]. When this was put to the test, mothers who had fewer visits had infants who were far more likely to be taken to neonatal critical care and stay there for a longer period of time [3, 4].

Again, the Cochrane Review findings by Dowswell *et al*., support this idea because they provide information that ANC programs with fewer visits are linked to higher perinatal mortality in countries with little resources and poor visitation rates [3, 4]. Thus, even in low-income countries (LICs), when pregnant women already attend fewer checkups, the decreased visits model may not be the best option.5 In addition to going to antenatal care early strongly advised, there is also a more dynamic approach that allows for additional visits from the moment an expectant mother books for prenatal care, which may allow for greater attention to be given to women who arrive late [6].

In addition, compared to mothers with the recommended frequency of antenatal appointments, those with fewer sessions are far less happy with the care they received. The number of visits that pregnant women would make to the medical facility would rely on the operating health system, which affects the availability and utilization of the antenatal care services in some ways [4-6].

There are various approaches to change health systems to make it easier for expectant mothers to get antenatal care, including new safety laws, training for health professionals, and reorganizing health services. Community-based initiatives to assist individuals in

changing their behavior may also be important [2-4]. Many people-oriented media campaigns geared at empowering communities to take charge of their personal well-being, interventions in information-education-communication, and financial incentives are illustrations of interventions [2-4]. One of these strategies helps increase the proportion of women seeking prenatal care, according to an evaluation of these programs [5]. However, combining measures may lower the number of babies with low birth weights born, decrease pregnancy and early infant mortality rates, and increase the proportion of women receiving antenatal care [6].

According to World Health Organization (WHO) data from the past, 830 expectant mothers die each day as a result of complications during pregnancy and delivery [7, 8]. Only 5 people resided in high-income nations; the remaining people did [9-12]. The knowledge of antenatal care services that are available to the people is very important, the reason being that ignorance of the services, and its benefits have a direct impact on utilization of the services [13-15]; in essence, an in-depth knowledge of the antenatal care (ANC) is essential in achieving the Millennium Development Goal (MDG) goal number 5 [10]. The level of knowledge of ANC has a direct effect on the attitude of women towards ANC [15, 16].

Again, the attitude of women to ANC is another very vital reason that would contribute to the actualization of the SDG goal [10, 17, 18]. The attitude towards ANC will influence the utilization of the services [19].

Utilization of antenatal care is paramount is achieving the MDG goal, and is a resultant effect of knowledge, and attitude of the women to the services [20-25]. Lastly, there are expedient factors that have been reported in literatures as affecting the utilization of ANC such as religion, education, cultures and traditions of the people, cost etc [26-28].

Lack of antenatal care and its underuse can result in a variety of unfavorable pregnancy outcomes, including intrauterine growth restriction, low birth weight, and mother and infant death. The northwestern states in Nigeria are Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto, and Zamfara.

It is reported that the maternal mortality ratio and infant mortality rate are as high as 1,576 per 100,000 live births and 78 per 1,000 live births, respectively, in Nigeria's northwestern region [29]. Sokoto is one of the states in north-west Nigeria. It therefore means that neonatal mortality is high and this could be a result of non-utilization and underutilization of antenatal care.

In addition, the millennium development goal (MDG) number 5 is geared towards improving maternal health: reduction of maternal mortality by three-quarter, and improved access to reproductive health [10]. It further means that the north-west is far behind in achieving the MDG goal. It therefore implies that to achieve this goal in Sokoto State and by extension the north-west, antenatal care services must be utilized maximally.

There are literatures in existence that have reported similar studies in the past [30-35]. This study is aimed at investigating the awareness and utilization of antenatal care services among women in Northern Nigeria.

Objectives

i. To determine the knowledge of ANC amongst the women in Northern Nigeria
ii. To determine the Attitude of the women towards ANC in Northern Nigeria
iii. To determine the utilization of ANC amongst the women in Northern Nigeria
iv. To determine the factors affecting utilization of ANC amongst the women in Northern Nigeria
v. To compare knowledge, attitude of the women towards ANC with utilization of ANC

MATERIALS AND METHODS

Study Design

A Descriptive Cross-sectional study design was adopted for this study.

Area of the Study

The study was carried out in Wamako LGA [36]. It is populated by Hausa people. It also comprises four villages: Kammata, Gwamatse, Kauran Kimaba and Kokani Cidawa. The inhabitants are mostly farmers and animal rearers [36]. Wamako as a Local Government Area has its headquarters in Wamako town. The LGA has an estimated area of 697 km^2 and a population of 179,619 as at the last census in 2006 with a population projection of 309,400 [37]. There are a total of 44 primary health centres, 2 secondary health facilities and 1 tertiary health facility in Wamako LGA.

Population for the Study

The study population are women of reproductive age residing in Wamako LGA of Sokoto State.

Criteria for Subject Selection

The participants for the study will be drawn from the study area. However, there are certain conditions required for recruitment into the study. Hence, the inclusion and exclusion criteria.

Inclusion Criteria

1. Female of reproductive age (15-49 years by the WHO) [35]

2. Residents of the communities within the study area.

Exclusion Criteria

1. Visitors who are not resident in any of the northern states in Nigeria.

Recruitment Method/ Sampling Technique

The sampling technique adopted for the study was Multi-stage sampling Method. This comprised 3 stages of simple random sampling and Lot Quality Assurance Sampling methods.

Stage 1: Selection of one Northern state from the list of 16 states by simple random sampling (Sokoto State was selected)

Stage 2: Selection of one LGA from the list of 23 LGAs in the selected state by simple random sampling, using sets of random numbers (Wamako LGA was selected)

Stage 3: Selection of one community from the selected LGA by simple random sampling, using a set of random numbers (Wamako Community was selected).

Stage 4: Selection of sample unit/Participants by Lot Quality Assurance Sampling.

The list of all compounds in the selected community was taken, if the compounds are more than 18, we would skip two compounds and sample the next, where the numbers of the compounds in the community are less than 18, then a compound would be skipped and the next was sample. All females of reproductive age were recruited in any compound sampled. The process was repeated till the sample size was achieved.

Sample size calculation for the study

The sample size was determined using the formula below for a test of difference in proportion and prevalence.

The equation= SS = $\frac{\mathrm{Z}\alpha^2 \times \mathrm{p(1\text{-}p)}}{d^2}$

P= the utilization of antenatal care service in Northern Nigeria from a previous study was 80.1% [38] Therefore, the calculated research sample size will be (245+25) = 270 volunteers

Sample size

A minimum sample size of 270 women of reproductive age resident in wamako were interviewed for the study.

Instrumentation for Data Collection

The instrument for the study was adapted from the Maternal WOICE Tool: antenatal care. The instrument was structured in five sections: Section A-socio-demographics, Section B captured questions on the knowledge of ANC, Section C captured questions on the attitude of the women towards ANC in Northern Nigeria, Section D captured questions on the utilization of ANC, and finally, Section E captured questions on the factors affecting utilization of ANC. At the end of the study, the data was stored on the online repository to provide access to other researchers and any public health organization.

Validity of Instrument

The instrument has undergone content validation by the world health organization to ascertain its content in line with the purpose of the study. In addition, the instrument was further validated by the research supervisor to ensure that it is consistent with the aim of the current study.

Reliability of the Instrument

The reliability test of the instrument has already been done by the world health organization. Although, after adaptation of the instrument to suit the current study, test-retest reliability test (Craonbach's alpha reliability coefficient) was used to examine the reliability of the research instrument under the supervision of the research supervisor.

Method of obtaining consent from the research subjects

The consent form had the title of the study being "awareness and utilization of antenatal care services among women in northern Nigeria" and the objectives of the study which was read thus "the aim and objectives of the study are to determine the knowledge, attitude, utilization of ANC, and the factors affecting utilization of ANC amongst the women in northern Nigeria".

Method of Data Collection

The data collection relied on the participant's informed consent to participate in the study. The instrument was interviewer administered.

Methods of Statistical Analysis

The data analyzed was analyzed using Statistical Package for Social Sciences (SPSS version 25). Means and proportions were used to represent continuous and discrete variables respectively. The confidence interval (C.I) was taken at 95%, with p-value less than 0.05 ($p<0.05$), chi square test was used to determine the association between variables. Bivariate and multivariate regression models were used to determine relationships where necessary.

A p-value of less than 0.05 was considered significant. Statistically significant variables on bivariate analysis were entered into a multivariate analysis model to control for any confounding influence. Multivariate analysis was performed using multivariate logistic regression. Odds ratio and 95% confidence intervals was used as measures to determine the strength of association. Statistical analyses conducted was based on the research objectives as outlined below:

0bjective 1: To determine the knowledge of ANC amongst the women in Northern Nigeria using descriptive statistics and chi square test.

0bjective 2: To determine the Attitude of the women towards ANC in Northern Nigeria using descriptive statistics and chi square test

0bjective 3: To determine the utilization of ANC amongst the women in Northern Nigeria using descriptive statistics and chi square test

0bjective 4: To determine the factors affecting utilization of ANC amongst the women in Northern Nigeria descriptive statistics and chi square test

0bjective 5: To compare knowledge, attitude of the women towards ANC with utilization of ANC using chi square test and Bivariate and Multivariate regression models for significant variables.

To assess knowledge, attitude and Utilization levels among respondents, items were selected from each section. The items that were negatively worded were reversed. The items were scored, using 1 for correct response and 0 for wrong response. All scores were summed and converted to percentages. Grading was done using 0 – 49% as Poor/Low, 50 – 69% as Fair/Medium, and 70 – 100% as Good/High.

Implementation procedures and methods

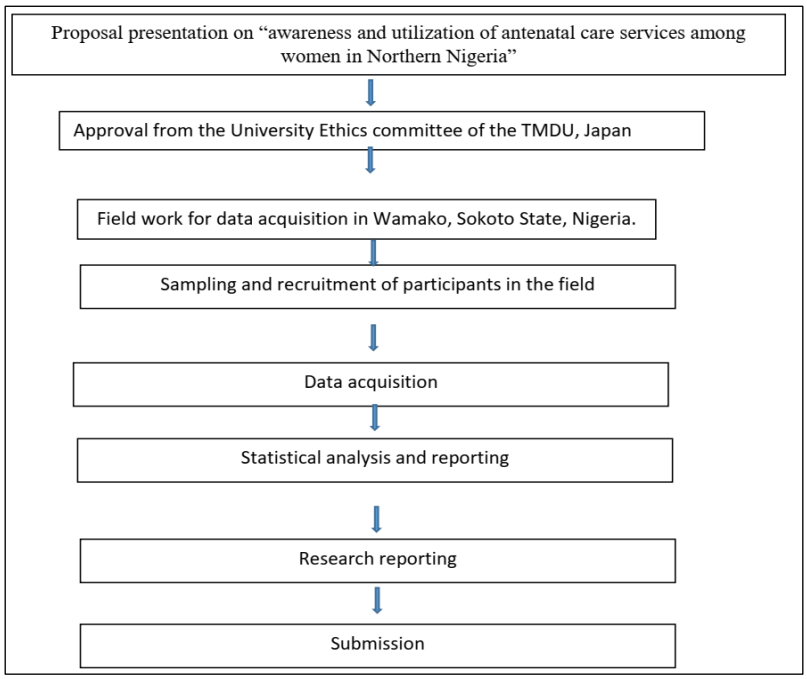

Figure 1: Flow chart of the stages research plan

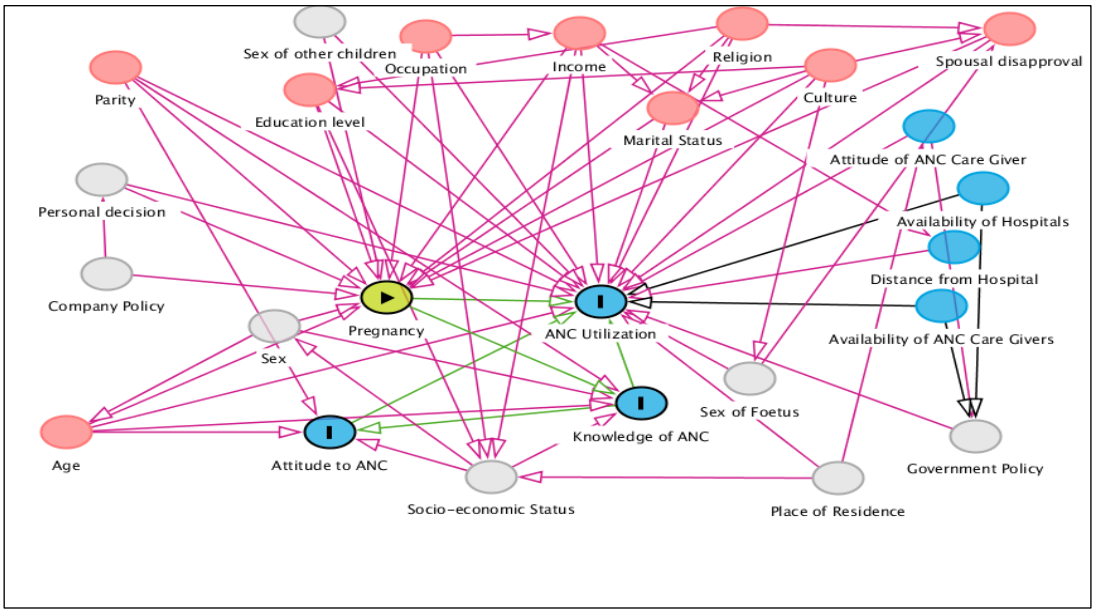

Figure 2: Direct Acyclic Graph for Study Outcome (DAG)

RESULTS AND DISCUSSION

The following results were obtained from this study:

Table 1: Socio-demographic Characteristics

Variable	N	%
Age group (years)		
≤ 29	76	28.1
30 – 39	62	23.0
40 – 49	71	26.3
50 – 59	61	22.6
Religion		
Christianity	4	1.5
Islam	266	98.5
Number of children		
None	7	2.6
1 – 3	78	28.9
4 – 6	99	36.6
7 – 9	72	26.7
≥ 10	14	5.2
Highest level of education		
No formal education	117	43.3
Primary	75	27.8
Secondary	63	23.3
Tertiary	15	5.6
Marital status		
Single/never married	3	1.1
Married/co-habiting	228	84.4
Divorced/separated	39	14.4

The distribution of age of respondents constitutes 28.1%, 23.0%, 26.3% and 22.6% for age groups of ≤ 29, 30 – 39, 40- 49, and 50 – 59 years respectively. Majority of the respondents, 117 (43.3%) had no formal education while 84.4% of the total respondents were married or cohabiting; only 1.5% were Christians (Table 1).

Table 2: Knowledge of ANC Services

Variable	N	%
Knowledge level		
Good (Score: 70% – 100%)	196	72.6
Fair (Score: 50% – 69.9%)	48	17.8
Poor (Score: 0% – 49.9%)	26	9.6
ITEMS USED FOR ASSESSMENT		
Heard about ANC		
Yes	259	95.9
No	11	4.1
Definition of ANC		
Services given to pregnant women who visit the hospital	141	52.2
Services given to women who visit hospitals	75	27.8
Services given to women who have given birth/gave birth in the hospital	37	13.7
Services given to babies only in the hospital	17	6.3
Source of info about ANC		
Your partner	96	35.5
You family member	72	26.6
Health care worker	58	21.5
Social media	35	13.0
Friends	8	3.0
Others	1	0.4

Variable	N	%
Know the services given in ANC		
Yes	253	93.7
No	17	6.3
Where ANC is best received		
Hospital	234	86.7
Home (visiting care givers)	22	8.1
TBA (Traditional Birth Attendant)	12	4.4
None of the above	2	0.7
Provider of ANC		
Health care worker	178	65.9
Religious leaders	43	15.9
TBA	34	12.6
Family	15	5.6

A total of 5 items were used to assess the knowledge of respondents toward ANC services, this excludes source of information about ANC. These items were recoded to have 1 as the score for right responses and 0 for wrong responses. The scores were summed and converted to percentages. Scores were graded as Good (70% - 100%), Fair (50% - 69.9%) and Poor (0 – 49.9%).

Respondents with Good knowledge of ANC constituted 72.6% while those who had Poor knowledge constituted 9.6% of the total.

There were 259 (95.9%) respondents who have heard of ANC and 52.2% of those who know the definition of ANC. Most (96, 35.5%) of the respondents heard of ANC from their partners and 93.7% know the services given in ANC. Respondents who said hospital was best place for receiving ANC accounted for 234 (86.7%), while 178 (65.9%) knows that ANC is provided by health care workers. (Table 2)

Table 3: Attitude towards ANC Services

Variable	n	%
Attitude level		
Good (Score: 70% – 100%)	181	67.0
Fair (Score: 50% – 69.9%)	37	13.7
Poor (Score: 0% – 49.9%)	52	19.3
ITEMS USED FOR ASSESSMENT		
Would visit an ANC clinic during pregnancy*		
Yes	199	73.7
No	15	5.6
Maybe	56	20.7
Would rather a health care worker provide your ANC than a TBA*		
Yes	225	83.3
No	45	16.7
Would recommend ANC services to your colleagues, neighbors, friends, family*		
Yes	215	79.6
No	55	20.4
Reason for not recommending n = 55		
Not my responsibility	18	32.7
I have no experience	25	45.5
They will not agree	4	7.3
Other reasons	8	14.5
Would trust the ANC service skill of a health care worker over your culture/traditions*		
Yes	208	77.0
No	62	23.0
Why No (n = 62)		
I prefer my culture/tradition	44	71.0
Contradicts my belief	4	6.5
I Don't trust HCW	5	8.0
Other reasons	9	14.5

Variable	n	%
Would defy every barrier to ensure you get ANC services from a Hospital*		
Yes	209	77.4
No	61	22.6
Why No (n = 58)		
I prefer my culture/tradition	40	69.0
Hospital is expensive	7	12.1
I don't trust HCW	2	3.4
Other reasons	9	15.5
Missing response = 3		

*= Items used for Assessment

A total of 5 items were used to assess the attitude of respondents toward ANC services. These items were recoded to have 1 as the score for right responses and 0 for wrong responses. The scores were summed and converted to percentages. Scores were graded as Good (70% - 100%), Fair (50% - 69.9%) and Poor (0 – 49.9%).

Respondents with Good Attitude towards ANC constituted 67.0%, while those with Poor attitude accounted for 19.3%.

Respondents that would visit ANC clinic during pregnancy accounts for 199 (73.7%) of the 270 women; most (225, 83.3%) of who would prefer a health care worker to provide ANC than TBA and then 79.6% who would recommend ANC to colleagues/neighbors. There were 208 (77.0%) who trusts the ANC service skills of Health Care Workers and 77.4% who would defy every barrier to ensure they get ANC services from a hospital (Table 3).

Table 4: Utilization of ANC Services amongst Respondents with Pregnancy History

Variable	n	%
Utilization level		
Good (Score: 70% – 100%)	123	52.3
Fair (Score: 50% – 69.9%)	100	42.6
Poor (Score: 0% – 49.9%)	12	5.1
ITEMS USED FOR ASSESSMENT		
Visits Hospital for Health Services when sick (n =270)		
Yes	230	85.2
No	40	14.8
Why No (multiple response, n = 43)		
Funds	13	33.3
Distance	8	20.5
Prefer herbs/traditional treatment	12	30.8
I Don't Like Hospitals	4	10.3
Prefer home treatment	2	5.1
Contradicts my religion	4	10.3
Have received ANC services* (n = 270)		
Yes	235	87.0
No	20	7.4
Not applicable	15	5.6
Why No (n = 20)		
Prefer Traditional Birth Attendant	11	55.0
Family disapproval	2	10.0
No Hospital	2	10.0
No Money	2	10.0
No reason stated	3	15.0
Where ANC service was accessed* (n = 235)		
Hospital	197	83.8
Traditional Birth Attendant	27	11.5
Home (Visiting HCW)	11	4.7
What services were accessed (Multiple response, n = 237)		
Laboratory examination*	59	25.1
Hand massaging *	50	21.3

Variable	n	%
Medications/drugs*	99	42.1
Counselling*	14	6.0
Prayer *	10	4.3
Vaccinations*	5	2.1
Number of visits made (n = 235)*		
1 – 3 visits	39	16.6
4 – 6 visits	106	45.1
7 – 9 visits	71	30.2
≥ 10 visits	19	8.1

*= Items used for assessment

To assess the utilization of ANC services among respondents, 9 items were selected. These items were recoded to have 1 as the score for right responses and 0 for wrong responses. The scores were summed and converted to percentages. Scores were graded as Good (70% - 100%), Fair (50% - 69.9%) and Poor (0 – 49.9%) (Table 4).

Good, Fair and Poor practice of uptake of ANC were recorded among 52.3%, 42.6% and 5.1% respectively (Table 4).

Respondents who visit hospitals when sick accounted for 85.2% of the total. The proportion of respondent who have received ANC was 235 (87.0%), 83.8% of them accessed ANC in a hospital, and 45.1% of them had 4 – 6 hospital visits for ANC (Table 4).

Table 4b: Utilization of ANC Services amongst Respondents with Pregnancy History

Variable	N	%
Reason for Patronizing Preferred ANC Provider (Multiple Response, n = 242)		
Safer for pregnancy	88	37.4
Empathy	80	34.0
Sympathy	5	2.1
Excellent service provision	23	9.8
Less expensive fees	10	4.3
Closer to you	12	5.1
Culture friendly	10	4.3
Related to the Care Giver	10	4.3
Other reasons	4	1.7

Of all the reasons why respondents patronize their preferred ANC provider, Safer for pregnancy and Empathy by ANC service provider were the major reasons, constituting 37.4% and 34.0% respectively.

Table 5: Factors Influencing Utilization of ANC

Variable	N	%
Factors influencing utilization (Multiple response, n = 245)		
Unemployment	34	14.5
Distance from my place of residence	34	14.5
Personal decision	31	13.2
I can't afford it	31	13.2
Attitude of health care service providers	25	10.6
Spouse disapproval	22	9.4
Lack of healthcare facility	17	7.2
Religion	15	6.4
Lack of time	15	6.4
Long Waiting time	14	6.0
Against my culture	5	2.1
Other factors	2	0.9

The factors which affects utilization of ANC among respondents were majorly unemployment (14.5%), Distance from place of residence (14.5%), personal decision (13.2%), Can't Afford ANC (13.2%). Spouse disapproval accounted for 9.4%. (Table 5)

Table 6: Relationship among Knowledge, Attitude and Utilization of ANC services among Respondents

Variable	ANC Utilization Level			Fishers' Exact
	Good n (%)	Fair n (%)	Poor n (%)	P-value
ANC knowledge level				
Good	105 (85.4)	71 (71.0)	6 (50.0)	
Fair	17 (13.8)	20 (20.0)	3 (25.0)	<0.001
Poor	1 (0.8)	9 (9.0)	3 (25.0)	
ANC attitude level				
Good	103 (83.7)	67 (67.0)	6 (50.0)	
Fair	8 (6.5)	19 (19.0)	2 (16.7)	0.003
Poor	12 (9.8)	14 (14.0)	4 (33.3)	

Fishers' Exact test reveals statistically significant associations with ANC utilization, knowledge and attitude of respondents, having p-values of < 0.001 and 0.003 for knowledge and attitude respectively (Table 6).

DISCUSSION

Summary of results

In the socio-demographic characteristics of the respondents, it was of note that 31.9% of the women have had at least 7 children. This study finds that most of the women, this consists 117 (43.3%) women, have had no formal education and only 15 (5.6%) of them have attained tertiary level education. The women were not all married, 3 (1.1%) were single, 228 (84.4%) were married or co-habiting, while 39 (14.4%) were divorced or separated (Table 1).

Though many of the women have heard of ANC, of this I mean 95.9% of the 270 respondents, but only 52.2% knew what ANC rightly means. This study finds that the 196 (72.6%) of the total sample had Good knowledge of ANC services, that 48 (17.8%) had Fair knowledge, while 26 (9.6%) had Poor knowledge of ANC and services (Tables 2 & 3).

The attitude of women were assessed and graded, and it was found that 52 (19.3%) women had Poor attitude towards ANC, while 37 (13.7%) and 181 (67.0%) had Fair and Good attitude respectively. This study finds that 73.7% of the total sample said they would visit an ANC clinic during pregnancy and 83.3%, which is 225 women, said they would rather a health care worker provides their ANC than a TBA. While 77.0% would trust the ANC service skill of health care workers over their culture/ tradition, 79.6% comprising 215 women said they would recommend ANC services to their colleagues, neighbors, friends and family.

The study assessed utilization of ANC among respondents and found a utilization percentage of 52.3%, 42.6% and 5.1% for Good, Fair and Poor Utilization respectively.

The factors that were highlighted as influencers of utilization were more on unemployment, distance of health centers from users' residence, their own personal decisions, and inability to afford the ANC services. Then there was also the issue of attitude of health care service providers and spousal disapproval. All of these factors accounted for 14.5%, 14.5%, 13.2%, 13.2%, 10.6% and 9.4% respectively. Some other factors included lack of time, religion, lack of health care facility and long waiting time in hospital.

Using Fishers' Exact test, the study finds a statistically significant association between ANC utilization and knowledge, having a p-value of <0.001, which is less than the 0.05 alpha level (level of significance). It further finds that there was a statistically significant association between ANC utilization and attitude of women. This had a p-value of 0.003. Then there was also a statistically significant association between ANC Utilization and marital status of women, having a p-value of 0.032.

Implications

This study was carried out to find out the level of awareness and utilization of antenatal care services among women in Northern Nigeria, paying specific attention to determining the knowledge of ANC, the attitude of women toward ANC and the utilization of ANC among women in Northern Nigeria. The study also sought to find the factors affecting utilization of ANC and to determine the association Knowledge and Attitude of ANC shares with Utilization of ANC. Finding showed that more of the participants were in the age groups of ≤ 29 years with majority of the respondents having no formal education, about two-third of the total participants were married or cohabiting, and most of the participants were Muslims. Finding revealed that more of the women have had at least 7 children.

Knowledge of ANC Services

The finding in the present study revealed that greater proportion of the women were aware of ANC, and they understood the meaning of ANC. The finding indicated that the women's level of knowledge and

understanding ANC were dependent on the source of the information. These findings may be linked to socio-demographic characteristics of the respondents. The present finding is in agreement with previous findings that various sources of information on antenatal services are provided such as people-oriented media campaigns geared at empowering communities to take charge of their personal well-being, interventions in information-education-communication, and financial incentives are illustrations of interventions [2-4]. One of these strategies helps increase the proportion of women seeking prenatal care [5]. The result showed that more of the of the women who took part in the study were aware of the ANC from their partners and most of them know the services given in ANC. Large number of the women reported that hospital was best place for receiving ANC and that ANC is offered by health care workers. The current study shows that majority of the women who participated in the study had good knowledge of ANC services, followed by fewer proportion that had fair knowledge of ANC services.

Attitude towards ANC Services

Finding showed that most of the participants reported to have visited ANC clinic during pregnancy, and majority of the women stated to prefer ANC services from a health care worker than that of TBA. This is consistent with the recommendations by WHO, that all pregnant woman should attend at least eight ANC [1]. Conversely, there is no similarity between the present finding and the finding in previous study that many pregnant women do not obtain the recommended eight visits to the antenatal clinic [2]. More than two-third of the women who took part in the study indicated they would recommend ANC to colleagues/neighbors. Similarly, majority of the women agree to have trust in the ANC service skills of health care workers than their culture/ tradition. Also, a great number percentage of the women would ensure they get ANC services from a hospital by resisting every barrier. There is consistency between present finding and findings that reported that various strategies are used to improve expectant mothers to get antenatal care services, including new safety laws, training for health professionals, and reorganizing health services [2-4]. The present finding revealed that most of the women had good attitude towards ANC services accompanied by those that have fair attitude towards ANC services. From the findings, it can be implied that majority of the women who participated in the study had good attitude towards ANC services.

Utilization of ANC Services amongst Respondents

The finding showed that greater number of the women who visited ANC in the hospitals when they were sick, and large number of the participants received ANC services. Most of the women accessed ANC in a hospital, and slightly less than half of them had 4-6 hospital visits for ANC. Majority of the women reported that they patronize their preferred ANC provider as to guarantee safety of the pregnancy and safe delivery. The present finding indicated that most of the women who took part in the study had good practice of uptake of ANC services followed by a fewer proportion of the participants who had fair practice of uptake of ANC services. There is similarity between current finding and finding in a study conducted in south west of Nigeria, a greater proportion of the participants utilized ANC services Aluko *et al*., [11]. Similarly, findings in studies conducted in Nigeria by Awoleke and Olofinbiyi [10]; Iyaniwura and Yususf [7]; Nwaeze *et al*., [22], and Olayinka *et al*., [6] were consistent with the finding in this study which reported that large number of the women who participated in the study utilized ANC services. Finding in this study is in keeping with finding in a study conducted in Nigeria, which reported that majority of the participants utilized ANC services Oyibo *et al*., [21] In addition, finding in the study conducted in south-south, Nigeria revealed that great number of participants used ANC services Okonofua *et al*., [9] From the finding in this study, it can be deduced that a large number of the women accessed and used ANC services.

Factors Influencing Utilization of ANC

The result indicated that the level of knowledge of ANC services among the women influenced the utilization of ANC services. Previous studies revealed that knowledge of antenatal care services has an impact on level of utilization of the ANC services [13-15]. Correspondingly, studies indicated that knowledge of the antenatal care (ANC) is vital in achieving high level of utilization of the ANC services [5, 10]. The present finding showed that unemployment, distance of health centers from users' residence, personal decision, spouse disapproval to attend ANC had none significant associations with the utilization of ANC services. There was a statistically significant relationship between the level of knowledge and utilization of ANC services and also between attitude towards ANC services and utilization. This is in keeping with finding in another study which reported that the level of utilization of antenatal care is affected by the knowledge, and attitude of the women to the services [20-25]. Also, substantial association was observed between marital status of the women and utilization of ANC services, as well as with inability to pay for ANC services (income). However, the age of the participants, number of children and level of education attained by the participants had no statistically significant relationship with the utilization of ANC services. Furthermore, attitude of health care service providers, spousal disapproval, lack of time, religion, lack of health care facility and long waiting time in hospital had no statistically significant association with utilization of ANC services. Finding in a study indicated that the level of knowledge of ANC has a direct effect on the attitude of women towards ANC [15, 16]. This is in keeping with finding in this study. Also, this study found a significant relationship between utilization of ANC and level of knowledge among the participants. Finding showed that utilization of ANC had a substantial relationship with the attitude of the women towards ANC

services. Attitude of women towards ANC services contribute to the actualization of the SDG goal [10, 17, 18]. The attitude towards ANC services has significant influence on the utilization of the services [19]. This is consistent with finding in the present study and finding in other studies.

Predictors of ANC Utilization

The finding showed that marital status and income (inability to afford ANC in the hospital) had a considerable influence on utilization. Hence, women who were married/cohabiting utilized the ANC service more than women who were single/divorced/separated group. This can be linked to the support given to the women by their spouse and the social life of their partners. Similarly, women who were able to afford ANC services utilized the ANC services more than those who could not afford it. Lastly, there are expedient factors that have been reported in literatures as affecting the utilization of ANC such as religion, education, cultures and traditions of the people, cost etc [26-28].

CONCLUSION

Although the women in Sokoto have knowledge of ANC services, their utilization of ANC services is relatively poor. Out of the 87.0% of uptake of ANC, only 52.3% were assessed to have Good utilization score. There is need for interventions to improve utilization of ANC services among women in Sokoto. This study finds that marital status and ability to pay/income of women/household affects utilization of ANC among women in Sokoto State. Public health officers would need to liaise with religious and community heads and leaders in order to improve enlightenment of women about the health benefits of ANC, using information, education and communication materials.

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Author's Contribution

We write to state that both authors have contributed significantly, and that both authors are in agreement with the content of the manuscript. "Author A" (DU) designed the study design, protocol, the write-up and intellectual content. "Authors B" (TF) reviewed the design, protocol, the write-up and managed the literature searches, "Author A & B " (DU & TF) managed the analyses of the study, wrote the first draft of the manuscript. Both authors read the final manuscript and approved it.

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REFERENCES

1. Islam, M. M., & Masud, M. S. (2018). Determinants of frequency and contents of antenatal care visits in Bangladesh: Assessing the extent of compliance with the WHO recommendations. *PloS one*, *13*(9), e0204752.
2. Basinga, P., Gertler, P. J., Binagwaho, A., Soucat, A. L., Sturdy, J., & Vermeersch, C. M. (2011). Effect on maternal and child health services in Rwanda of payment to primary health-care providers for performance: an impact evaluation. *The Lancet*, *377*(9775), 1421-1428.
3. Gilmore, B., & McAuliffe, E. (2013). Effectiveness of community health workers delivering preventive interventions for maternal and child health in low-and middle-income countries: a systematic review. *BMC public health*, *13*(1), 1-14.
4. Symon, A., Pringle, J., Cheyne, H., Downe, S., Hundley, V., Lee, E., ... & Alderdice, F. (2016). Midwifery-led antenatal care models: mapping a systematic review to an evidence-based quality framework to identify key components and characteristics of care. *BMC pregnancy and childbirth*, *16*(1), 1-15.
5. Akowuah, J. A., Agyei-Baffour, P., & Awunyo-Vitor, D. (2018). Determinants of antenatal healthcare utilisation by pregnant women in third trimester in peri-urban Ghana. *Journal of tropical medicine*, 2018.
6. Feijen-de Jong, E. I., Jansen, D. E., Baarveld, F., van der Schans, C. P., Schellevis, F. G., & Reijneveld, S. A. (2012). Determinants of late and/or inadequate use of prenatal healthcare in high-income countries: a systematic review. *The European Journal of Public Health*, *22*(6), 904-913.
7. Olonade, O., Olawande, T. I., Alabi, O. J., & Imhonopi, D. (2019). Maternal mortality and maternal health care in Nigeria: Implications for socio-economic development. *Open access Macedonian journal of medical sciences*, *7*(5), 849.
8. Villar, J., Ba'aqeel, H., Piaggio, G., Lumbiganon, P., Belizán, J. M., Farnot, U., ... & Berendes, H. (2001). WHO antenatal care randomised trial for the evaluation of a new model of routine antenatal care. *The lancet*, *357*(9268), 1551-1564.
9. Carroli, G., Villar, J., Piaggio, G., Khan-Neelofur, D., Gülmezoglu, M., Mugford, M., ... & Bersgjø, P. (2001). WHO systematic review of randomised controlled trials of routine antenatal care. *The Lancet*, *357*(9268), 1565-1570.
10. Bryce, J., Black, R. E., & Victora, C. G. (2013). Millennium Development Goals 4 and 5: progress and challenges. *BMC medicine*, *11*(1), 1-4.
11. Arya, A., Mehra, N., & Mehra, J. S. (2017). To Study the Knowledge, Attitude and Practices Regarding Antenatal Care among Pregnant Women in Haldwani Block, District Naintal (Uttarakhand) India. *Journal of Medical Science And clinical Research [Internet]*, *5*(04), 20093-20102.
12. Renfrew, M. J., McFadden, A., Bastos, M. H., Campbell, J., Channon, A. A., Cheung, N. F., ... & Declercq, E. (2014). Midwifery and quality care: findings from a new evidence-informed framework for

maternal and newborn care. *The Lancet*, *384*(9948), 1129-1145.
13. Gupta, R. K., Shora, T. N., Verma, A. K., & Jan, R. (2015). Knowledge regarding antenatal care services, its utilization, and delivery practices in mothers (aged 15-49 years) in a rural area of North India. *Trop J Med Res*, *18*(2), 89-94.
14. Patel, B. B., Gurmeet, P., Sinalkar, D. R., Pandya, K. H., Mahen, A., & Singh, N. (2016). A study on knowledge and practices of antenatal care among pregnant women attending antenatal clinic at a Tertiary Care Hospital of Pune, Maharashtra. *Medical Journal of Dr. DY Patil University*, *9*(3), 354-362.
15. Akhtar, S., Hussain, M., Majeed, I., & Afzal, M. (2018). Knowledge attitude and practice regarding antenatal care among pregnant women in rural area of Lahore. *International Journal of Social Sciences and Management*, *5*(3), 155-162.
16. Shafqat, T., Fayaz, S., Rahim, R., & Saima, S. (2015). Knowledge and awareness regarding antenatal care and delivery among pregnant women. *Journal of Medical Sciences*, *23*(2), 88-91.
17. Akhtar, S., Hussain, M., Majeed, I., & Afzal, M. (2018). Knowledge attitude and practice regarding antenatal care among pregnant women in rural area of Lahore. *International Journal of Social Sciences and Management*, *5*(3), 155-162.
18. Ogunba, B. O., & Abiodun, O. B. (2017). Knowledge and attitude of women and its influence on antenatal care attendance in Southwestern Nigeria. *J Nutr Health Sci*, *4*(2), 207.
19. Knight-Agarwal, C. R., Kaur, M., Williams, L. T., Davey, R., & Davis, D. (2014). The views and attitudes of health professionals providing antenatal care to women with a high BMI: a qualitative research study. *Women and Birth*, *27*(2), 138-144.
20. Simkhada, B., Teijlingen, E. R. V., Porter, M., & Simkhada, P. (2008). Factors affecting the utilization of antenatal care in developing countries: systematic review of the literature. *Journal of advanced nursing*, *61*(3), 244-260.
21. Tekelab, T., Chojenta, C., Smith, R., & Loxton, D. (2019). Factors affecting utilization of antenatal care in Ethiopia: a systematic review and meta-analysis. *PloS one*, *14*(4), e0214848.
22. Ali, S. A., Dero, A. A., Ali, S. A., & Ali, G. B. (2018). Factors affecting the utilization of antenatal care among pregnant women: a literature review. *J Preg Neonatal Med*, *2*(2).
23. Akowuah, J. A., Agyei-Baffour, P., & Awunyo-Vitor, D. (2018). Determinants of antenatal healthcare utilisation by pregnant women in third trimester in peri-urban Ghana. *Journal of tropical medicine*, *2018*, 8.
24. Feijen-de Jong, E. I., Baarveld, F., Jansen, D. E., Ursum, J., Reijneveld, S. A., & Schellevis, F. G. (2013). Do pregnant women contact their general practitioner? A register-based comparison of healthcare utilisation of pregnant and non-pregnant women in general practice. *BMC family practice*, *14*(1), 1-7.
25. Gebreyohannes, Y., Ararso, D., Mengistu, F., Abay, S., & Hadis, M. (2017). Improving antenatal care services utilization in Ethiopia: an evidence–based policy brief. *Int J Health Econ Policy*, *2*, 111-117.
26. Pell, C., Menaca, A., Were, F., Afrah, N. A., Chatio, S., Manda-Taylor, L., ... & Pool, R. (2013). Factors affecting antenatal care attendance: results from qualitative studies in Ghana, Kenya and Malawi. *PloS one*, *8*(1), e53747.
27. Tekelab, T., Chojenta, C., Smith, R., & Loxton, D. (2019). Factors affecting utilization of antenatal care in Ethiopia: a systematic review and meta-analysis. *PloS one*, *14*(4), e0214848.
28. Basha, G. W. (2019). Factors affecting the utilization of a minimum of four antenatal care services in Ethiopia. *Obstetrics and Gynecology International*, *2019*.
29. Abegunde, D., Orobaton, N., Shoretire, K., Ibrahim, M., Mohammed, Z., Abdulazeez, J., ... & Ganiyu, A. (2015). Monitoring maternal, newborn, and child health interventions using lot quality assurance sampling in Sokoto State of northern Nigeria. *Global Health Action*, *8*(1), 27526.
30. Dahiru, T., & Oche, O. M. (2015). Determinants of antenatal care, institutional delivery and postnatal care services utilization in Nigeria. *Pan Afr Med J*, 21, 1-17. doi:10.11604/pamj.2015.21.321.6527.
31. Yeoh, P. L., Hornetz, K., & Dahlui, M. (2016). Antenatal care utilisation and content between low-risk and high-risk pregnant women. *PLoS One*, *11*(3), e0152167.
32. Vogel, J. P., Habib, N. A., Souza, J. P., Gülmezoglu, A. M., Dowswell, T., Carroli, G., ... & Oladapo, O. T. (2013). Antenatal care packages with reduced visits and perinatal mortality: a secondary analysis of the WHO Antenatal Care Trial. *Reproductive health*, *10*(1), 1-7.
33. Villar, J., Carroli, G., Khan-Neelofur, D., Piaggio, G., & Gülmezoglu, M. (2002). Patterns of routine antenatal care for low-risk pregnancy. *Cochrane database of systematic reviews issue*, *4*.
34. Ajayi, I. O., Osakinle, D. C., & Osakinle, E. O. (2013). Quality assessment of the practice of focused antenatal care (FANC) in rural and urban primary health centres in Ekiti State. *Open J Obstet Gynecol*, *3*(3), 1-8. DOI:10.4236/ojog.2013.33059
35. https://platform.who.int/data/maternal-newborn-child-adolescent-ageing/maternal-and-newborn-data/maternal-and-newborn---demographics
36. https://nigeriazipcodes.com/4471/list-of-towns-and-villages-in-wammako-lga/
37. https://www.citypopulation.de/en/nigeria/admin/
38. Okafoagu, N. C., Oche, O. M., Raji, M. O., Onankpa, B., & Raji, I. (2017). Factors influencing complementary and weaning practices among women in rural communities of Sokoto state, Nigeria. *Pan African Medical Journal*, *28*(1).