Maternal health care services utilization among teenage and non-teenage mothers in Nigeria: A secondary data analysis of 2007 National HIV/AIDS and Reproductive Health Survey plus

.

ABSTRACT

Aims: To compare the maternal health care services utilization among teenage mothers (TM) and non-teenage mothers (NTM) using the National HIV/AIDS and Reproductive Health Survey (NARHS) Plus data.

Study design: This was a cross-sectional secondary data analysis of the 2007National HIV/AIDS and Reproductive Health Survey (NARHS) Plus.

Place and Duration of Study: The study took place in all 36 states of the federation and the Federal Capital Territory in 2007.

Methodology: The sample size is 3,604 consisting of 240 TM aged 15-19 and 3,364 NTM aged 20-49 years. Data was analyzed using SPSS version 23.0. Bivariate and multivariate analysis were used to determine the risk factors and predictors of maternal health services utilization respectively. The level of significance was at P<.05.

Results: The mean age of the TM and NTM were 17.6 SD (1.2) years and 32 SD (7.9) years respectively. A significantly higher proportion of the NTM 63.8% vs 51.5% of the TM received antenatal care (ANC). Similarly, more NTM 42.7% utilized postnatal care (PNC) than the TM 21.9% (P<.05). Predictors of ANC among the TM were location (OR=3.52, 95%CI=1.22-10.21) and education (OR=0.24, 95%CI=0.08-0.73). Among the NTM, education (OR=0.57, 95%CI=0.43-0.75) and zone/region of residence predicted ANC utilization. Only education (OR=0.25, 95%CI=0.08-0.76) predicted the utilization of PNC among the TM. Meanwhile, PNC utilization was predicted by the NTM's location, zone of residence, level of education, and TV-watching habits.

Conclusion: Teenage mothers in this study poorly utilized maternal health care services. Though

utilization of the available maternal health care services is generally low, teenage mothers have poorer levels of utilization of these services.

Keywords: ANC, NAHRS, Nigeria, non-teenage mothers, PNC, teenage mothers

1. INTRODUCTION

The teenage years span from ages 10 to 19 years, a period characterized by significant transformation and opportunities for growth. The word “teenager” is synonymous with the word“adolescence” and the two words could be used interchangeably. However, the transitional phase of adolescence also brings a variety of challenges. This generation of adolescents, the largest in history, encounters immense complexities such as conflict, climate change, poverty, and global pandemics. Additionally, adolescent pregnancy and childbirth can adversely impact the health of both the young mother and her baby [1].

Teenagers or adolescents make up approximately 16% of the global population of the world’s population with about 90 percent of them in developing countries while in Nigeria they comprise about a fifth of the national population [2-4]. As of 2019, adolescents aged 15–19 years in low- and middle-income countries (LMICs) had an estimated 21 million pregnancies each year [5,27,28,29],

One in four girls in the world becomes a mother before the age of 19 years, and every year, more than 14 million teenage girls give birth, andmost of these young mothers live in non-industrialized countries. The incidence of teenage childbearing is particularly high in Africa, where a significant portion of the world’s young people reside [2,6]. Teenage childbearing is a worldwide problem of public health importance, with varying prevalence rates across different regions. The global adolescent fertility rate was 51.9 births per 1,000 girls aged 15-19 in 2007, meaning that on average about 5.19 percent of adolescents give birth each year [7].

Meanwhile, the World Health Organization (WHO) reported that approximately 295,000 maternal deaths occurred globally in 2017, with about 94% of these deaths occurring in low and lower-middle-income countries, particularly in sub-Saharan Africa and Southern Asia [8]. Adolescent girls face considerable health risks during pregnancy and childbirth, significantly contributing to the Global Burden of Disease for maternal conditions. They account for a substantial proportion of maternal deaths. Girls aged 15-19 years are twice as likely to die in childbirth compared to older women, while those under 15 are five times more likely to die. Additionally, infant and child mortality rates are higher among children born to adolescent mothers [1]. With an estimated 82,000 maternal deaths in 2020, Nigeria, which has approximately 2.6% of the world's population, contributes nearly 23% of the world's maternal deaths [9].

Interest over the years has grown in the area of infants, maternal death, and adolescent health because maternal health care services utilization provides an opportunity for early detection of diseases and timely treatment. It also provides opportunities for preventive health care services such as immunization against neonatal tetanus, prophylactic treatment of malaria through the use of intermittent presumptive treatment approaches, and HIV counseling and testing [10].

Adolescent mothers face significant barriers to accessing health care, including socio-economic disadvantages and stigma, resulting in higher risks during pregnancy and early motherhood [11]. The provision and utilization of maternity care services continue to be crucial for reducing maternal and child morbidity and mortality worldwide. According to the WHO, ensuring access to skilled attendants during delivery, along with adequate equipment, drugs, and supplies for managing obstetric complications, remains the most significant factor in preventing maternal deaths [12].

The underlying factors that contribute to the high maternal and infant mortality rates in Nigeria include lack of antenatal care, a low proportion of women attended to by skilled birth attendants, and delays in the treatment of complications of pregnancy. Other indirect factors that affect both maternal and infant mortality rates include maternal educational level, cultural practices, and poverty [4].

Maternal health service utilization in the majority of Sub-Saharan African countries is still relatively low [13]. The prevalence of maternal healthcare utilization among young women in Sub Sharan Africa is 55.2%, 78.8%, and 40% for antenatal care (ANC), Skilled Births Attendant (SBA), and Postnatal care (PNC) respectively with inter-country variations [14]. It has been revealed that women drop out more at postnatal care than at skilled delivery and antenatal care [15]. Furthermore, considerable disparities exist in ANC utilization and quality with a greater vulnerability for rural residents, regions, and socioeconomically disadvantaged mothers in Nigeria [16] while low uptake of PNC is associated with antenatal care use, distance, education, place of delivery, region and wealth status are significantly associated with the non-utilization of postnatal care services [17].

Utilization of maternal health services is associated with improved maternal and neonatal health outcomes. However, there is little knowledge of antenatal care, and postnatal care among young adolescent mothers [4]. In addition, there is little or no data or research at the national level comparing Nigerian mothers' maternal health care services utilization. Therefore, this study compares the maternal health care services utilization among teenage mothers and non-teenage mothers using this nationally representative data.

2. MATERIAL AND METHODS

This was a cross-sectional secondary data analysis of the 2007 National HIV/AIDS and Reproductive Health Survey (NARHS) Plus. The study population for this study is 3,604. It consists of 240 TM aged 15-19 and 3,364 NTM aged 20-49.

NARHS Plus is a nationally representative sample of females aged 15-49 years and males aged 15-64 years living in households in rural and urban areas in Nigeria. The 2007 NARHS survey included a biological component that is HIV testing and thus called “NARHS Plus”. NARHS Plus is the third in the series (the first and second were conducted in 2003 and 2005 respectively).

The NARHS Plus sample was drawn from the updated master sample frame of rural and urban localities developed and maintained by the National Population Commission (NPC).The sampling procedure was a (four-level) multi-stage cluster sampling aimed at selecting eligible persons with known probability. Stage 1 involved the selection of rural and urban localities. Stage 2 involved the selection of Enumeration Areas (EA) within the selected rural and urban localities. Stage 3 involved the listing of eligible individuals within households while stage 4 involved the selection of actual respondents for interview and testing. Overall, 11,822 respondents were selected for interview of which 11,521 were successfully interviewed resulting in a 2.5% non-response rate.

The study area consisted of all 36 states of the federation and the Federal Capital Territory**.** The survey captured, among others, the following broad themes: socio-demographic characteristics Sexual behavior, Knowledge and treatment of STIs, Knowledge and perception of HIV/AIDS, Condom accessibility and use Stigma and discrimination, Knowledge about family planning, Attitude and use of family planning, Availability, affordability and accessibility of family planning products, Reproductive rights and violence against women, Awareness of Maternal mortality and vesico-vaginal fistulae and its Causes, Exposure to Health Communication and Knowledge and treatment of Tuberculosis.

Data of female teenagers aged 15-19 years and NTM aged 20-49 years was extracted from the 2007 NARHS plus data. This study used the following variables; Socio-demographic or background characteristics, utilization of ANC and PNC. Analysis was performed using SPSS version 23.0 statistical software. Descriptive statistics (mean, median, and standard deviation) was used to summarize the quantitative variable while frequencies and proportions were used for qualitative variables. The test of association was carried out using the Chi-square test, which was utilized for cross-tabulation to compare the association of the relevant individual characteristics of the study population. Multivariate analysis using logistic regression was carried out. Logistic regression analysis was used to study the influence of the independent variables (the sociodemographic characteristics,) on the dependent variable (maternal health care services) among the teenage and non-teenage mothers. All significant tests were at a 5% level and 95% confidence interval.

3. RESULTS AND DISCUSSION

The mean age of the teenage mothers and non-teenage mothers were 17.6 (SD±1.2) and 32 (SD±7.9) respectively. There were 240 teenage mothers (TM) compared with 3364 non-teenage mothers (NTM) in this study. A significantly

higher proportion (80.4%) of TM was compared to 67.9% of NTM were from rural areas (*P*<.001). Concerning geographical zones, 47.1% of TM compared to 26.8% of NTM were from the North West (*P*<.001). About two-thirds (75.4%) of the TM and over half (53.3%) of the NTM are Muslims by religion. The difference is significant (*P*<.001). A significant proportion of 97.7% of the NTM compared to 88.1% TM were currently married at the time of study (p<0.001), (Table 1).

A significantly higher proportion of the NTM 63.8% vs 51.5% of the TM received ANC. Similarly, more NTM utilized PNC than the TM (*P*<.001), (Table 2).

The risk factors of ANC utilization among the TM were location (*P*<.001), religion (*P*=.01), level of education (p=0.004), and radio listening habit (*P*<.002). Location and level of education were the factors predicting ANC utilization among the TM. TM in the urban areas are about four times more likely to utilize ANC than those in the rural areas. The location of the teenage mothers is a factor in predicting their ANC utilization (OR=3.52, 95%CI=1.22-10.21). The teenage mothers who received ANC are about five times less likely to have had primary or lower levels of education than those with secondary or higher educational attainment (OR=0.24, 95%CI=0.08-0.73), (Table 3).

The risk factors of ANC among the NTM were the variables except marital status (*P*<.05). NTM in the North Eastern (OR=3.92, 95%CI=2.26-6.82), North Central (OR=3.76, 95%CI=2.35-6.02), and South Eastern (OR=4.13, 95%CI=2.45-6.97) region of the country are about four times more likely than those in the South Southern region of the country to utilize ANC. However, NTM in the South Western region is about three times more likely than those in the South Southern region to utilize ANC (OR=3.25, 95%CI=2.11-5.01). Urban dwelling NTM is about three times more likely than those dwelling in rural areas to receive ANC (OR=2.58, 95%CI=1.94-3.42). NTMs with lower levels of education are about two times less likely than those with higher levels of education to receive ANC. Education is a predictor of ANC utilization by NTM (OR=0.57, 95%CI=0.43-0.75), (Table 4).

The risk factors of PNC utilization among the TM were location, zone, education, radio listening habit, and television watching habit (*P*<.05). Education was the only predictor of PNC among the TM. Teenage mothers with primary or lower levels of education are four times less likely to utilize PNC than those with secondary or higher levels of education. Education is the only predictor of PNC utilization among teenage mothers (OR=0.25, 95%CI=0.08-0.76), (Table 5).

All the variables were risk factors of utilizing PNC among the NTM except marital status (*P*<.05). Meanwhile, PNC utilization was predicted by the NTM location, zone of residence, level of education, and TV-watching habits. The NTM residing in the urban areas are about two times more likely to utilize PNC than those in rural areas (OR=1.98;

95%CI=1.58-2.46). Those of lower levels of education utilized PNC about two times less likely than those with higher levels of education (OR=0.94, 95%CI=0.43-0.68). The NTM who view TV every day are about two times more likely to utilize PNC than those who do not view TV at all (OR=1.95, 95%CI=1.37-2.78). Those who view TV less than once a week are also more likely to utilize PNC than those who do not at all (OR=1.36, 95%CI=1.02-1.81), (Table 6).

Table 1: Comparison of the background characteristics of the respondents

Variables	TM	NTM	X^2	P-Value
Location			16.41	**<0.001**
Urban	47 (19.6%)	1081 (32.1%)		
Rural	193 (80.4%)	2283 (67.9%)		
Total	240 (100.0%)	3364(100.0%)		
Zone			61.67	**<0.001**
North West	113(47.1%)	903(26.8%)		
North East	36(15.00%)	480(14.3%)		
North Central	42(17.5%)	591(17.6%)		
South West	11(4.6%)	569(16.9%)		
South East	11(4.6%)	317(9.4%)		
South South	27(11.3%)	504(15%)		
Total	240(100.0%)	3364(100.0%)		
Religion			44.10	**<0.001**
Islam	181(75.4%)	1778(53.3%)		
Christianity	59(24.6%)	1556(46.7%)		
Total	240(100.0%)	3334(100.0%)		
Level of education			3.29	0.072
Primary or lower	77(58.8%)	1067(50.6%)		
Secondary or higher	54(41.2%)	1041(49.4%)		
Total	131(100.0%)	2108(100.0%)		
Marital status			68.25	**<0.001**
Currently married	200(88.1%)	2891(97.7%)		
Never married	27(11.9%)	67(11.9%)		

TOTAL	227(100.0%)	2958(100.0%)

Table 2: Bivariate analysis of respondents with maternal health care service utilization

Variables	TM	NTM	X^2	p-value
Received ANC?			14.15	<0.001
Yes	122(51.5%)	1582(63.8%)		
No	115(48.5%)	896(36.2%)		
Total	237(100.0%)	2478(100.0%)		
Received PNC?			38.55	<0.001
Yes	52(21.9%)	1058(42.7%)		
No	185(78.1%)	1420(57.3%)		
Total	237(100.0%)	2487(100.0%)		
Seen by a Doctor during ANC?			18.20	<0.001
Yes	15(6.3%)	416(17.0%)		
No	222(93.7%)	2034(83.0%)		
Total	237(100.0%)	2450(100.0%)		
Seen by a Nurse during ANC?			22.92	<0.001
Yes	63(26.6%)	1044(42.6%)		
No	174(73.4%)	1406(57.4%)		
Total	237(100.0%)	2450(100.0%)		

Table 3: Bivariate and multivariate analysis of ANC utilization among the TM.

Variables	Received ANC		Total	P-Value	AOR	95% CI
	Yes	No				
Location				**<0.001**		
Urban	36(76.6%)	11(23.4%)	47(100.0%)		3.52	**1.22-10.21**
Rural(ref)	86(45.3%)	104(54.7%)	190(100.0%)		1.00	
Zone				0.086		
North West	47(42.3%)	64(57.7%)	111(100.0%)			
North East	22(61.1%)	14(38.9%)	36(100.0%)			
North Central	21(51.2%)	20(48.8%)	41(100.0%)			
South West	10(90.9%)	1(9.1%)	11(100.0%)			
South East	9(81.8%)	2(18.2%)	11(100.0%)			
South South(ref)	13(48.1%)	14(51.9%)	27(100.0%)			
Religion				**0.014**		
Islam	84(46.9%)	95(53.1%)	179(100.0%)		2.00	0.68-5.83
Christianity(ref)	38(65.5%)	20(34.5%)	58(100.0%)		1.00	
Level of education				**0.004**		
Primary or lower	41(53.2%)	36(46.8%)	77(100.0%)		0.24	0.08-0.73
Secondary or higher(ref)	42(77.8%)	12(22.2%)	54(100.0%)		1.00	
Marital status				0.089		
Currently married	98(49.2%)	101(50.8%)	199(100.0%)			

Never married(ref)	18(66.7%)	9(33.3%)	27(100.0%)		
Received information on childspacing/FP				0.857	
Yes	26(83.9%)	5(16.1%)	31(100.0%)		
No(ref)	18(85.7%)	3(14.3%)	21(100.0%)		
Radio listening habit					
Every day or almost every day	34(68.0%)	16(32.0%)	50(100.0%)	**0.002** 2.60	0.77-8.81
Less than or once a week	54(52.4%)	49(47.6%)	103(100.0%)	2.00	0.65-6.13
Not at all(ref)	27(36.5%)	47(63.5%)	74(100.0%)	1.00	
Television watching habit				0.086	
Every day or almost every day.	16(66.7%)	8(33.3%)	24(100.0%)		
Less than or once a week.	36(63.2%)	21(36.8%)	57(100.0%)		
Not at all(ref)	65(44.5%)	81(55.5%)	146(100.0%)		

FP=Family planning

Table 4:Bivariate and multivariate analysis of ANC utilization among the NTM.

Variables	Received ANC		Total	P-Value	AOR	95% CI
	Yes	**No**				
Location				**<0.001**		
Urban	652(82.8%)	135(17.2)	787(100.0%)		2.58	**1.94-3.42**
Rural(ref)	930(55.0%)	761(45.0)	1691(100.0)		1.00	
Zone				**<0.001**		
North West	319(44.9%)	392(55.1%)	711(100.0%)		1.42	0.87-2.32
North East	228(60.2%)	151(39.8%)	379(100.0%)		3.92	**2.26-6.82**
North Central	309(69.4%)	136(30.6%)	445(100.0%)		3.76	**2.35-6.02**
South West	328(84.1%)	62(15.9%)	390(100.0%)		3.25	**2.11-5.01**
South East	174(86.1%)	28(13.9%)	202(100.0%)		4.13	**2.45-6.97**
South South(ref)	224(63.8%)	127(36.2%)	351(100.0%)		1.00	
Religion				**<0.001**		
Islam	756(54.2%)	638(45.8%)	1394(100.0%)		0.74	0.51-1.09
Christianity(ref)	820(77.1%)	244(22.9%)	1064(100.0%)		1.00	
Level of education				**<0.001**		
Primary or lower					0.57	**0.43-0.75**
Secondary or higher(ref)	554(70.0%)	235(29.8%)	789(100.0%)		1.00	
	683(83.8%)	132(16.2%)	815(100.0%)			
Marital status				0.693		

Currently married	1414(63.7%)	806(36.3%)	2220(100.0%)			
Never married(ref)	28(60.9%)	18(39.1%)	46(100.0%)			
Received information on childspacing/FP				**0.005**		
Yes	715(93.1%)	53(6.9%)	768(100.0%)			
No(ref)	233(87.6%)	33(12.4%)	266(100.0%)			
Radio listening habit				**<0.001**		
Every day or almost every day	576(79.0%)	153(21.0%)	729(100.0%)		0.73	0.29-1.80
Less than or once a week	687(64.0%)	386(36.0%)	1073(100.0%)		0.80	0.35-1.88
Not at all(ref)	297(46.8%)	338(53.2%)	635(100.0%)		1.00	
Television watching habit				**<0.001**		
Every day or almost every day.	405(85.4%)	69(14.6%)	474(100.0%)		1.75	0.77-4.00
Less than or once a week.	547(74.6%)	186(25.4%)	733(100.0%)		1.53	0.75-3.13
Not at all(ref)	591(49.5%)	604(50.5%)	1195(100.0%)		1.00	

Table 5: Bivariate and Multivariate analysis of PNC utilization among the TM.

Variables	Received PNC		Total	P-value	AOR	95% CI
	Yes	**No**				
Location						
Urban	17(36.2%)	30(63.8%)	47(100.0%)	**0.008**	0.83	0.30-2.30
Rural(ref)	35(18.4%)	155(81.6%)	190(100.0%)		1.00	
Zone						
North West	11(9.9%)	100(90.1%)	111(100.0%)	**<0.001**	0.30	0.05-1.82
North East	11(30.6%)	25(69.4%)	36(100.0%)		0.92	0.20-4.23
NorthCentral	9(22.0%)	32(78.0%)	41(100.0%)		0.71	0.13-3.97
South West	6(54.5%)	5(45.5%)	11(100.0%)		2.41	0.45-12.94
South East	5(45.5%)	6(54.5%)	11(100.0%)		2.17	0.46-10.11
South South(ref)	10(37.0%)	17(63.0%)	27(100.0%)		1.00	
Religion				**<0.001**		
Islam	28(15.6%)	151(84.4%)	179(100.0%)		2.07	0.42-10.17
Christianity(ref)	24(41.4%)	34(58.6%)	58(100.0%)		1.00	
Level of education						
Primary or lower	12(15.6%)	65(84.4%)	77(100.0%)	**<0.001**	0.25	0.08-0.76
Secondary or	25(46.3%)	29(53.7%)	54(100.0%)		1.00	

higher(ref)						
Marital status				0.055		
Currently married	41(20.6%)	158(79.4%)	199(100.0%)			
Never married(ref)	10(37.0%)	17(63.0%)	27(100.0%)			
Radio listening habit				**0.005**		
Every day or almost every day	19(38.0%)	31(62.0%)	50(100.0%)		3.38	0.80-17.93
Less than or once a week	21(20.4%)	82(79.6%)	103(100.0%)		1.21	0.27-5.47
Not at all(ref)	10(13.5%)	64(86.5%)	74(100.0%)		1.00	
Television watching habit.				**0.024**		
Every day or almost every day	8(33.3%)	16(66.7%)	24(100.0%)		0.38	0.08-1.81
Less than or once a week	18(31.6%)	39(68.4%)	57(100.0%)		1.29	0.43-3.91
Not at all(ref)	24(16.4%)	122(83.6%)	146(100.0%)		1.00	

Table 6: Bivariate and multivariate analysis of PNC utilization among the NTM.

Variables	Received PNC		Total	P-value	AOR	95% CI
	Yes	**No**				
Location				**<0.001**		
Urban	481(61.1%)	306(38.9%)	787(100.0%)		1.98	**1.58-2.46**
Rural(ref)	577(34.1%)	1114(65.9%)	1691(100.0%)		1.00	
Zone				**<0.001**		
North West	164(23.1%)	547(76.9)	711(100.0%)		0.85	0.56-1.28
North East	156(41.2%)	223(58.8%)	379(100.0%)		2.24	**1.44-3.48**
NorthCentral	222(49.9%)	223(50.1%)	445(100.0%)		2.54	**1.73-3.72**
South West	234(60.0%)	156(40.0%)	390(100.0%)		1.63	**1.16-2.29**
South East	119(58.9%)	83(41.1%)	202(100.0%)		1.49	**1.02-2.18**
South South(ref)	163(46.4%)	188(53.6%)	351(100.0%)		1.00	
Religion				**<0.001**		
Islam	462(33.1%)	932(66.9%)	1394(100.0%)		0.78	0.59-1.05
Christianity(ref)	590(55.5%)	474(44.5%)	1064(100.0%)		1.00	
Level of education				**<0.001**		**0.43-0.68**
Primary or lower	352(44.6%)	437(55.4%)	789(100.0%)		0.54	
Secondary or higher(ref)	523(64.2%)	292(35.8%)	815(100.0%)		1.00	

Marital status				0.619		
Currently married	950(42.8%)	1270(57.2%)	2220(100.0%)			
Never married(ref)	18(39.1%)	28(60.9%)	46(100.0%)			
Radio listening habit				**<0.001**		
Every day or almost every day	141(56.8%)	315(43.2%)	729(100.0%)		1.35	0.95-1.92
Less than or once a week	457(42.6%)	616(57.4%)	1073(100.0%)		1.20	0.88-1.65
Not at all(ref)	171(26.9%)	464(73.1%)	635(100.0%)		1.00	
Television watching habit.				**0.001**		
Every day or almost every day	323(68.1%)	151(31.9%)	474(100.0%)		1.95	**1.37-2.78**
Less than or once a week	372(50.8%)	361(49.2%)	733(100.0%)		1.36	**1.02-1.81**
Not at all(ref)	334(27.9%)	861(72.1%)	1195(100.0%)		1.00	

This study was to compare the maternal healthcare services utilization of teenage and non-teenage mothers in Nigeria by analyzing data from the 2007 NARHS Plus Survey; a secondary health surveyandis nationally representative of the women in Nigeria.

The mean age of the teenage (TM) and non-teenage mothers (TM) was 17.6 SD (1.2) years and 32 SD (7.9) years respectively. About 4 in 5 of the TM were married. The prevalence of teenage childbearing in the study population was approximately 6.7%, a proportion observed to have increased between 2007 and 2018 and it slightly lower than the prevalence of 7.5 and 49.5% reported in a scoping review that assessed factors associated with adolescent pregnancy and the public health interventions to address in Nigeria [18].

According to the 2018 NDHS, 19% of the teenagers had begun childbearing and are more likely to reside in the rural and Northern regions of the country [4]. This was also revealed in this study. A significantly larger proportion of TM in Nigeria reside in the rural areas and are Muslims. However, fewer were likely to reside in the Southern region, currently married and educated compared to the NTM. The percentage of teenagers who had started childbearing decreased with increasing levels of education. Teenagers with no education are more than twice as likely to start childbearing early compared to those with primary education and only 3 percent of teenagers with more than secondary education had begun childbearing. These observations point to the fact that teenage pregnancy is more associated with poor socio-economic background. The lower a woman's level of education, the more likely it is that she will marry early and begin childbearing, play a reduced role in decision-making, and exercise her reproductive rights [6].

Surprisingly, this study showed that a significant proportion of the never-married teenagers utilized ANC compared to their married counterparts. This report is contrary to the recent study by Mekwunyei and Odetola, in 2020 that reported otherwise and concluded that single pregnant teenagers are less likely to utilize maternal health services than their married counterparts. The observed differences could be that their study is more recent but was conducted in one of the states in the South Southern region of the country. However, more married NTMs utilized ANC [19].

Generally, it was shown that NTM utilized antenatal care better than the TM. This could be a result of the NTM having a higher level of education; experience in childbearing and a stable income source that will enable them to afford ANC. Also, during such visits, more of NTM were attended to by skilled attendants (doctors or nurses) compared to the teenage mothers. The teenage mothers' non-utilization of maternal healthcare services could be a result of stigmatization and poverty [11,19]. The findings that teenage mothers poorly utilize ANC and a low proportion of them saw skilled attendants during pregnancy also correspond with that of the 2018 NDHS report and the finding of Mekwnyei and Odetola, which both revealed that the percentage of mothers who received ANC from a health professional or skilled attendants appears higher among the older women [4,19]. This implies that a high proportion of women especially the TM may be abandoning

expert care for cheaper nonprofessional ones probably because of the cost of services, lower socioeconomic status, or maybe concealing the pregnancy and this has significant negative implications on maternal and child health status in the country [20]. It was also observed from this study that among the TM who received ANC, about three-quarters live in the urban areas and secondary or higher level of education. These findings could be a result of increased exposure of urban dwellers. This similarly applies to their utilization of PNC.

The proportion (though less than half) of the NTM who received PNC doubled that of the NTM. The reason for this could be that during ANC visits the TM were discriminated against or stigmatized so after putting to bed they decided not to obtain PNC to avoid such treatments so they shy away from this service. The NTM who also utilized maternal health services were more urban dwellers compared to the teenage mothers. They were mainly residents of the southeastern region rather than the TM of whom the majority resided in the southwestern region, more Christians by religion, more educated, and more exposed to the mass media than the teenage mothers. The above findings agree with the 2018 NDHS report that only 32.4%, that is about 3 in 10 TM received any postnatal care [4]. The reported findings on PNC imply that the infant and child mortality and morbidity rate in the country will still be on the increase.

From the results of this study, the demographic predictors of ANC utilization among the TM were location and level of education while among the NTM; location, geographical zone, and level of education were the predictors. Being rural dwellers, teenage mothers are disadvantaged because most rural areas are deprived of basic health amenities such as a primary health center where ANC might be received and the proximity of the available clinic. These findings could also be a result of increased exposure of urban dwellers.

The finding of this study that one of the predictors of ANC utilization is education agrees with the study of Babalola and Fatusi, 2009 who reported over a decade that education is a significant predictor of maternal health service utilization [21]. Adedokun and Uthman, 2019 in their study found that formal education is still a significant predictor of whether women deliver within or outside health institutions in Nigeria [22], and Envuladu et al reported that poverty, lack of education, and residence in the northeast and northwest regions were associated with non-receipt of recommended antenatal or delivery care in Nigeria [23]. Education serves as a proxy for information, cognitive skills, and values; teenage mothers' lower level of education will hinder them from acquiring more knowledge for safe motherhood. It also exerts an effect on health-seeking behavior through several ways which include a higher level of health awareness and greater knowledge of available health services among educated women and their enhanced level of autonomy that results in improved ability and freedom to make health-related decisions, including choice of maternal services to use will be lacked by the TM.

The predictors of PNC utilization among the TM were only education but among the NTM were zone, location, level of education, and television viewing habit in this study. PNC utilization is equally as important as ANC utilization. Education

is the only predictor of PNC utilization among teenage mothers because a higher proportion of them do not have formal education.

This aligns with the 2008 NDHS report which revealed that PNC utilization varies by zones among the women that utilized it [4]. Also, Nikiema et al. in their study on providing information on pregnancy complications during antenatal visits: unmet educational needs in sub-Saharan Africa revealed that more than 50% of women reported receiving no information on childcare [24]. Since teenage mothers mainly had a primary or lower level of education, they will hardly obtain PNC, they might experience complications arising from the delivery and miss the important information on how to care for themselves and their children [17]. Media exposure has been shown to increase levels of maternal healthcare use due to its positive impact on reproductive health knowledge [25].

Overall, the majority of the NTM compared with TM received ANC with skilled birth attendants (doctors and nurses), though this proportion was less than 50%. However, this contradicts the findings among newly delivered in which 85.9% attended antenatal care with skilled birth attendants [26]. In Sub Sharan Africa, 78.8%, of young mothers were reported to receive ANC from SBA [14]. These variations might be due to differences in study population and settings.

This study is not without some limitations. Some known predictors of maternal health service utilization are missing from the analyses. For example, the availability of maternal health services within the immediate locality of respondents, the distance of respondents to such health services, and birth order could have contributed to the utilization pattern. These variables unfortunately were not available in the NARHS Plus data. The mothers might not have completely remembered and given accurate answers to the questions asked, hence information bias might be experienced in the respondents. The variables used for this study were restricted to those retrieved from NARHS Plus data. Despite these limitations, the data used is nationally representative, therefore findings can be generalized.

5. CONCLUSION

Teenage mothers in this study have poorer levels of utilization of maternal health care services. Effective interventions targeting teenage mothers should focus on rural women, never married, of lower education, and residence in northwestern zones.

Ethical Approval:

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

DEFINITIONS, ACRONYMS, ABBREVIATIONS

ANC: Antenatal care

LMICs: Low- and middle-income countries

NARHS: National HIV/AIDS and Reproductive Health Survey

NDHS: Nigeria Demographic and Health Survey

NTM: Non teenage mothers

PNC: Postnatal care

SBA: Skilled birth attendant

TM: Teenage mother

UNFPA: United Nations Population Fund

WHO: World Health Organization

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

Option 2:

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc have been used during writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

2.

3.

REFERENCES

1. World Health Organization (2024). The adolescent health indicators recommended by the Global Action for Measurement of Adolescent health: guidance for monitoring adolescent health at country, regional and global levels. Geneva: Licence: CC BY-NC-SA 3.0 IGO.
2. UNICEF. Adolescents.2024 Accessed 14 May 2024. Available:Adolescents Statistics - UNICEF DATA
3. WHO Adolescent Health (2023). Adolescent and young adult health. Accessed 14 May 2024. Available:https://www.who.int/news-room/fact-sheets/detail/adolescents-health-risks-and-solutions.
4. National Population Commission (NPC) [Nigeria] Nigeria Demographic and Health Survey: 2018 (2018 NDHS) NPC; Abuja, Nigeria: ICF; Rockville, MD, USA: 2019.
5. Sully EA, Biddlecom A, Daroch J, Riley T, Ashford L, Lince-Deroche N et al., *Adding It Up: Investing in Sexual and Reproductive Health 2019*. New York: Guttmacher Institute; 2020.9. DOI: https://doi.org/10.1363/2020.31593
6. WHO, 2024 Adolesence Pregnancy. Accessed 14 May 2024. Available:https://www.who.int/news-room/fact-sheets/detail/adolescent-pregnancy.
7. World Bank Group. Adolescent fertility rate (births per 1,000 women ages 15-19). Accessed 25 June 2024. Available: https://genderdata.worldbank.org/en/indicator/sp-ado-tfrt.html/?view=trend&geos=WLD_LCN
8. WHO - Maternal Mortality. 2019. Accessed 14 May 2024. Available:https://www.who.int/news-room/fact-sheets/detail/maternal-mortality
9. WHO, UNICEF, UNFPA, World Bank Group, UNDESA/Population Division. Trends in maternal mortality 2000 to 2020: estimates by WHO, UNICEF, UNFPA, World Bank Group and UNDESA/Population Division. 2023. Accessed 14 May 2024. Available:https://data.worldbank.org/indicator/SH.MMR.DTHS?locations=NG.
10. Kana MA, Doctor HV, Peleteiro B, Lunet N, Barros H. Maternal and child health interventions in Nigeria: a systematic review of published studies from 1990 to 2014. *BMC Public Health.* 2015;**15:** 334. https://doi.org/10.1186/s12889-015-1688-3
11. Banke-Thomas OE, Banke-Thomas AO, Ameh CA. Factors influencing utilisation of maternal health services by adolescent mothers in Low-and middle-income countries: a systematic review. *BMC Pregnancy Childbirth.* 2017;**17:**65. https://doi.org/10.1186/s12884-017-1246-3
12. World Health Organization. Maternal mortality. 2020 Accessed 14 May 2024. Available:https://www.who.int/news-room/fact-sheets/detail/maternal-mortality.
13. Mekonnen T, Dune T, Perz J. Maternal health service utilisation of adolescent women in sub-Saharan Africa: a systematic scoping review. BMC Pregnancy Childbirth. 2019;19(1):366. doi:10.1186/s12884-019-2501-6

14. Bain LE, Aboagye RG, Dowou RK, Kongnyuy EJ, Memiah P, Amu H. Prevalence and determinants of maternal healthcare utilisation among young women in sub-Saharan Africa: cross-sectional analyses of demographic and health survey data. BMC Public Health. 2022;22(1):647. doi:10.1186/s12889-022-13037-8.
15. Oyedele.K., Fagbamigbe, A.F., Akinyemi, O.J. Adebowale AS. Coverage-level and predictors of maternity continuum of care in Nigeria: implications for maternal, newborn and child health programming. BMC Pregnancy Childbirth 23, 36 (2023). https://doi.org/10.1186/s12884-023-05372-4
16. Adewuyi EO, Auta A, Adewuyi MI, Phili AA, OlutuasVe, Zhao Y, Khanal V. Antenatal care utilisation in Nigeria: assessing disparities between rural and urban areas—analysis of the 2018 Nigeria demographic and health survey. doi: https://doi.org/10.1101/2024.01.24.24301729
17. Somefun OD, Ibisomi L. Determinants of postnatal care non-utilization among women in Nigeria. BMC Res Notes. 2016;9:21. doi:10.1186/s13104-015-1823-3
18. Alukagberie ME, Elmusharaf K, Ibrahim N, Poix S. Factors associated with adolescent pregnancy and public health interventions to address in Nigeria: a scoping review. Reprod Health. 2023;20(1):95. doi:10.1186/s12978-023-01629-5
19. Mekwunyei LC, Odetola, TD. Determinants of maternal health service utilisation among pregnant teenagers in Delta State, Nigeria. Pan African Medical Journal. 2020;37:81. doi: 10.11604/pamj.2020.37.81.16051
20. Alex-Ojei CA, Odimegwu CO, Ntoimo LFC. A qualitative investigation into pregnancy experiences and maternal healthcare utilisation among adolescent mothers in Nigeria. Reprod Health. 2023;20: 77. https://doi.org/10.1186/s12978-023-01613-z
21. Babalola S, Fatusi A. Determinants of use of maternal health services in Nigeria - looking beyond individual and household factors. BMC Pregnancy Childbirth. 2009;9:43.https://doi.org/10.1186/1471-2393-9-43
22. Adedokun ST, Uthman OA. Women who have not utilized health service for delivery in Nigeria: Who are they and where do they live? BMC Pregnancy and Childbirth, 2019;19(1):1-9.https://doi.org/10.1186/s12884-019-2242-6
23. Envuladu EA, Issaka AI, Dhami MV, Sahiledengle B, Agho KE. Differential Associated Factors for Inadequate Receipt of Components and Non-Use of Antenatal Care Services among Adolescent, Young, and Older women in Nigeria. Int. J. Environ. Res. Public Health 2023;20:4092. https://doi.org/10.3390/ijerph20054092
24. Nikiéma B, Beninguisse G, Haggerty JL. Providing information on pregnancy complications during antenatal visits: unmet educational needs in sub-Saharan Africa. Oxford Journals of Medicine, Health Policy and Planning. 2009;24(5):367-376.doi: 10.1093/heapol/czp017

25. Sarker AR, Sheikh N, Mahumud RA, Sultana M. Determinants of adolescent maternal healthcare utilization in Bangladesh. Public Health. 2018;157:94.doi: 10.1016/j.puhe.2018.01.010

26. Bello CB, Esan DT, Akerele SA, Fadare RI. Maternal health literacy, utilisation of maternal healthcare services and pregnancy outcomes among newly delivered mothers: A cross-sectional study in Nigeria. Public Health Pract (Oxf). 2022;3:100266. doi:10.1016/j.puhip.2022.100266

27DARCHA R, KUKEBA M. MATERNAL CHARACTERISTICS AND OUTCOMES OF OBSTETRIC COMPLICATIONS AT A TERTIARY HEATH FACILITY IN NORTHERN GHANA. ASIAN J. PREG. CHILDB. [INTERNET]. 2021 OCT. 30 [CITED 2024 JUN. 15];4(1):187-98. AVAILABLE FROM: HTTPS://JOURNALAJPCB.COM/INDEX.PHP/AJPCB/ARTICLE/VIEW/58

28SAY L, SOUZA JP, PATTINSON RC. MATERNAL NEAR MISS–TOWARDS A STANDARD TOOL FOR MONITORING QUALITY OF MATERNAL HEALTH CARE. BEST PRACTICE & RESEARCH CLINICAL OBSTETRICS & GYNAECOLOGY. 2009 JUN 1;23(3):287-96.

29NAVANEETHAM K, DHARMALINGAM A. UTILIZATION OF MATERNAL HEALTH CARE SERVICES IN SOUTHERN INDIA. SOCIAL SCIENCE & MEDICINE. 2002 NOV 1;55(10):1849-69.