ORIGINAL RESEARCH ARTICLE

Individual and ecological analyses of antenatal care: Prospects for delivery assistance and use of modern family planning in Nigeria

DOI: 10.29063/ajrh2022/v26i11s.7

*KK Salami[1], OB Yusuf[1], JO Akinyemi[1], IO Morhason-Bello[1], RO Eyelade[1], T Ilori[1], AA Aderinto[1], K Alarape[2], A Alada[1], AS Jegede[1], O Fawole[1], I Kana[3], O Solanke[3], J Suleiman[3], D Okara[3], A Adebiyi[3], AM Abdullahi[3], OO Ejiade[1] and IF Adewole[1]**

University of Ibadan, Ibadan[1]; Ministry of Health, Oyo State[2]; Federal Ministry of Health[3]

***For Correspondence**: Email: *ifadewole@gmail.com*

Abstract

Despite the availability of healthcare centres for the provision of antenatal care (ANC) services in Nigeria, the services are still underutilized by pregnant women. ANC services not only reduce maternal mortality and birth defects, but also have a strong link to many causes of maternal deaths. This study explored the individual and ecological relationships between antenatal care, skilled birth assistance during delivery, and family planning use across states in Nigeria. This study was a secondary analysis of data from the 2018 National Nutrition and Health Survey (NNHS) carried out among 24,985 women aged 15-49 years in the 36 states and the Federal Capital Territory (FCT) in Nigeria. Analysis was carried out at the level of individual women and at the ecological level. Only 68.3% visited a health professional (doctors, nurses, midwives, community health extension workers, and community health officers) for ANC in the most recent pregnancy before the survey. At delivery, 44.9% were assisted by delivery attendants with about half (50.1%) assisted by non-professional (traditional birth attendants, relatives and friends) during delivery. There was a significant variation in use of modern family planning (FP) across types of ANC provider. There was a strong positive correlation between ANC utilisation and skilled birth attendance (SBA) ($r=0.706$, $p<0.001$), and between SBA and FP ($r=0.730$, $p<0.001$). These results have implications for the design of appropriate interventions for strengthening the role of healthcare providers to enhance ANC patronage, utilization of safe delivery services and sustained use of reproductive health services. *(Afr J Reprod Health 2022; 26[11s]:69-76).*

Keywords: Antenatal care, service providers, assisted delivery, pregnant women

Résumé

Malgré la disponibilité de centres de santé pour la prestation de services de soins prénatals (ANC) au Nigéria, ces services sont encore sous-utilisés par les femmes enceintes. Les services de soins prénatals réduisent non seulement la mortalité maternelle et les malformations congénitales, mais ont également un lien étroit avec de nombreuses causes de décès maternels. Cette étude a exploré les relations individuelles et écologiques entre les soins prénatals, l'assistance qualifiée à l'accouchement pendant l'accouchement et l'utilisation de la planification familiale dans les États du Nigeria. Cette étude était une analyse secondaire des données de l'Enquête nationale sur la nutrition et la santé (NNHS) de 2018 menée auprès de 24 985 femmes âgées de 15 à 49 ans dans les 36 États et le Territoire de la capitale fédérale (FCT) au Nigeria. L'analyse a été effectuée au niveau des femmes individuelles et au niveau écologique. Seuls 68,3 % ont consulté un professionnel de la santé (médecins, infirmières, sages-femmes, agents de vulgarisation de la santé communautaire et agents de santé communautaires) pour les soins prénatals au cours de la grossesse la plus récente avant l'enquête. A l'accouchement, 44,9% ont été assistées par des accoucheuses dont environ la moitié (50,1%) assistées par des non professionnels (accoucheuses traditionnelles, parents et amis) lors de l'accouchement. Il y avait une variation significative dans l'utilisation de la planification familiale (PF) moderne selon les types de prestataires de soins prénatals. Il y avait une forte corrélation positive entre l'utilisation des soins prénatals et l'assistance qualifiée à l'accouchement (SBA) ($r=0,706$, $p<0,001$), et entre la SBA et la PF ($r=0,730$, $p<0,001$). Ces résultats ont des implications pour la conception d'interventions appropriées pour renforcer le rôle des prestataires de soins de santé afin d'améliorer le patronage des soins prénatals, l'utilisation de services d'accouchement sûrs et l'utilisation soutenue des services de santé reproductive. *(Afr J Reprod Health 2022; 26[11s]: 69-76).*

Mots-clés: Soins prénatals, prestataires de services, accouchement assisté, femmes enceintes

Introduction

The Sustainable Development Goal 3 recognises the promotion of optimum health for women and the reduction of maternal mortality globally to less than 70 per 100,000 live births by 2030[1-2]. Antenatal care (ANC), which refers to the care given to women during pregnancy, is one of the pillars for achieving this goal[2]. This involves periodic visits of pregnant women to designated

health centres operated by skilled health providers and equipped for maternity care[3-4] and safe delivery.

The WHO 2016 ANC model recommends one contact at the first trimester, two contacts at the second trimester and at least five contacts at the third trimester, making a minimum of eight contacts during pregnancy[5]. These visits cover the identification of pre-existing health conditions, early detection of pregnancy complications, health promotion and disease prevention, and birth preparedness and complication readiness planning[5]. Pregnant women also receive advice for the purpose of developing healthy behaviours, as well as how to prepare for birth and emergencies through preventive interventions, such as use of Insecticide treated net (ITN), condom use, and iron supplement[4-6]. Although Nigeria has always adopted the WHO guidelines on antenatal care in her policy implementation, the acceptability by pregnant women varies by regions. For example, studies from the southern region of Nigeria showed that the majority of women preferred the focused antenatal care model of reduced visit because it was convenient for them[7]. However, another study from the northern part of Nigeria found that women disliked reduced visits because it usually reduced opportunity for them to leave home and interact with their friends in the clinic[8].

In sub-Saharan Africa and South Asia, with the highest rate of maternal mortality of 86% of the estimated global maternal deaths in 2017, the pooled prevalence of recommended antenatal care utilization (at least four visits) reported among pregnant women in sub-Saharan Africa countries was 58.5%, while it was 49% in South Asia[5,9]. Nigeria is one of the countries with the highest number of maternal and neonatal deaths in the world[10-12]. Studies have also demonstrated that countries with low ANC attendance have higher maternal mortality rate, and ANC attendance reduces maternal and neonatal mortality[13-14].

The availability and utilisation of routine ANC not only prevents maternal mortality, but also reduces miscarriages and birth defects, low birth weight and other preventable health problems during and after pregnancy[5]. Despite the provision of healthcare centres across communities in Nigeria to enhance antenatal care and reduce maternal deaths, ANC facilities are still underutilised by pregnant women[15]. Underutilisation of antenatal care services in Nigeria is associated with many causes of maternal deaths[15-17].

This study analyzed how the type of ANC provider influenced the prospect of skilled delivery assistance and the use of modern family method by individual women, and how ANC visits increase the prospects for utilization of other reproductive health (RH) services during delivery and subsequent use of family planning methods, across the states in Nigeria.

Methods

This study was a secondary analysis of data from the 2018 National Nutrition and Health Survey (NNHS) conducted as part of the implementation of the Saving One Million Lives Programme for Results (SOML PforR) in Nigeria. The SOML PforR is a maternal and child health initiative by the Government of Nigeria launched in 2014 and supported by the World Bank as an interventional response to reduce the high rate of maternal and child mortality in the country[18]. The programme was developed on six pillars, namely: (i) improving maternal, newborn and child health; (ii) improving routine immunization coverage and polio eradication; (iii) elimination of mother-to-child transmission of HIV; (iv) scaling up access to essential medicines and commodities; (v) malaria control; and (vi) improving child nutrition. States were rewarded based on results attained with respect to selected indicators specially designed to assess the progress of the six pillars. Indicators were measured through National Health Facility Surveys (NHFS) and National Nutrition and Health Surveys (NNHS). The first NHFS was conducted in 2016, while the NNHS has been conducted in 2014, 2015 and 2018.

The NNHS is a nationally representative cross-sectional survey, first conducted in Nigeria in 2014, and it utilized the Standardized Monitoring and Assessment of Relief Transitions (SMART) method. The SMART methodology was designed to be a simple and scientifically sound household survey for continuous monitoring of nutritional status among under-five children and general mortality in a population. It has been in use since 2002 and has undergone improvement over time. Due to its simplicity, minimal set of variables are collected in the surveys. The survey utilised a cross-sectional design to collect nationally representative

data from all 36 states and the Federal Capital Territory. Detailed description of the sample design, tools, and data collection processes for the NNHS has been reported elsewhere[18]. However, a description of the procedures and methods employed is provided as follows: Women aged 15-49 years were selected by a two-stage cluster sampling technique. The first stage of sampling was the selection of 36 clusters which were census enumeration areas (EAs) using probability proportional to size in each state.

Subsequently, 20 households were selected from the EAs using the systematic random sampling technique. All consenting women aged 15-49 years were eligible for interview. The detailed description of survey including interview procedure, interview content, and data collection has been published[18]. Data were collected between February and May 2018 by trained interviewers using Open Data Kit installed on Galaxy tablets. This electronic data collection facilitated real time data quality check and preliminary analyses as fieldwork progressed. Overall, 24,985 women were successfully interviewed across the 36 states and the Federal Capital Territory (FCT) in Nigeria.

Data analysis

In this paper, two complementary approaches were adopted for analyses. First, analysis was carried out at the level of individual women to assess how the type of antenatal care (ANC) provider influenced the prospect of skilled delivery assistance and use of modern family method. This was done nationally and for the six geo-political regions. Type of ANC provider and delivery assistance was classified as professional (doctor, nurse, midwife, community health extension workers (CHEW) and community health officers – CHO), non-professional (traditional birth attendants (TBAs) and relative/friend) and none. The classification 'professional' incorporated CHEW and CHO, as they are viewed as parts of skilled birth attendants.

Secondly, an ecological approach was adopted to investigate whether ANC visits increases the prospects for utilization of other reproductive health (RH) services, such as use of contraceptives, use of skilled birth assistance (SBA) during delivery and subsequent use of family planning methods, across the states. From the 2018 NNHS data, the percentage of women with live births within 2 years before the survey who received ANC was derived for each of the 36 states and FCT. Similar estimations were done for SBA and Family Planning (FP). These estimates for the 36 States and FCT were then used as input for bivariate correlation. Pearson Correlation Coefficient and p-values were estimated to assess the strength of linear relationship for ANC vs SBA; ANC vs FP and SBA vs FP. The relationships between these RH indices were also explored using scatter plot with trend lines fitted. Trend line for ANC vs SBA was fitted using a polynomial regression of order 2, while linear regression was used for SBA vs FP.

Results

Individual-level analyses

The age distribution of the participants (Table 1) show that 21.7% and 26.7% were aged 20-24 years and 25-29 years, respectively. Most of the women (95.1%) were in union (married or living with a man). About one-third (34.8%) were residents in the North West region, while 8.2% lived in the South East. For their last pregnancy, 68.3% visited a professional for ANC, while 6.1% received ANC from a non-professional. At delivery, 44.9% were assisted by a professional, while about half (50.1%) were assisted by non-professional during delivery of most recent pregnancy.

Across the entire country, only 57.6% of those women who received ANC from a professional benefited from skilled (professional) assistance during delivery. Of these women, 39.1% received delivery assistance from a non-professional (Figure 1). In contrast, 80.5% of the women who received ANC from a non-professional were also assisted by non-professional during delivery. Of the few women who did not see anyone for ANC, 79.5% also received delivery assistance from non-professionals.

Table 2 reveals the relationship between ANC and delivery assistance across the six geo-political zones in Nigeria. In the North East and North West, less than half of those who received ANC from professionals continued with them until delivery. Substantial proportions switched to non-professionals for delivery assistance. The patterns in the southern regions was such that women tended to stick with same calibre of healthcare provider for

Table 1: Background characteristics of study participants

Variable (n=8329)	Number	Percentage (%)
Age group (years)		
15-19	625	7.5
20-24	1807	21.7
25-29	2224	26.7
30-34	1849	22.2
35-39	1124	13.5
40-49	700	8.4
Union status		
In union	7921	95.1
not in union	408	4.9
Region		
North Central	1224	14.7
North East	1258	15.1
North West	2898	34.8
South East	683	8.2
South South	1041	12.5
South West	1224	14.7
ANC provider		
Professional	5689	68.3
Non-professional	508	6.1
None	2132	25.6
Delivery assistance		
Professional	3740	44.9
Non-professional	4173	50.1
None	416	5
Modern FP use	1449	17.4

ANC and delivery, while those who did not see anyone for ANC were more likely to seek assistance from non-professionals during delivery.

The relationship between ANC, delivery assistance and use of modern family planning is illustrated in Table 3. For the country as a whole, there was a significant variation in use of modem family planning across types of ANC provider. As expected, there were sharp regional differences between the northern and southern regions. There were significant differences in use of family planning across ANC providers in the North, such that those who patronized them were more likely to use the modern FP method. Although this pattern persisted in the South, the differences were not statistically significant.

Similarly, women who patronized professionals for delivery assistance had a higher proportion of those using modern FP (25.9%) than those who sought assistance from non-professionals (10.7%). This pattern was replicated in the three northern regions. In the southern regions, the use of the modern FP method was evenly distributed across different types of delivery assistance.

Ecological (state-level) analyses

The ANC utilization ranged from 28.3%, in Zamfara State, to 97.3%, in Imo State; while SBA varied from 25.3% to 99.2% in Jigawa and Anambra States, respectively. Modem contraceptive use also ranged from 0.6% to 44.5% in Jigawa and Oyo States, respectively. Table 1 captures the relationship among the three reproductive health indices. There was a strong positive correlation between ANC and SBA ($r=0.706$, $p<0.001$). Similarly, SBA and FP positively correlated ($r=0.730$, $p<0.001$).

A graphical illustration of the relationship between ANC and SBA is presented in Figure 2. It indicates that the positive effect of ANC on SBA became noticeable only when ANC coverage was at least 50.0%. The fitted polynomial curve and accompanying equation showed that ANC could explain 60.44% of the variation in SBA. The scatter plot depicting a strong linear relationship between SBA and FP ($r=0.73$) is shown in Figure 3. As seen in the fitted linear model, SBA explained 53.38% of the variation in FP across states. Graphical exploration was not done for ANC vs FP because Table 4 actually shows that the relationship between the two RH indices was not strong.

Discussion

In this study, the relationship between three key RH indices with significant impact on maternal and child survival was investigated. The results showed that not every woman who received ANC from a skilled provider continued at the same service point till delivery. This is in consonance with a previous study on maternity care continuum in Nigeria[19]. Further, the findings showed a strong ecological linkage between ANC and skilled attendance at delivery on the one hand and between skilled delivery assistance and use of family planning method, on the other hand. Previous studies have demonstrated these sorts of relationships at individual level of analysis[20-21].

These results underscore antenatal care as a strategic entry point that needs to be strengthened because of its multiplier effects on skilled delivery attendance and, eventually, family planning. A previous study[22] has shown that delivery assistance is contingent on the quality and content of antenatal

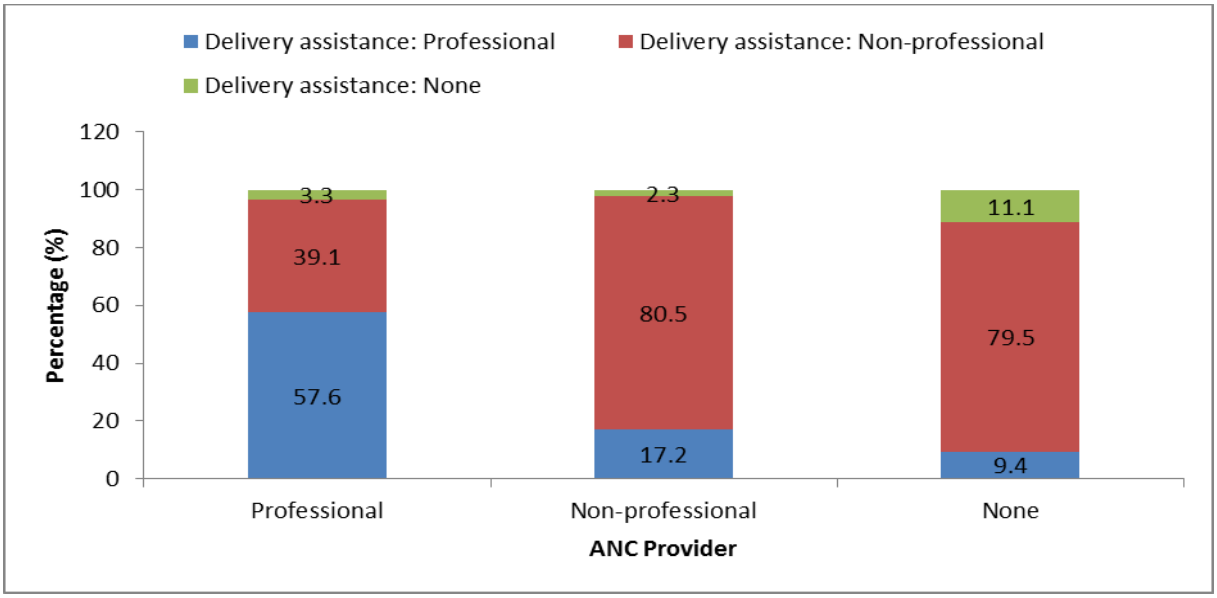

Figure 1: Relationship between type of ANC provider and delivery assistance among Nigerian women, NNHS 2018

Table 2: Relationship between ANC and delivery assistance across the six geo-political zones in Nigeria, NNHS 2018

North Central	**Delivery assistance**		
ANC provider	Professional	Non-professional	None
Professional	770 (65.2)	322 (27.3)	89 (7.5)
Non-professional	3 (12.0)	22 (88.0)	0 (0.0)
None	67 (20.2)	194 (58.4)	71 (21.4)
North East			
ANC provider			
Professional	509 (42.1)	671 (55.6)	28 (2.3)
Non-professional	12 (24.0)	38 (76.0)	0 (0.0)
None	23 (4.3)	488 (90.7)	27 (5.0)
North West			
ANC provider			
Professional	455 (31.4)	937 (64.8)	55 (3.8)
Non-professional	9 (14.5)	51 (82.3)	2 (3.2)
None	62 (5.4)	942 (81.8)	147 (12.8)
South East			
ANC provider			
Professional	5156 (92.6)	41 (7.4)	0 (0.0)
Non-professional	9 (15.3)	50 (84.8)	0 (0.0)
None	18 (66.7)	8 (29.6)	1 (3.7)
South South	Delivery assistance		
ANC provider			
Professional	419 (76.5)	124 (22.6)	5 (0.9)
Non-professional	30 (15.7)	160 (83.8)	1 (0.5)
None	20 (10.5)	161 (84.7)	9 (4.7)
South West	Delivery assistance		
ANC provider			
Professional	529 (86.4)	77 (12.6)	6 (1.0)
Non-professional	13 (23.6)	35 (63.6)	7 (12.7)
None	28 (35.9)	49 (62.8)	1 (1.3)

Table 3: Relationship between type of ANC provider, delivery assistance and modern FP use in Nigeria, NNHS 2018

	Use of Modern Family Planning Method (%)						
ANC Provider	**North Central**	**North East**	**North West**	**South East**	**South South**	**South West**	**Nigeria**
Professional	14.1	4.2	9.3	23.9	33.9	43.5	19.8
Non-professional	32.0	2.0	4.8	37.3	38.2	30.9	29.2
None	8.1	1.1	2.9	14.8	35.3	41.0	8.3
Total	*13.1*	*3.2*	*6.4*	*24.8*	*35.1*	*42.3*	17.4
p-value	*<0.001*	*0.001*	*<0.001*	*0.045*	*0.565*	*0.191*	<0.001
Delivery assistance							
Professional	17.0	7.2	12.9	22.6	36.0	43.4	25.9
Non-professional	10.4	1.3	4.7	35.4	33.9	38.5	10.7
None	1.8	5.3	5.9	50.0	41.2	35.7	8.4
Total	*13.1*	*3.2*	*6.4*	*24.7*	*35.1*	*42.3*	17.4
p-value	*<0.001*	*<0.001*	*<0.001*	*0.01*	*0.707*	*0.473*	<0.001

Table 4: Correlation matrix for the relationship between ANC, SBA and FP across the 36 States and FCT in Nigeria, NNHS, 2018

	Correlation coefficient (p-value)	
	ANC	SBA
SBA	0.706 (p<0.001)	
FP	0.405 (p=0.013)	0.730 (p<0.001)

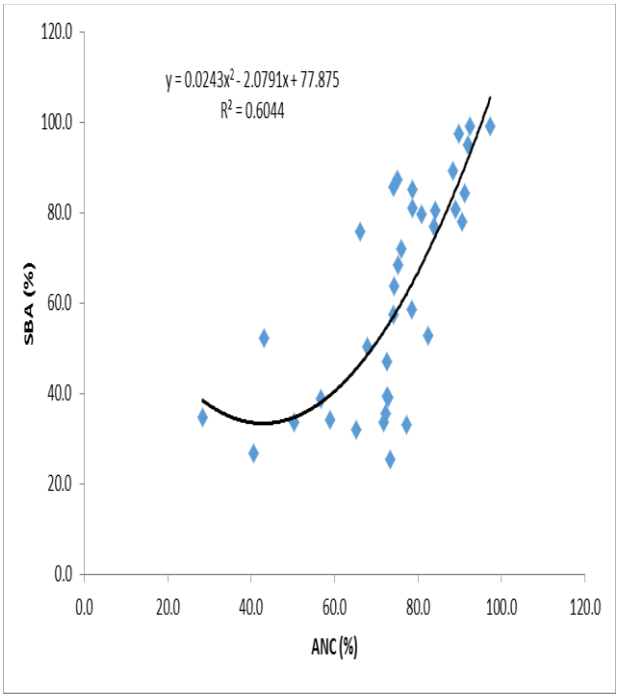

Figure 2: Relationship between ANC and SBA across 36 States and FCT in Nigeria, NNHS, 2018

care. Findings from previous studies have shown that pregnant women who have tendency of developing higher risks of postpartum bleeding[23], obstetric fistula[10], pre-eclampsia, anaemia and other problems associated with childbirth[24] can be detected and prevented through early ANC[25]. In addition, access to ANC and delivery assistance from a skilled provider increases women's empowerment, especially in societies where health care is not widely available[11]. The Nigeria Demographic and Health Survey (NDHS) of 2013 revealed that women who are economically empowered are more likely to seek and use healthcare services to better meet their own reproductive health needs than other women who are less empowered[15].

The results of both individual-level and ecological-level analyses have raised some concerns for explanation. While there are few regional (northern/southern) differences in the shift in use of birth attendants on ANC and delivery activities, none of the regions has a clear good performance to reckon with in programming. For instance, reliance on non-professionals for delivery by those women without ANC provider is as bad as the case of those women in the northern region who shifted from ANC through SBA to delivery with non-professionals. Factors such as cost of delivery (including other materials to provide in the form of delivery kits) in professional services and proximity to service areas may be responsible for a sharp drop in the use of SBA for delivery.

The overall ANC utilization in the country is still very low compared with what obtains in industrialized countries, with over 98% of pregnant women visiting a skilled provider for at least once and more than 62% having at least four visits[4]. However, cultural factors may play a pivotal role in the utilization of health care services. Oshinyemi, Aluko and Oluwatosin[26] (2018) observe that the prevailing cultural norms, illiteracy and myths about pregnancy and childbirth are major reasons

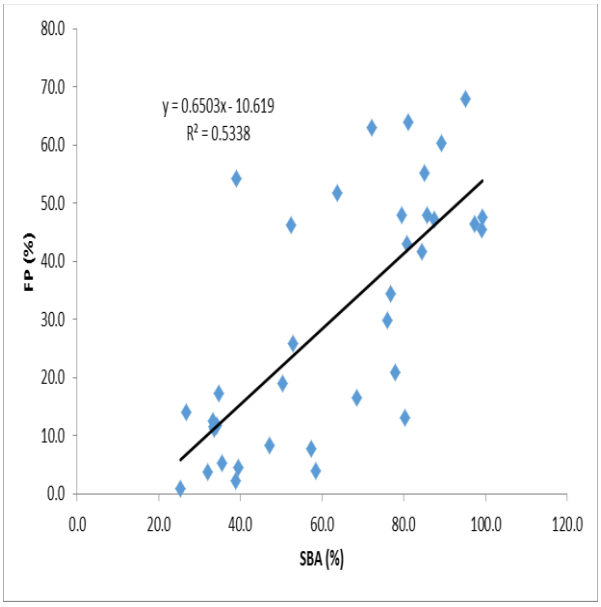

Figure 3: Relationship between SBA and FP across the 36 States and FCT in Nigeria, NNHS, 2018

why some women consult unskilled birth attendants/traditional healers instead of SBA as pregnancy is perceived as a natural health process. Although this study reported high rate of utilization of ANC, this utilization alone without strong awareness and understanding of contents of its activities may not influence use of SBA and uptake of FP. Decision on uptake of RH services is influenced by the quality of information received during ANC. A study reported that awareness of ANC activities significantly influenced place of delivery[27]. This may also explain why women have to change places of delivery from those of ANC. This is a pointer to the need for strengthening the role of healthcare providers in counselling and health education to enhance greater acceptance and sustained use of RH services[28]. Empowering and improving the status of women may reduce maternal mortality, prompt better utilization and increase the survival chances of women of reproductive age[29].

Ethical considerations

Consent of the participants in this study was obtained. Detailed description of the principles of ethical consideration observed in the NNHS has been reported elsewhere[18].

References

1. United Nations. Transforming our world: The 2030 Agenda for Sustainable Development A/RES/70/1, 2015; www.sustainabledevelopnet.un.org
2. Alkema L, Chou D, Hogan D, Zhang S, Moller AB, Gemmill A, Fat DM, Boerma T, Temmerman M, Mathers C and Say L. Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: A systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group. *The Lancet*. 2016; 387(10017):462±74.
3. National Collaborating Centre for Women's Children's Health (NCCWCH). *Antenatal care: Routine care for the healthy pregnant woman*. London: RCOG Press, 2008. Adewuyi EO, Auta A, Khanal V, Bamidele OD, Akuoko CP, Adefemi K. Tapshak SJ and Zhao Y. Prevalence and factors associated with underutilization of antenatal care services in Nigeria: A comparative study of rural and urban residences based on the 2013 Nigeria Demographic and Health Survey. *PLoS ONE* 2018; 13(5):e0197324. doi: 10.1371/journal.pone.0197324
4. World Health Organization (WHO). *Recommendations on antenatal care for a positive pregnancy experience: Summary*. Geneva, Switzerland, 2018.
5. World Health Organization (WHO). *Statement on antenatal care*. Geneva, Switzerland, 2011.
6. Aniebue UU and Aniebue PN. Women's perception as a barrier to focused antenatal care in Nigeria: the issue of fewer antenatal visits. *Health Policy and Planning, 2010;* 26(5), 423-428. doi:10.1093/heapol/czq073
7. Ekele BA, Shehu CE, Ahmed Y and Fache M. What is the place of the new WHO antenatal care model in a teaching hospital setting? *Trop Doct, 2008; 38*(1), 21-24. doi:10.1258/td.2007.005023.
8. Tessema ZT, Teshale AB and Tesema GAKoku ST. Determinants of completing recommended antenatal care utilization in sub-Saharan from 2006 to 2018: evidence from 36 countries using Demographic and Health Surveys. *BMC Pregnancy and Childbirth*, 2021; 21,192. https://doi.org/10.1186/s12884-021-03669-w.
9. United Nations Children Fund UNICEF. Child marriage. *The UNICEF Ghana Internal Statistical Bulletin*, 2015; Issue 4.
10. National Population Commission (NPC) [Nigeria] and ICF International. *Nigeria Demographic and Health Survey (2013)*. Abuja, Nigeria and Rockville, Maryland, USA: NPC and ICF International. 2014
11. Adewuyi EO and Zhao Y. Determinants of neonatal mortality in rural and urban Nigeria: Evidence from a population-based national survey. *Paediatrics Int'l.* 2017; 59(2):190±200.
12. Darmstadt GL, Bhutta ZA, Cousens S, Adam T, Walker N, De Bernis L and Lancet Neonatal Survival Steering Team. Evidence-based, cost effective interventions: how many newborn babies can we save? *The Lancet, 2005;* 365(9463):977-88.

13. Chen XK, Wen SW, Yang Q and Walker MC. Adequacy of prenatal care and neonatal mortality in infants born to mothers with and without antenatal high-risk conditions. *Australian and New Zealand Journal of Obstetrics and Gynaecology*, 2007; 47(2):122±7.
14. National Population Commission (NPC) [Nigeria] and ICF International. *Nigeria Demographic and Health Survey (2012)*. Abuja, Nigeria and Rockville, Maryland, USA: NPC and ICF International.2013.
15. Adamu YM, Hamisu SA, Nalini SK and Greg RA. Maternal mortality in northern Nigeria: A population-based study. *European Journal of Obstet & Gynaecol and Reproductive Biology*, 2003; 109:153-7.
16. Global One. Maternal health in Nigeria statistical overview. 2012. Revised 26 June 2012
17. Federal Ministry of Health. *Program implementation manual, Saving One Million Lives Program for Results*. Federal Ministry of Health, Abuja, Nigeria. 2016.
18. Akinyemi JO, Afolabi RF and Awolude OA. Patterns and determinants of dropout from maternity care continuum in Nigeria. *BMC Pregnancy Childbirth, 2016;* 16(1):282. https://doi.org/ 10.1186/s12884-016-1083-9.
19. Fekadu GA, Kassa GM, Berhe AK, Muche AA and Katiso NA. The effect of antenatal care on use of institutional delivery service and postnatal care in Ethiopia: a systematic review and meta-analysis. *BMC Health Serv Res, 2018; 18*(1):577. doi: 10.1186/s12913-018-3370-9. PMDI: 30041655 PMC6056996.
20. McNellan, CR, Dansereau, E, Wallace, MCG, Colombara, DV, Palmisano, EB, Johanns, CK, Schaefer A, Rios-Zertuche D, Zuniga-Brenes P, Hernandez B, Iriarte E and Mokdad AH. Antenatal care as a means to increase participation in the continuum of maternal and child healthcare: an analysis of the poorest regions of four Mesoamerican countries. *BMC Pregnancy Childbirth*, 2019; 19(1):66. https://doi.org/10.1186/s12884-019-2207-9
21. Okigbo CC and Eke AC. Skilled birth attendance in Nigeria: A function of frequency and content of antenatal care. *Afr J. Reprod Health*, 2015; 19(1): 25-33.
22. Conde-Agudelo A, Belizán JM and Lammers C. Maternal-perinatal morbidity and mortality associated with adolescent pregnancy in Latin America: cross-sectional study. *Am. J. Obstet. Gynecol.*, 2005; 192:342-9.
23. World Health Organization WHO. Adolescent pregnancy. http://www.who.int/mediacentre/factsheets/fs364/en/. 2014. Accessed 13 May 2017.
24. Hodgins S, Tielsch J, Rankin K, Robinson A, Kearns A, Caglia J. A nw look at care in pregnancy: Simple, Effective interventions for neglected populations. PLoS ONE, 2016; 11(8):e0160562. doi: 10.1371/journal.pone.0160562.
25. Oshinyemi TE, Aluko JO and Oluwatosin OA. Focused antenatal care: Re-appraisal of current practices. *International Journal of Nursing and Midwifery*, 2018; Vol. 10(8): 90-98. DOI: 10.5897/IJNM2018.0312. Article Number: 40AE2D758078. ISSN: 2141-2456. Retrieved April 5, 2019 from http://www.academicjournals.org/IJNM.
26. Ewa EE, Lasisi CJ, Maduka SO, Ita AE, Ibor UW and Anjorin OA. Perceived factors influencing the choice of antenatal care and delivery centres among childbearing women in Ibadan north south-western, Nigeria. *Ethiopian Journal of Environmental Studies and Management* (*EJESM*), 2012; Vol. 5 No. 4: 373-383. Retrieved April 4, 2019 from http://dx.doi.org/10.4314/ejesm.v5i4.6
27. Hijazi HH, Alyahya MS, Sindiani AM, Saqan RS and Okour AM. Determinants of antenatal care attendance among women residing in highly disadvantaged communities in northern Jordan: A cross-sectional study. *Reproductive Health*, 2018; 15:106. Retrieved April 4, 2019 from https://doi.org/10.1186/s12978-018-0542-3

Azuh DE, Azuh AE, Iweala EJ, Adeloye D, Akanbi M and Mordi RC. Factors influencing maternal mortality among rural communities in southwestern Nigeria. *International Journal of Women's Health, 2017;* 9, 179–188. Retrieved April 5, 2019 from https://www.dovepress.com/.