Regional Differences in the Optimal Utilisation of Antenatal Care in Nigeria

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Abstract: Many maternal deaths in Nigeria are as a result of pregnancy related complications that are preventable through utilisation of antenatal care facility. The World Health Organisation recommends at least four visits to an antenatal care facility to attain full life saving potentials for pregnant women and their unborn babies. As the deadline for the Millennium Development Goals (MDG 5), which focuses on maternal health and access to health facilities) approaches, it is important to evaluate the optimal utilisation of ANC and impact of regional differences. This study determined factors that affect optimal utilisation of ANC visits. The National Demographic and Health Survey, 2013 dataset on women aged 15-49 years who had their most recent birth in the last 5 years prior the survey was used for the analysis. Optimal utilisation of ANC was defined as four or more visits. Data were analyzed using Chi-square and binary logistic regression models (α=0.05). Mean age of women was 29±7 years and 53% achieved optimal utilisation. The identified predictors of optimal use of ANC were age, wealth index, number of children alive, and region among others. Women in the South-West were about 7 (OR=6.73, 955% CI=5.843, 7.758; p<0.001) times more likely to have had optimal utilisation of ANC than those in the North Central zone. This strength of relationship was retained after other socio-demographic factors were included in the regression model as control. Respondents aged 34-39 years were 2 times more likely to attain optimal utilisation of ANC facility compared to those aged 15-19 years (OR=1.50, 95% CI: 1.152, 1.946). Respondents who belong to the richest wealth quintile were about 3 times more likely to attain optimal utilisation of ANC visits (OR=2.86, 95% CI: 2.162, 3.775) compared to respondents in the poorest quintile. Optimal utilisation of ANC in Nigeria is still poor and differentials exist across the regions. Therefore, regional specific programmes targeting better utilisation of ANC visits among women should be provided particularly in the Northern part of Nigeria.

Keywords: Optimal Utilisation, Maternal Health, Maternal Mortality, Focused Antenatal Care (FANC),
Health Regional Differences

1. Introduction

Maternal morbidity and mortality occur due to complications during pregnancy and child birth. The World Health Organization (WHO) estimates that maternal mortality is over 500 000 deaths per year worldwide and 99 percent of these occur in developing countries. Nigeria accounts for about 10 percent of the world's overall maternal mortality [1, 2]. Thus Nigeria is among countries with high burden of Maternal Mortality globally.

An estimated 800 women die every day from preventable pregnancy related causes [3]. Pregnancy related complications such as infections, eclampsia, and obstructed labour and maternal deaths may be effectively reduced through services obtainable in antenatal care services. Despite the benefits of antenatal care services, women do not utilize them optimally.

Studies have identified factors that affect the use of antenatal care facility in Nigeria. Several of these studies were done based on individual local government areas and states. [4−11]. Other studies were based on data collected at regional level, [12−14]. A few however, have utilized

nationwide data, [15−17].

Women educational status, household wealth and distance of antenatal have been identified as factors associated with the use of antenatal care [15, 18]. Poor communication, poverty, cultural norms, personal cost and poor power supply were identified as factors that affect the quality of care obtainable in an antenatal care facility. These reasons invariably affect the utilisation of these facilities [19]. Physical accessibility of health facilities was identified as a factor that affects utilisation of ANC services [20]. Despite several studies done on factors that affect ANC utilization, few studies have been done to identify factors that affect optimal utilization of ANC using a national representative data. As the year 2015 marks the deadline for the Millennium Development Goals (MDG 5), which focuses on improving maternal health, it is important to evaluate the utilisation of ANC and the impact of regional differences on optimal utilisation. The objectives of this study were to determine the factors associated with optimal utilisation of antenatal care and to determine the regional influence on the optimal utilisation of ANC amidst other socio-demographic factors.

2. Methodology

Nigeria is one of the sub-Saharan African countries located in the West African region. It covers a total area of 923,768 kilometer square. Nigeria comprises of 36 states and a Federal Capital Territory (FCT). These states are grouped into six geopolitical zones; North Central, North East, North West, South East, South-South and South West.

Data for this study was obtained from the National Demographic and Health Survey [21]. The survey made use of a population based cross-sectional study design.

The 36 states were regrouped by geopolitical location into six zones and using the 2006 Population census implementation, each locality was subdivided into Enumeration Areas (EAs). A complete list of the EAs served as the sample frame of the survey. The sampling technique for the 2013 NDHS was a stratified sample, selected at random in three stages from the sampling frame. At the first stage; each state was stratified into urban and rural areas; this resulted in a list of localities. At the second stage one enumeration area was randomly selected from a selected locality with equal probability selection, the resulting list of households served as sampling frame for the selection of households in the third stage. At the third stage 45 households were selected in every urban and rural cluster through equal probability systematic sampling using the household listing. More details can be obtained from the NDHS report [21].

For the purpose of this study a sample of 9909 women within reproductive age 15-49yrs, who gave birth within the last five years and had the history of index birth, was used.

Extraction of relevant data from the NDHS dataset was performed, weighting of the data was done and simple summary statistics (percentage for categorical variables or mean for continuous variables) for all independent variables was also performed. Socio economic factors that affect utilisation of ANC were identified across the two regions of the country i. e. northern and southern regions. Chi-square test was used to investigate associations between optimal utilisation and categorical variables such as age, geopolitical zones, wealth index etc. Variables that were significant in the chi square analysis were then entered into a binary logistic regression model to further investigate the strength of these associations at 5% level of significance. Model fit was assessed using the Hosmer Lemeshow goodness of fit test.

Number of visits to antenatal care facility was the outcome variable in this analysis, it was categorized into two; optimum use and no optimum use. Optimum use was defined as four or more visits and no optimum use defined as less than four visits [22].

$$\text{Optimum use of ANC} = \begin{cases} 1 \text{ if number of visits is } \geq 4 \\ 0 \text{ if otherwise} \end{cases} \quad (1)$$

The key explanatory variable was region of residence (North Central, North West, North East, South East, South West and South South). Others include; age, region, place of residence, educational level, religion, wealth index, occupation, place of antenatal, ethnicity, number of children, husband's/partner's educational level and occupation. SPSS version 20 was used for analysis.

3. Results

The mean age of the women was 29 years (SD=7.5). Women within the age group 30-34 years had the highest proportion of optimal utilisation of ANC (82.8%), while those aged 15-19 had the least proportion (67.6%) (p<0.001). Optimal utilisation increased with increase in educational level; respondents with higher educational level had the highest proportion compared to respondents with no education (95.1% vs. 66.9%, p<0.001). The same pattern was observed in the wealth index of respondents, the richest had the highest proportion while the poorest had the least proportion (93.5% vs. 61.2%, p<0.001). Respondents who were employed had highest proportion of optimal utilisation of ANC while those unemployed had the lowest (80.9% vs. 73.6%, p<0.001). (Table 1)

Table 1. Socio demographic factors associated with optimal utilisation.

Variables	Optimal use%	Total women	p-value
Age (years)			
15-19	67.6	516	
20-24	76.0	4907	
25-29	78.4	2606	
30-34	82.8	2124	<0.001
35-39	82.4	1604	
40-44	81.8	836	
45-49	75.2	314	
Region			
North Central	74.3	1445	
North East	65.7	1514	
North West	68.4	2637	<0.001
South East	90.7	1272	
South South	87.8	1002	

Variables	Optimal use%	Total women	p-value
South West	94.9	2037	
Residence			
Urban	86.1	4428	<0.001
Rural	73.5	5479	
Educational level			
No education	66.9	3504	
Primary	80.8	2606	<0.001
Secondary	88.8	3470	
Higher	95.1	327	
Religion			
Christianity	87.1	4569	<0.001
Islam	72.2	5255	
Traditional	79.5	83	
Wealth index			
Poorest	61.2	1251	
Poorer	69.2	2047	<0.001
Middle	79.1	2273	
Richer	85.3	2388	
Richest	93.5	1949	
Employment status			
Unemployed	73.6	2346	<0.001
Employed	80.9	7562	
Ethnicity			
Hausa	66.8	2656	
Igbo	91.5	1592	<0.001
Yoruba	95.2	1714	
Others	75.5	3945	
Number of children alive			
1-4	80.0	7112	<0.001
5-9	77.2	2720	
10 and Above	61.3	75	
Place of ANC			
At a home	84.9	304	
Government health facility	76.0	7480	<0.001
Private health facility	89.2	2123	
Husband's/partners educational status			<0.001
No education	64.9	2693	

Variables	Optimal use%	Total women	p-value
Educated	84.5	7215	
Husband's/partners employment status			
unemployed	91.7	48	0.032
employed	79.1	9860	

3.1. Differences in Optimal Utilization of ANC in the Geo-political Zones

There was a difference in the proportion of respondents who attained optimal utilisation of ANC in the different zones. Age was found to be significantly associated with optimal utilisation in the northern zones. Respondents aged 35-39 years had the highest proportion of optimal utilisation in the North Central zone (82.2%), while those aged 15-19 had the least 61.0%. Respondents in urban residence had higher proportions of optimal utilisation of ANC in the North Central (88.8%), and North West (71.8%); however this proportion increased in South West zone (95.7%).

Wealth index was significantly associated with optimal utilisation across all zones, proportion of respondents increased with increase in wealth index i. e. from the poorest quintile to the richest quintile (North Central: 43.6% vs. 93.3%; North East: 65.1% vs. 80.8%; South East: 73.4% vs. 97.4%). Educational status of the respondents husband/partner was associated with optimal utilisation. In the North East, 60.3% of those whose husbands had no education attained optimal utilisation compared to 71.5% of the respondents with educated husbands/partners. This pattern was similar in the South West zone however with slightly higher proportion of 87.5% vs. 95.6% for not educated and educated respectively. (Table 2)

Table 2. Factors associated with optimal utilisation in the geo-political zones.

Variables	North Central		North East		North West		South East		South South		South West	
	Optimal use (%)	Total	optimal use (%)	Total	Optimal use (%)	Total	Optimal use (%)	Total	optimal use(%)	Total	optimal use (%)	Total
Age												
15-19	61.0*	77	50.7*	134	69.2*	214	92.6	27	92.9	28	97.3	37
20-24	74.8	306	66.5	367	66.3	600	89.6	183	84.1	164	96.5	286
25-29	73.9	410	67.1	362	63.5	650	90.9	353	87.2	273	93.9	558
30-34	71.5	284	69.9	266	74.1	505	90.3	289	91.1	235	95.2	545
35-39	82.2	202	63.9	230	73.5	373	91.0	244	85.8	169	95.1	386
40-44	76.5	119	69.6	112	68.6	188	91.8	134	89.2	102	95.0	181
45-49	72.3	47	68.3	41	63.0	108	90.7	43	90.3	31	88.6	44
Residence												
Urban	88.8*	340	68.7	428	71.8*	937	90.2	880	85.4*	371	95.7*	1472
Rural	69.7	1104	64.5	1086	66.5	1702	91.8	392	87.8	632	93.3	563
Educational level												
No education	70.6*	606	61.3*	936	64.9*	1649	77.4*	62	88.5*	61	88.9*	190
Primary	72.8	416	67.7	322	70.1	522	86.8	386	88.2	304	93.7	655
Secondary	80.1	397	78.5	237	77.8	446	92.9	737	87.2	571	96.8	1083
Higher	96.0	25	94.1	17	100	21	98.9	88	89.6	67	94.5	109
Religion												
Christianity	69.3*	677	70.4	226	88.2*	288	90.9	1238	87.4	968	96.1*	1172
Islam	79.3	750	64.9	1280	66.0	2343	80.0	10	100	27	93.3	845
Traditional	50.0	18	62.5	8	50.0	6	88.0	25	100	8	100	19
Wealth index												
Poorest	43.6*	110	58.2*	455	65.1*	591	73.4*	79	50.0*	2	64.3*	14

Variables	North Central		North East		North West		South East		South South		South West	
	Optimal use (%)	Total	optimal use (%)	Total	Optimal use (%)	Total	Optimal use (%)	Total	optimal use(%)	Total	optimal use (%)	Total
Poorer	58.5	316	65.8	1445	66.1	812	82.9	181	88.8	89	91.8	146
Middle	78.0	549	70.3	503	67.0	528	90.6	339	85.3	279	92.0	299
Richer	85.4	335	68.3	279	71.7	474	92.9	365	86.9	358	95.5	649
Richest	93.3	135	88.2	208	80.8	234	97.4	308	87.7	275	96.4	928
Employment status(respondent)												
Unemployed	69.7*	284	74.2	621	68.4	811	93.3	253	87.5	184	95.8	192
Employed	75.3	1160	63.3	893	68.4	1827	90.1	1019	87.9	819	94.9	1845
Ethnicity												
Hausa	58.8*	51	70.2*	389	65.9	2175	86.7	15	100*	2	95.7	23
Igbo	85.7	28	83.3	6	93.0	43	90.8	1239	91.7	121	96.8	155
Yoruba	93.0	128	100	5	76.7	30	85.7	7	100	24	95.6	1521
Others	72.6	1239	63.8	1114	78.7	390	90.9	11	86.9	855	91.1	337
Number of children alive												
0-4	74.9	1059	65.4	1003	68.7	1765	91.1*	887	87.8	735	95.0*	1662
5-9	72.8	378	66.0	497	68.4	833	90.5	379	88.2	263	95.4	370
10 and Above	55.6	9	76.9	13	56.4	39	50.0	6	75.0	4	50.5	4
Place(facility) of ANC												
At a home	81.8	11	42.9	7	53.8	26	82.8*	58	88.7	71	92.4	131
Government	74.6	1123	65.7	1444	68.6	2566	89.9	574	87.5	763	94.8	1011
Private	72.3	311	69.8	63	66.7	45	92.3	640	88.7	168	95.5	895
Husband's/partner's educational level												
No education	62.1*	380	60.3*	773	63.9*	1252	82.9*	76	77.8	36	87.5*	176
Educated	78.6	1065	71.5	740	72.5	1387	91.2	1196	88.2	967	95.6	1861
Husband's/partner's employment status												
unemployed	100	10	75.0	4	77.8	9	100	3	100	15	100	6
employed	74.1	10	65.7	1510	68.4	2629	90.7	1269	87.7	988	94.9	2030

*Statistically significant at 0.05.

3.2. Logistic Regression Results

Respondents from the North East geopolitical zone were less likely than respondents from the North Central zone to have optimal utilisation of ANC (OR=0.50, 95% CI: 0.455, 0.557). Similarly North West respondents were less likely to attain optimal utilisation of ANC (OR=0.34, 95% CI: 0.309, 0.370), (Table 3).

Table 3. *Region as a Predictor of ANC Optimal Utilisation.*

Variable	OR	p-value	95% CI	
			Lower bound	Upper bound
North Central[a]				
North East	0.50	<0.001	0.455	0.557
North West	0.34	<0.001	0.309	0.370
South East	4.85	<0.001	4.137	5.687
South South	1.62	0.001	1.435	1.836
South West	6.73	<0.001	5.843	7.758

(a: reference category).

Respondents aged 35-39 years were more likely to attain optimal utilisation of ANC compared to those aged 15-19 years (OR=1.50, 95% CI: 1.152, 1.946). Optimal utilisation of ANC differed with respect to geo political zones. Respondents in South East, South South and South West zones were 2, 2 and 3 times (OR=1.77, 95% CI: 1.123, 2.808; OR=1.73, 95% CI: 1.351, 2.207; OR=3.20, 95% CI: 2.353, 4.309) respectively more likely to attain optimal utilisation of ANC than North Central zone. Respondents with secondary and higher educational levels were 1 and 2 times (OR=1.28, 95% CI: 1.071, 1.532; OR=1.96, 95% CI: 1.140, 3.353) more likely than those with no education to

attain optimal utilisation of ANC respectively. Respondents who belong to the richest wealth quintile were about 3 times more likely to attain optimal utilisation (OR=2.86, 95% CI: 2.162, 3.775) compared to respondents in the poorest quintile, (Table 4).

Table 4. *Socio Demographic Characteristics as Predictors of ANC Optimal Utilisation.*

Variables	OR	p-value	95% CI	
			Lower bound	Upper bound
Age				
15-19[a]				
20-24	1.11	0.352	0.890	1.388
25-29	1.06	0.570	0.856	1.327
30-34	1.41	0.005	1.107	1.787
35-39	1.50	0.003	1.152	1.946
40-44	1.62	0.001	1.203	2.180
45-49	1.46	0.044	1.010	2.094
Region				
North Central[a]				
North East	0.92	0.391	0.771	1.107
North West	1.00	0.997	0.815	1.227
South East	1.77	0.014	1.123	2.808
South South	1.73	<0.001	1.351	2.207
South West	3.20	<0.001	2.353	4.309
Residence				
Urban[a]				
Rural	1.14	0.065	0.992	1.320
Educational level				
No education[a]				
Primary	1.02	0.818	0.879	1.178
Secondary	1.28	0.007	1.071	1.532
Higher	1.96	0.015	1.140	3.353
Religion				

Variables	OR	p-value	95% CI	
			Lower bound	Upper bound
Christianity[a]				
Islam	1.05	0.603	0.879	1.250
Traditional	1.02	0.953	0.572	1.811
Wealth index				
Poorest[a]				
Poorer	1.17	0.041	1.006	1.368
Middle	1.53	<0.001	1.288	1.819
Richer	1.83	<0.001	1.489	2.248
Richest	2.86	<0.001	2.162	3.775
Employment status				
Unemployed[a]				
Employed	1.02	0.706	0.907	1.154
Ethnicity				
Hausa[a]				
Igbo	1.83	0.007	1.179	2.849
Yoruba	1.89	<0.001	1.329	2.683
Others	1.06	0.501	0.891	1.265
Number of children alive				
1-4[a]				
5-9	0.89	0.114	0.764	1.029
10 and Above	0.49	0.006	0.290	0.813
Place of ANC				
At a home[a]				
Government health facility	1.27	0.175	0.898	1.807
Private health facility	1.17	0.412	0.806	1.691
Husband's/partner's educational level				
No education[a]				
Educated	1.38	<0.001	1.209	1.567
Husband's/partner's employment status				
Unemployed[a]				
employed	0.37	0.076	0.125	1.108

(a: reference category).

4. Discussion

Optimal utilisation of ANC is very important as a woman will attain maximum care from at least four visits; this is referred to as the Focused Antenatal Care (FANC).

In our study we found different predictors of optimal utilisation of ANC in the different zones. The southern geopolitical zones had higher optimal utilization of ANC compared to the northern zones. The seeming higher socio economic characteristics such as wealth status and educational status of women residing in the southern zones compared to those in the northern zones were found to affect the optimal utilisation of ANC; this is similar to results obtained from [16], which found geopolitical zones to be a factor that affects maternal healthcare service utilisation. Religious and cultural practices are vastly different and these have been found to affect utilisation of healthcare facilities, ANC visits inclusive.

There was a noticeable difference in optimal utilisation between the different age groups with older respondents attending ANC visits more than younger respondents. This finding agrees with the reports of a similar study in South Western, Nigeria [12]. Similarly [10], found women aged greater than twenty-five years utilized ANC more than those

less than twenty-five years old and this is similar to results found in our study where older women attained optimal utilization of ANC more than younger women. This may be due to more knowledge about the advantages of ANC by the older women compared to their younger counter parts as they may have had previous births.

Education is a key factor in the utilisation of healthcare in general [9, 6, 15]. Educating the girl child in the northern zones is not considered essential as a result of socio cultural practices and religious beliefs. Similarly, a previous report from North Central Nigeria [4] showed maternal education to be a predictor of ANC service utilisation in North Central Nigeria. Our study found higher level of education improved optimal utilization of ANC. Educated women are more likely to be aware of the benefits of optimal utilization and are likely to be empowered to make decisions about their health.

Social structure affects ANC utilisation; through communication at social gathering, women talk to their peers and discuss about different features of life including health related issues [23]. With increase in wealth, there was increase in the proportion of women who utilized ANC visits. Several studies [24, 25] have linked wealth of women to utilisation; possibly because higher socio economic status is associated with higher education and employment. This enables hospital bills to be paid as more often than not bills are paid out of pockets due to poor state of health insurance in the country.

5. Conclusion

In conclusion, several factors were found to affect the optimal utilization of ANC in Nigeria and regional differences occur as well with women in South East, South West and South South utilizing ANC more than those in North East, North West and North Central. The most affected zones are the North East and North West. Measures to improve utilisation of ANC should address the following issues: education of females and regional specific programmes targeting better utilisation of ANC among women should be improved particularly in the Northern part of Nigeria.

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