Does female education explain the disparity in the use of antenatal and natal services in Nigeria? Evidence from demographic and health survey data.

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Abstract

Background: Nigeria is among the countries with a high number of annual maternal deaths partly due to low utilization of maternal health services (MHS).

Objective: This study aimed to explore whether there is an association between women's level of education and the appropriate use of antenatal and delivery services.

Method: A quantitative cross-sectional study was used to analyze the Nigerian Demographic and Health Survey (NDHS) data. Information from 33,385 women aged 15 – 49 years was analyzed using Bivariate Pearson Chi square test and multiple logistic regressions.

Results: Education is statistically associated with the number of antenatal clinic visits made (AOR = 3.208; CI 2.875 – 3.578; p < .0001) and the place of delivery (AOR = 2.009; CI 1.449 – 2.785; p < .0001) even after controlling for availability of skilled health workers, parity, income, religion, age and distance.

Conclusion: A long term investment in girls' education will improve income, interaction with health care providers, level of autonomy to seek and pay for appropriate MHS and ultimately use of MHS and positive pregnancy outcomes.

Keywords: Education, antenatal, delivery, Nigeria.

Introduction

Maternal mortality remains one of the major causes of death among women in the reproductive age group in the developing countries. From time immemorial, serious concern has been raised on how to improve access and utilization of antenatal and delivery services in order to reduce pregnancy related morbidity, deaths and disability. In 2003, the World Health Organization (WHO) estimated that, 289,000 women died as a result of pregnancy related complications[1], showing an additional 2,000 maternal deaths[2] higher than what was recorded in 2011. Almost all (99%) of these deaths occur in the developing countries among the rural, poor, and illiterate women[1].

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Moreover, about two-thirds of the estimated annual maternal deaths were from five South East Asian countries (Afghanistan, Bangladesh, India, Indonesia, and Pakistan) and six African countries namely Democratic Republic of the Congo, Ethiopia, Kenya, Nigeria, Sudan, and Tanzania[1,2,3,4]. By extension, it means maternal death is recorded every two minutes in the developing countries and hence, women living in the developing world are at higher life time risk of dying as a result of pregnancy related complications. For instance, current estimates showed that the lifetime risk of a Nigerian woman dying as a result of pregnancy related morbidity is 1 in 23 compared to Australia and Ireland at 1 in 17, 800 and Greece at 1 in 31,800 respectively, signifying between 17,000 - 20,000 fold disparity between Nigeria and these developed countries[2].

Maternal mortality ratio (MMR) is the number of maternal deaths per 100,000 live births[1]. It is a pointer of the status of women in any community, the state of their health, and the degree of access to the MHS. Although, progress has been recorded in reducing these avoidable deaths by local and international efforts such as the Safe

motherhood Initiative, Making Pregnancies Safer, Millennium Development Goal 5 (MDG) and currently Sustainable Development Goal 3 (SDG 3), however, none of the high burden countries in South East Asian and sub-Saharan African countries mentioned above have achieved a reduction in Maternal Mortality Ratio (MMR) by two-thirds when compared with figures of the 1990[4]. The target of SDG 3 is to achieve a Maternal Mortality Ratio of 140/100,000 live births by 2030 for the high burden countries[4]. However, it is important to note that by the end of 2015, these high burden countries have not been able to achieve the target set for MDG 5 of 300 maternal deaths per 100,000 live births[4]. Most disturbing is the fact that monitoring of progress towards achieving the MDG 5 revealed that, there are huge disparities within and between the various parts of a given country[5].

One reason that is central to the observed disparities in the use of modern health care services within and between the various parts of any given country is the level of educational attainment of the pregnant woman. Education is known to influence a woman's worldview[6,7], readiness to accept modern obstetric care[4], capacity to participate in the decision making process on issues relating to her health[8,9], economic independence[10,11] and her overall health cultural capital[12]. Pooled data from 2005 to 2010 shows the global adult literacy rate of 84%, with the lowest rate of 63% from sub-Saharan Africa[2]. It is pertinent to note that, disparities in literacy were well documented within the African region, with the West African countries (Nigeria belongs to this region) of Mali, Niger, Senegal, and Sierra Leone having the lowest literacy rates with more than 50% of women in the reproductive age (15-49 years) having formal education (unable to read or write) and a high MMR[2].

The current female literacy rate for Nigeria[2] was estimated at 61%. However, differences exist between the six political zones that were drawn based on commonality in ethnic, religious and cultural inclination. Some states in the North Eastern and North Western zones of Nigeria have more than two-thirds of the female population as stalk illiterates[32]. Interestingly, studies on maternal mortality in some states of these zones have reported an MMR of up to 1,791 per 100,000 live births[13,14] which nearly doubled reports from the Southern part of Nigeria[15,16]. While education is related to socio-economic class,

nevertheless, data shows it influences health behavior and the utilization of health services when income level was controlled[9,11,17-24]. Studies have demonstrated that women who have gone beyond the primary school level are more likely to have higher number of ante-natal clinic visits and deliver in a health facility compared to unschooled women[9,11,17,18]. However, other studies have shown that educational attainment does not always lead to appropriate use of health services[25]. For example, educated people were found to miss follow up visits, fail to comply with full treatment regimen and more comply to self-prescribed regimens compared to their illiterate colleagues that belong to similar socio-economic levels or reside in similar neighborhoods[25]. Furthermore, it has been reported that uneducated women account for disproportionately high maternal and neonatal morbidity, mortality and disabilities due in part to their low health cultural capital and lack of autonomous status to negotiate their reproductive rights within the family structure[22,23,24,26]. In Nigeria[11,27, 28] and other parts of the world,[3,29] raising levels of education delays age at marriage and age at first delivery while increasing opportunities for better paying jobs. Studies in India,[30] Kenya[31] and elsewhere[32] have demonstrated that delaying child bearing until women are between the age of 20 – 30 years was reported to have a fourfold lower risk of dying from pregnancy related complications compared to those less than 20 years old. Furthermore, women in the developed countries delay child bearing and have few number of children compared to the high fertility rate of 5 or more in the sub-Saharan African countries.

Overall, the level of educational attainment enhances the ability of a woman to overcome negative cultural norms, enhance her skills to bargain for autonomy within the family and community structure and ultimately take appropriate health related actions compared to her illiterate counterpart[33]. Given the significant disparities in the level of female literacy and MMR among the various parts of Nigeria as highlighted above, this study aimed to explore whether the use of ante-natal and delivery services is influenced by the educational attainment of the Nigerian women. Findings of the study will add to the available data on maternal health with potential to improve data driven planning, implementation and ultimately high-use rate of MHS. The theoretical framework of the study was based on the Anderson health utilization model which provides constructs on personal, community and health system characteristics[34].

Methods

The study design was cross-sectional using the Nigerian demographic and health survey (DHS) data to test whether there is significant statistical association between a woman's level of education and the use of MHS as measured by the number of antenatal visits (<4 or ≥4 visits) and place of delivery (home or health facility). A two stage cluster proportionate to size sampling technique was used to recruit 33,385 women from all the 36 states and the federal capital territory which were clustered into 6 geopolitical zones (Figure 1).
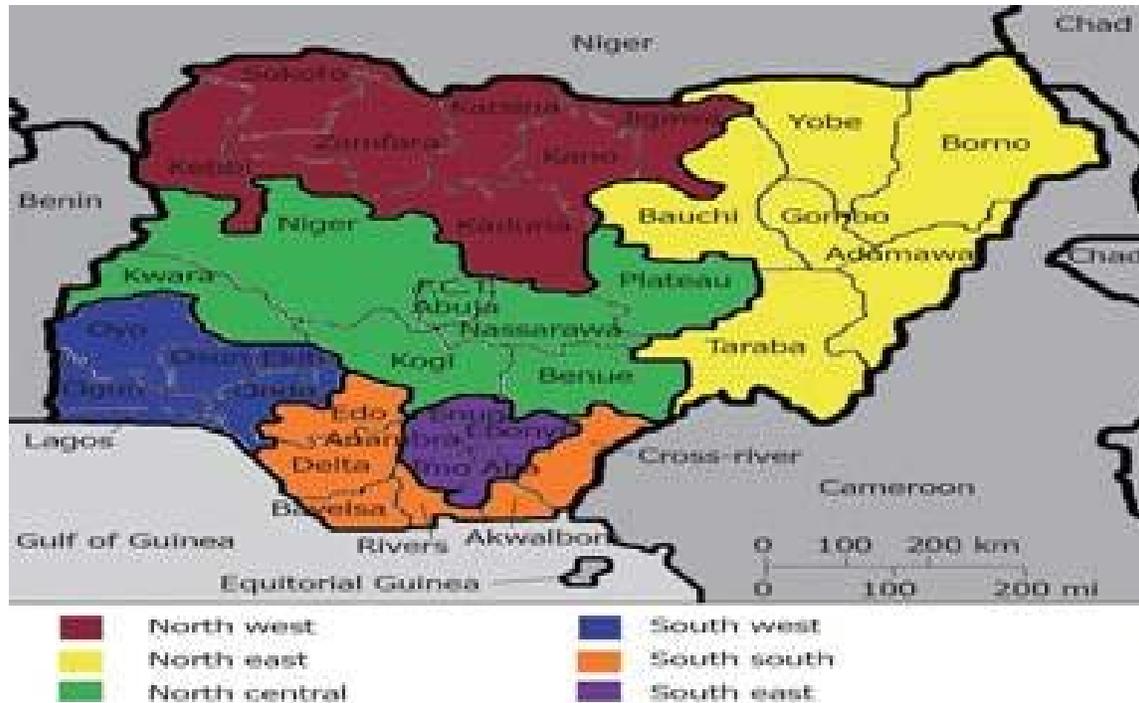
Figure 1: Map of Nigeria showing the six geopolitical zones and states

The information collected during the survey covered all the Millennium Development Goals (MDGS). Details of the survey method can be obtained from the survey report available online[35]. Periodic DHS are currently conducted in over 70 countries from 1984 to date to provide uniform data for international comparison within and between countries.[36] Bivariate Pearson's Chi-square test statistic and two stages of Multivariate regression analysis were conducted. The number of ANC visits made during the pregnancy before the survey was coded as 0 for those that had reported having made less than four visits while women who made a minimum of four visits as recommended by WHO[3] were coded as 1 and compared to the former. The place of delivery was categorized as home (coded as 0) and institutional (coded as 1) and comparison was with home as the reference population. The level of education was coded as 1 for those with no formal education, code 2 for Primary level, code 3 for Secondary (high school) level, and code 4 for post-secondary (high school) levels. Women with no formal education were the reference group.

Confounding variables that were controlled when assessing whether there was significant statistical association between a woman's level of education and the use of MHS included availability of skilled health worker, distance, parity, income, religion, age and distance. These variables were chosen based on well-known predictors from published works[6,7,10,11,27] and / or were observed to be statistically significant on Pearson chi-square statistic.[37] The unadjusted and adjusted odd ratios from the regression analysis were estimated at 95% confidence interval, which was the critical value when the hypothesis was tested.

Ethical consideration

The custodian of the DHS data - ORC Macro and ICF International based in Calverton Maryland, USA granted the permission to use the DHS data. The Institutional Review Board (IRB) of Walden University Minneapolis, MN 55401, USA approved this study via approval number 01-23-15-03386[13].

Results

The female literacy rate by zones in order of increasing magnitude showed North West 32.5%; North East 34.5%; North Central 60.7%, South-South 78.5%, South East 78.2% and South West 85.1%.

A high percentage of women (40%) and husbands/partners (43%) had no formal education. Only 7.9% of respondents and 11.8% of their husbands/partners had more than secondary (high school) level of education respectively (Table 1). Further analyses revealed that less than 5% of all women that had more than 12 years of formal education, which is equivalent to the completion of senior secondary school level (high school) based on the National Education Policy[35].

Table 1: Educational characteristics of respondents

Independent variable	Proportion of sample (%)	Number of ANC visits (N = 31,985)			
		< 4 visits	(%)	≥ 4 visits	(%)
Respondents' highest education level					
No formal education	40.0	83.5		16.5	
Primary	19.5	64.0		36.0	
Secondary	32.6	72.4		27.6	
Higher	7.9	70.1		29.9	
Total years of schooling					
Zero	40.4	83.4		16.8	
less than 6 years	19.6	64.2		35.8	
6 -12 years	35.2	72.6		27.4	
13+ years	4.8	67.3		32.7	
Husband/Partner highest education level					
No formal education	43.0	85.1		14.9	
Primary	20.5	62.7		37.3	
Secondary	24.7	50.1		49.9	
Higher	11.8	49.9		50.1	

The proportion of women who had four or more antenatal visits was higher for educated women when compared to those with no formal education, irrespective of the level of educational attainment (Figure 2).
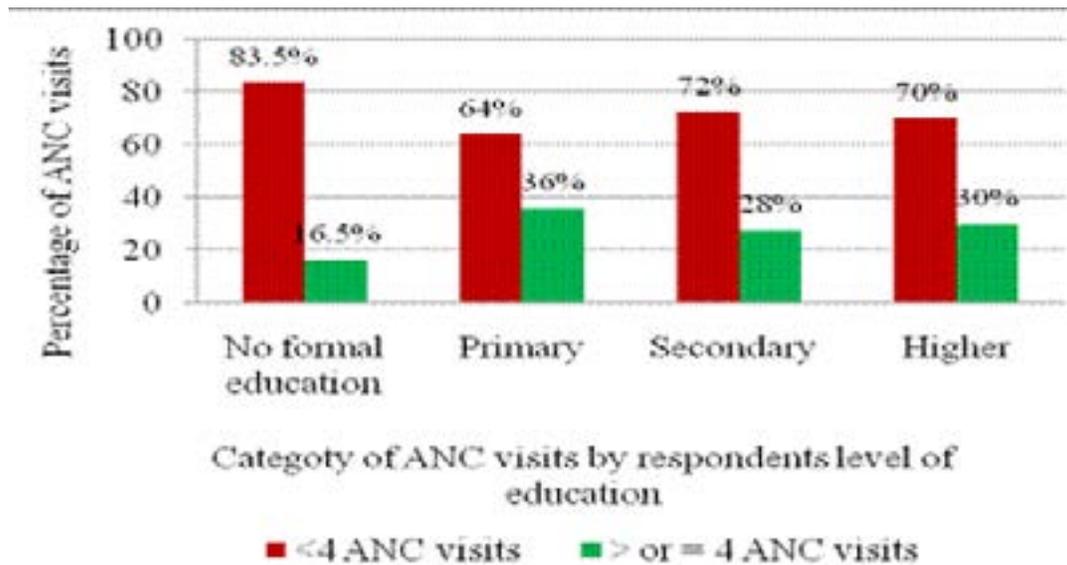
Figure 2: Level of education and the number of antenatal visits made.

Education was found to be statistically associated with the use of antenatal services (χ2 = 972.025; df = 3; p < .001). Women who had completed primary school have more than two folds more likelihood of achieving the minimum recommended four antenatal clinic (ANC) visits compared to their uneducated counterparts (UOR = 2.856; CI 2.664 – 3.062). The use of antenatal services was found to increase with increasing level of education (χ2 = 2696.057; df = 3; p < .001) (Table 2). Moreover, women whose husbands/partners have gone beyond primary level of education were more likely to achieve the minimum recommended number of ANC visits by at least five folds compared to women whose husbands/partners were illiterate (UOR = 5.691; CI 5.28 – 6.134). The positive impact of women's education on the use of ANC services remained similar after controlling for confounders (AOR = 3.208; CI 2.875 – 3.578;p < .0001) (Table 2).

Table 2: Women's level of education attainment and the number of antenatal visits

Educational status	ANC visits (n = 31,985) < 4 visits	≥ 4 visits	Bivariate analysis Pearson's Chi-square	UOR	95% CI for UOR Lower limit	Upper limit	AOR	P values	95% CI for AOR Lower limit	Upper limit
None	10697	2111	0.001*	1.00			1.00			
Primary	3992	2250		2.86	2.66	3.06	2.37	0.001*	2.16	2.60
Secondary	7540	2873		1.93	1.81	2.06	3.21	0.001*	2.88	3.58
Tertiary	1768	754		2.16	1.96	2.38	2.45	0.001*	2.07	2.89
Years of schooling			0.002*							
Zero	10769	2150		1.00			1.00			
<6 years	4033	2248		2.79	2.615	2.99	3.47	0.001*	2.78	3.63
7-12 years	8168	3090		1.90	1.78	2.02	17.93	0.001*	10.40	21.26
13+	1027	500		2.44	2.17	2.74	12.94	0.001*	4.46	36.67
Husband highest education										
None	8654	1517	0.001*	1.00			1.00			
Primary	3044	1808		3.39	3.13	3.67	2.03	0.10	0.6546	6.37
Secondary	2923	2916		5.69	5.28	6.13	1.94	0.40	0.609	6.17
Higher	1392	1398		5.73	5.223	6.28	1.79	0.20	0.567	5.67

* p is significant at the 0.05 level.
Note: Variables adjusted in the model: parity, income, religion, age and distance.

Increasing level of education was observed to be associated with greater percentage of institutional delivery ($\chi2$ = 5431.96; df = 3; p < 0.001). Women with greater than a primary level of education are twice more likely to deliver in a health facility compared to illiterates after adjusting for covariates (AOR = 2.009; CI 1.449 – 2.785; p< .0001) (Table 3). The educational status of husbands/ partners was observed to be associated with the use of modern delivery facilities ($\chi2$ = 3550.95; df = 3; p < 0.001). Women whose husbands/partners had secondary or higher level of education had 10 fold higher likelihood to deliver in a health facility compared to women whose husbands/partners are uneducated (UOR = 10.529; CI 9.566 – 11.589) (Table 3).

Table 3: Women's Levels of Educational attainment and the Place of Delivery

	Place of delivery (n = 17,949)		Bivariate analysis		Multivariate logistic regression analysis					
	Home	Facility	Pearson Chi-square	UOR	95% CI for UOR		AOR		95% CI for AOR	
Educational status					Lower limit	Upper limit		P values	Lower limit	Upper limit
Woman's Education status			0.001*							
None	7878	951		1.00			1.00			
Primary	2425	1622		5.54	5.053	6.075	1.332	0.001*	1.093	1.79
Secondary	1378	2764		16.62	15.14	18.241	2.009	0.001*	1.449	2.79
Tertiary	94	837		73.76	58.99	92.242	4.03	0.001*	2.358	6.88
Husband highest Education			0.001*							
None	6376	736		1.00			1.00			
Primary	2212	1372		5.37	4.85	5.95	1.075	0.67	0.77	1.49
Secondary	2071	2517		10.53	9.57	11.55	1.11	0.55	0.80	1.54
Higher	665	1277		16.64	14.7	18.77	0.83	0.356	0.56	1.23

* p is significant at the 0.05 level.

Note: Variables adjusted in the model: income, religion, availability of skilled health worker, distance to the nearest health facility, age and parity.

Discussion

Findings of this study demonstrated that educational attainment is an important determinant for the proper use of ante-natal and delivery services with women having higher education found to have higher number of antenatal care visits and modern delivery services. The North Western and North Eastern parts of Nigeria had the lowest utilization rates of MHS. This is partly due to the regions having only a fifth of all women who are literates compared to four-fifths of women in the South Western region[35] of Nigeria, that had highest MHS utilization rate in this study.

Furthermore, the Northern states of the country had the lowest use of MHS. This is partly due to the fact that of the 7.3 million children who are not attending school, girls accounted for 60% of these children and majority are from the North Eastern and North Western zones of the country.[38] Adherence to cultural and religious beliefs such as girls should be married off in their teens, preference to educate the male child, mal-distribution of schools resulting in longer travel time to reach the nearest school and high poverty are some of the factors responsible for states in the North East and North West level having the lowest level of female literacy.[38,39,40]

The possible consequence of education on female reproductive health comprises late marriage, deferred child bearing, lowering of fertility rate, greater independence on reproductive health choices, independence to freely decide on when and where to seek medical attention without approval from anybody and economic empowerment. Education enhances a woman's ability to communicate effectively with health providers and participate in the decision making process based on the various management options regarding her prevailing reproductive issues[41]. Even though, education is related to personal and family income levels, nevertheless, it is significantly asso-

ciated with the use of prenatal and natal services when income and wealth family index were controlled, as was the case in this study. This finding was similarly observed in Nigeria[11,42], Kenya[18,24], Netherlands[22], and several other countries[17,23].

This might be related to the fact that education increases a woman's world view, opportunities for better paying jobs, ability to defend her reproductive health rights and overcome age long negative cultural stereotyping of submissiveness to husband/partner regarding her reproductive health desires and adopt behaviors that enhance her health and wellbeing[43]. Conversely, several studies have reported low utilization of modern maternity services with concomitant high risk of maternal and neonatal morbidity, mortality and disability to be highest among illiterates[22,23,24,26]. Generally, the higher a woman's level of education, the higher her level of autonomy, use of MHS, delay in having children and having fewer number of children which, jointly reduces her risk of dying from pregnancy related complications as reported by studies in Nigeria[11,25], Namibia[26] and other parts of the world[3,29].

Overall, this study showed that educated women have a higher number of antenatal care visits and institutional delivery compared to uneducated women living in a similar setting and economic status. This finding is in variance with studies that have reported that increasing levels of education do not necessarily translate to higher use of health services, because educated persons tend to practice self-treatment and non-compliance with treatment and follow up schedule[25]. It is important to note that the latter study concluded that a population of uneducated minorities had positive attitudes and increased utilization of the medical system when symptoms presented. Nevertheless, increased education improves women's knowledge of high-risk prenatal warning signs and treatment, and ultimately promotes positive attitudes toward health care and utilization of services. A long term investment in girls' education will have a ripple effect of opportunity for better paying jobs, better financial capacity to pay for the cost of obstetric services, higher health cultural capital, high level of autonomy and likelihood to be early adaptors of public health programmes such as family planning and immunization.

Strength of this study
The strength of this study lies in its large sample size of about 34,000 and the proportionate to probability sam-

pling methods.[35,36] which are pre requisite for high external validity of the findings of any study.[44] Findings from this study provided better understanding of how education influences the use of MHS after adjusting for the differences in income, religion, availability of skilled health worker, distance to the nearest health facility, age and parity. It highlighted the role of the education sector in improving the use of health services by pregnant women, which will improve planning for any long term upstream public health intervention. Findings have the potential for social change by stimulating discussions among the various leaders in education, health, religious and traditional institutions in order address issues relating to these areas.

Limitations of this study
The study design was cross-sectional, provided additional information on how education influences the use of MHS and therefore, does not imply causality. The DHS data does not have information on what causes delay to take decision to go to the hospital and factors between taking the decision and reaching the appropriate health facility. The access (geographical, economic or cultural) and school attendance are not even within and between each state of the federation and therefore, might account for the differences in female literacy rate and the use of MHS.

There is the need for further research that will provide additional insights (qualitative studies) on how decisions to seek for MHS were taken at family level, and how geographical, economic and cultural factors influence girls' education and the subsequent use of MHS.

Conflict of interest
None

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