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Determinants of Institutional Delivery in Yobe State, Nigeria

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Abstract **Context:** In Nigeria, there exist wide disparities within and between the 36 states regarding the magnitude, pattern and factors that determines the choice of place of delivery. This study aimed to identify women's biological, sociocultural, and economic characteristics that influence their choice of place of delivery in Yobe State. **Methods:** This is a descriptive cross sectional study using the 2008 National Demographic and Health Survey with records of 659 women between 15-49 years old, who had given birth between January 2003 and December 2008 in Yobe State. Bivariate Pearson's Chi square test and two stages of Multivariate regression analysis were conducted. **Results:** Women leaving near a health facility (Adjusted OR (AOR) = 6.318; CI 1.294 – 30.847), and availability of skilled health workers in the facility (AOR = 3.311; CI 1.153 – 4.49) are more likely to deliver in a health facility compared to those that are living far away from a health facility and the health facility is lacking skilled health workers. **Conclusion and Public health implication:** Proximity and accessibility to a health facility and the availability of skilled health worker in the nearest health facility were the consistent influencers for the choice of place of delivery after controlling for confounders. This calls for redistributing of health resources and strengthening the institutional capacities of health facilities.

Keywords: *institutional delivery, determinants, Yobe, Nigeria*

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1. Introduction

Social determinants of maternal mortality are the biological, physical, socioeconomic, and local cultural context in which women are born, live, work and have children. These factors account for the differential maternal morbidity, mortality and disability within and between the various strata of the population as a result of pregnancy and its related complication in a given place and time. In 2013 alone, an estimated 289,000 women died as a result of pregnancy and its related complications with over 99 percent (286,110) of these deaths accounted by developing countries [1]. The Maternal mortality ratio (MMR) for Nigeria is very high and ranked amongst the highest in the world. Official figure put the MMR as 545 maternal deaths per 100,000 live births ranging from 475 to 615deaths per 100,000 live births [2]. This figure is far below the 820 deaths per 100,000 live births reported by UNICEF [3] and the 1000 deaths per 100,000 live births reported by community based study [4]. This is an indication of underestimation, since records of vital events are incomplete and the sensitivity of surveillance on maternal deaths is low in two thirds of countries (Nigeria inclusive) in the WHO African Regional office [5,6]. The reason for the fewer cases of maternal deaths in the developed countries is largely as a result of high access and utilization of maternal health services such as ante natal, natal, post-natal and family planning services.

Place of delivery and the availability of skilled health workers are among the major factors that were known to be associated with or influencing the risk of a woman dying as a result of pregnancy and its related complications [7]. In Nigeria, only 38% of the estimated 8.3 million annual pregnancies in 2010 were attended by skilled health workers during delivery [5]. It is pertinent to note that there exist wide disparities within and between the six geopolitical zones of Nigeria with the North east zone having the worse maternal health indicators [2]. Furthermore, Yobe state (study area) has the lowest proportion of deliveries attended by skilled health workers of 9.3% compared to the national and regional average of 38% and 15.5..% respectively [2,8]. Considering the fact that more than 70% of the population of Yobe state live in rural and desert areas with poor road network, the proportion of skilled deliveries is likely to be lower than the state average noted above. A plausible reason been that the health facilities in the state lack adequate number of skilled health care workers, equipment's and essential medications [2,8,9]. This is buttressed by the fact that there are only 45 certified midwives spread across the 523 public health facilities who are supposed to attend to the over half a million pregnancies per year [8]. This means that the average workload of a midwife per day will be 50 pregnant women which without doubt, will compromise the time available for health worker – client communication and invariably may result in poor quality of services rendered as was similarly observed in some parts of Sokoto state [10].

In order to reposition the state plan, there is the need to identify what are the barriers and challenges at individual, community and health facility levels using the Anderson health behavior model [11]. The model has three constructs a) Predisposing characteristics; b) enabling characteristics and c) need characteristics [12]. The model provides a systematic approach to look at conditions, processes and relationships at various levels of the society that defines the autonomy of individuals, how it affects the pattern of accessing and utilizing health services and the distribution of health outcomes. The usefulness of the model is underscored by its wide application in research of social and public health importance [13,14,15]. This study aimed to identify whether women's individual, community and health system factors are associated with the place of delivery in Yobe state.

2. Methodology

2.1. Background of the Study Area

Yobe state is one of the 36 states in Nigeria, located in the North eastern part of the country. It shares common boundaries with Niger Republic to the North, Borno state to the east, Bauchi state to the west and Gombe state to the south. The state has an estimated population of 3 million with over 70% living in rural areas and a female and male literacy rate of 12% and 32% respectively [8].

2.2. Study Design

This is a descriptive cross sectional study.

2.3. Source of Data

The 2008 National Demographic and Health Survey (2008 NDHS) data provides information to assess the influence of social, economic, cultural and political factors on the use of modern delivery services. Respondent's bio-socio-demographic and economic characteristics were the independent variables and the place of delivery (home or health facility) as the dependent variable.

2.4. Sample Size and Recruitment of Participants

The data base contained 695 women whose had delivered between January 1, 2003 to December 31, 2008. Participants were recruited proportionate to population density, rural/urban ratio and composition from all parts of the state, [2]. The sampling strategy was a stratified two stage cluster sampling with the 2006 Nigerian national census enumeration areas as cluster. Sampling at lowest administrative unit is considered ideal as it will strengthen the external validity and generalizability of findings and statistical precision that will demonstrate acceptable effect size [2,8]. Details on sample size estimation, sampling strategy and method of data collection are presented in the survey report and other relevant documents [16,17].

2.5. Data Analysis

The data was analyzed using SPSS version 16. Bivariate Pearson's Chi-square test statistic and two stages of Multivariate regression analysis were conducted in order to identify factors influencing the utilization of delivery services in Yobe state. Variables that were included the predictive model were either known influencers from previous research and or were found to have significant statistical association from bivariate Pearson Chi-square statistic. The critical value was set at 95% confidence interval. A similar approach was used to identify how religion influence none, partial and complete childhood immunization [19]. Furthermore, Fapohunda & Orobaron (2014) have used 2008 NDHS data and similar analytical approach to identify factors associated with women who deliver with no one present [20].

2.6. Ethical Consideration

Access to the raw data was granted by ORC Macro and ICF International based in Calverton Maryland, USA who are the custodian of the Demographic and Health Survey data.

3. Results

Out of the 695 women aged 15-49 years who were interviewed, only 659 were included in the analysis representing 6.2% missing data. A total of 44 (6.7%) out of the 659 respondents had their last delievery in a health facility with home deliveries accounting for 93.3%.

Table 1: Majority (60.1%) of the respondents are between 20 – 34 years old with a mean age of 26.3 ± 2.4 years.

Table 1. Biological and behavioural characteristics of respondents

Independent variable	Proportion of sample (%)	Place of delivery (N = 659)	
		Home (%)	Institutional (%)
Age in years			
<20	14.3	94.7	5.7
20 – 34	60.1	91.1	8.1
35 – 49	25.6	95.9	4.1
Parity			
1	14.3	87.2	12.8
2 -4	38.2	93.3	6.7
5+	47.5	95.2	4.8
Birth interval between the last two deliveries			
Less 24 Months	25.0	94.3	6.7
24 - 48 Months	57.9	94.5	5.5
49+ Months	17.2	93.8	6.2
Frequency of ANC visit			
None	65.6	99.1	0.9
1 – 3 visits	10.3	94.1	5.9
≥4 visits	24.1	77.4	22.6

The extreme of ages (<20 years and >34 years) had the lowest proportion of women whose last delivery was conducted in a health facility accounting 5.7% and 4.1% respectively. Majority of the women are grand multi-para (47.5%) and had a birth interval between the last two deliveries of 24 - 48 months (57.9%). The highest proportion of institutional deliveries (12.8%) was recorded among women having their first delivery.

Table 2: Majority of the women belonged to Kanuri/Baribari, Hausa, and Fulani ethnic groups (57.7%), Muslims (99.1%), lacking any form of autonomy (90.4%)

and rural dwellers (73%). The proportion of institutional delivery is higher among urban dwellers (27.2%), Yoruba and Igbo ethnic groups (67%), Christians (50%) and among women having at least some form of autonomy (36.4%) compared to their respective counterparts.

Table 3: Majority of the respondents had no formal education (82.8%) and belonged to the poorest wealth quintile (52.4%), and only 4% and 1.3%, respectively of these women that have delivered in a health facility.

Table 4: Higher proportion of institutional delivery was observed among women living near a health facility (13.4%), availability of skilled health workers in the nearest health facility (63.2%) and those who reported to have received health talks during ANC visits.

Table 2. Socio-cultural characteristics of respondents

Independent variable	Proportion of sample (%)	Place of delivery (N = 659) Home (%)	Institutional (%)
Place of domicile			
Rural	73	96.5	3.5
Urban	27	84.8	15.2
Marital status			
Married	97.6	93.3	6.7
Divorced/separated	1.7	90.9	9.1
Widowed	0.8	100.0	0.0
Ethnicity			
Hausa	22.0	89.7	10.3
Yoruba	0.5	33.3	66.7
Igbo	0.2	0.0	100
Fulani	17.3	96.5	3.5
Kanuri/Baribari	16.4	98.1	1.9
Others	43.6	94.3	5.7
Religion			
Islam	99.1	93.5	6.5
Christianity	0.6	50.0	50.0
Tradition	0.3	100	0.0
Level of autonomy			
None	90.5	95.5	4.5
Some	16.9	88.0	12.9
Full	2.7	76.5	23.5

Table 3. Economic characteristics of respondents

Independent variable	Proportion of sample (%)	Place of delivery (N = 659) Home (%)	Institutional (%)
Family wealth índex			
Poorest	52.4	98.6	1.3
Poorer	25.0	92.7	7.3
Middle	13.4	93.2	6.8
Rich	7.7	68.6	31.4
Richest	1.5	50.0	50.0
Respondent highest education			
No formal education	82.8	96.0	4.0
Primary	10.2	89.6	10.4
Secondary	6.4	71.4	28.6
Higher	0.6	25.0	75.0
Husband highest education			
No formal education	73.7	96.7	3.3
Primary	7.3	91.7	8.3
Secondary	12.6	85.5	14.5
Higher	6.4	71.4	28.6

Table 4. Characteristics of respondents health system environment

Independent variable	Proportion of sample (%)	Place of delivery (N = 659) Home (%)	Institutional (%)
Distance s			
No	81.6	94.8	5.2
Yes	18.4	87.6	13.4
Have health insurance			
No	99.8	93.5	6.5
Yes	0.2	0.0	100.0
Availability of skilled health worker			
No	89.7	99.8	0.2
Yes	10.3	36.8	63.2
Received health talks during ANC			
No	8.7	90.9	9.1
Yes	91.3	73.3	26.7
Access to the media			
Never/rarely	80.3	94.3	5.7
Almost always	19.7	89.2	10.8

Table 5. Association between women's biological characteristics and place of delivery

Independent variable	Place of delivery (N = 659) Home n	Institutional n	Bivariate analysis: Pearson Chi Square	Multivariate Logistic Regression analysis: Unadjusted Odds Ratio	95% CI for unadjusted odds ratio Lower	Upper	P value for unadjusted odds ratio	Adjusted odds ratio	95% CI for adjusted odds ratio Lower	Upper	P value for adjusted odds ratio
Age in Years											
<20	89	5	$\chi2 = 3.274$	1.000				1.000			
20 – 34	364	32	df = 2	1.565	0.593	4.130	0.366	1.000	0.000		0.996
35 – 49	162	7	P = 0.195	0.769	0.237	2.494	0.662	0.000	0.000		0.995
Parity											
1	82	12	$\chi2 = 7.379$	1.000				1.000			
2 – 4	235	17	df = 2	0.494	0.226	1.079	0.077	0.768	0.177	3.335	0.725
5+	298	15	P = 0.025	0.344	0.155	0.764	0.009	1.833	0.384	8.738	0.447
Birth interval between the last two deliveries											
Less 24 Months	133	8	$\chi2 = 0.065$	1.000				1.000			
24 - 48 Months	309	18	df = 2	0.968	0.411	2.282	0.942	1.113	0.335	3.781	0.667
49+ Months	91	6	P = 0.968	1.096	0.368	3.265	0.869	1.037	0.336	4.137	0.084

Variables that have positive impact on the place of delivery include parity of ≥5 (AOR = 1.88; CI 0.38 – 8.73) (Table 5), Christians (AOR = 6.20; CI 3.24 – 8.41) (Table 6), living in urban areas (AOR = 2.03; CI 0.41 – 10.21) (Table 6), women having full autonomy (AOR = 7.06; CI 3.37 – 13.67) (Table 6), women belonging to the rich wealth quintile (AOR = 3.24; CI 0.23 – 45.71) (Table 7), women who had more than secondary level of education (AOR = 7.41) (Table 7), women whose husband had more than secondary level of education (AOR =12.06; CI 0.19 –

75.73)) (Table 7), distance to the nearest health facility (AOR = 6.31; CI 1.29 – 3.08) (Table 8), availably of skilled health workers (AOR = 3.31; CI 1.15 – 4.49) (Table 8), and access to the media as a source of information on MHS (AOR = 11.71) (Table 8).

Table 6. Association between women's sociocultural characteristics and place of delivery

Independent variable	Place of delivery (N = 659)		Multivariate Logistic Regression analysis							
	Home	Institutional	Bivariate analysis: Pearson Chi Square	Unadjusted Odds Ratio	95% CI for unadjusted odds ratio		P value for unadjusted odds ratio	Adjusted odds ratio	95% CI for adjusted odds ratio		P value for adjusted odds ratio
	N	n			Lower	Upper			Lower	Upper	
Place of domicile											
Rural	464	17	$\chi2 = 28.223$ df = 1 P = 0.000	1.000				1.000			
Urban	151	22		4.880	2.589	9.200	0.000	2.038	0.407	10.211	0.386
Ethnicity											
Hausa	130	15		1.000				1.000			
Yoruba	1	2		17.33	1.482	202.728	0.023	0.000	0.000		0.955
Igbo	0	1	$\chi2 = 40.733$ df = 5 P = 0.000	1.400	0.000		1.000	0.000	0.000		0.997
Fulani	110	4		0.315	0.102	0.977	0.046	0.000	0.000		0.999
Kanuri/Baribari	106	2		0.164	0.037	0.731	0.018				
Others	268	20		0.659	0.327	1.329	0.244				
Religion											
Islam	609	42	$\chi2 = 12.210$ df = 2 P = 0.002	1.000				1.000			
Christianity	2	2		14.500	1.993	105.520	0.008	6.205	3.243	8.412	0.643
Tradition	2	0		0.000	0.000	.	0.999	0.000			1.000
Level of autonomy											
None	489	26	$\chi2 = 14.832$ df = 2 P = 0.001	1.000				1.000			
Some	95	13		2.574	1.277	5.188	0.008	1.704	0.445	6.523	0.437
Full	13	4		5.787	1.764	18.985	0.004	7.068	3.379	13.670	0.190

Table 7. Association between women's socioeconomic and place of delivery

Independent variable	Place of delivery (N = 659)		Multivariate Logistic Regression analysis							
	Home	Institutional	Bivariate analysis: Pearson Chi Square	Unadjusted Odds Ratio	95% CI for unadjusted odds ratio		P value for unadjusted odds ratio	Adjusted odds ratio	95% CI for adjusted odds ratio		P value for adjusted odds ratio
	n	n			Lower	Upper			Lower	Upper	
Family wealth index											
Poorest	340	5		1.000				1.000			
Poorer	153	12	$\chi2 = 95.267$ df = 3 P = 0.000	5.333	1.847	15.403	0.002	0.909	0.123	6.741	0.926
Middle	82	6		4.976	1.482	15.703	0.009	0.578	0.050	6.644	0.660
Rich	35	16		31.086	10.740	89.972	0.000	3.249	0.231	45.714	0.382
Richest	5	5		86.000	14.844	311.502	0.000	1.342	0.029	62.689	0.881
Respondent highest edu.											
No formal education	524	22		1.000				1.000			
Primary	60	7	$\chi2 = 69.950$ df = 3 P = 0.000	2.779	1.139	6.777	0.025	0.160	0.020	1.300	0.086
Secondary	30	12		9.527	4.308	21.072	0.000	0.378	0.042	3.404	0.386
Higher	1	3		71.455	7.142	714.854	0.000	7.416	0.000		0.999
Husband highest education											
No formal education	469	6		1.000				1.000			
Primary	44	4	$\chi2 = 49.4$ df = 3 P = 0.000	2.665	0.854	8.319	0.843	1.000			
Secondary	71	12		4.954	2.251	10.905	0.000	1.232	0.099	15.314	0.997
Higher	30	12		11.725	5.090	27.001	0.000	12.066	0.194	75.738	0.990

The model contained six predictive variables (family wealth quintile, religious affiliation, highest educational attainment, availability of skilled health workers, and distance to health facility). These variables were selected based on the result of the bivariate Pearson Chi square test, binary logistic regression and or known theoretical facts. These variables were found to be statistically significant χ^2 (16, N=659) 227.774; P< 0.001, indicating that, the model was able to distinguish between participants who delivered at home and those who had delivered in a health facility. The variables accounted for 30.1% (Cox & Snell R Square) and 78.1% (Nagelkerke R Square) of variability among participants, correctly classified 71% of cases and together with Hosmer and Lemeshow goodness of fit test indicated the model being useful (p = 0.59) since the p-value is larger than the alpha level [21].

Table 8. Association between women's enabling factors and Place of delivery

Independent variable	Place of delivery (N = 659)		Bivariate analysis: Pearson Chi Square	Multivariate Logistic Regression analysis							
	Home	Institutional		Unadjusted Odds Ratio	95% CI for unadjusted odds ratio		P value for unadjusted odds ratio	Adjusted odds ratio	95% CI for adjusted odds ratio		P value for adjusted odds ratio
	n	n			Lower	Upper			Lower	Upper	
Distance											
No	508	28	$\chi2 = 8.303$ df = 1 P = 0.004	1.000				1.000			
Yes	106	15		2.567	1.325	4.973	0.005	6.318	1.294	30.847	0.023
Has health insurance policy											
No	615	43	$\chi2 = 13.999$ df = 1 P = 0.000	1.000							
Yes	0	1		2.311	0.000		1.000	1.001	0.911	1.561	0.0641
Availability of skilled health worker*											
No	590	1	$\chi2 = 3.893$ df = 1 P = 0.000	1.000				1.000			
Yes	25	43		1.015	134.267	7.670	0.000	3.311	1.153	4.490	0.000
Access to the media as source of health information											
Never/rarely	499	30	$\chi2 = 4.353$ df = 1 P = 0.037	1.000				1.000			
Almost always	116	14		2.007	1.032	3.907	0.040	11.714	0.000		0.999

* only among those who have attended ANC at least once=648.

4. Discussions

Yobe state has not been able to achieve the Millennium Development Goal 5 (MDG 5) as set in the state health strategic plan for 2010 – 2015 [8], because as of 2012, the state was reported to have an MMR of about 1100 per 100, 000 live births in 2012 [4]. However, while it is important to note that this figure is lower than what was recorded in 2008 (1,549 per 100, 000 live births), it is still higher than the national average of 820 per 100, 000 live births in 2012 [3].

In this study, the proportion of institutional delivery is 6.7% which is lower than the figures cited in the state health strategic plan for 2010 – 2015 [8] and five folds lower than the National average of 38% as reported by the WHO [5].Thus, the state seem to be under performing even within the North east geopolitical zone of Nigeria since the zonal average stands at 15.5% [2]. While several studies have reported ethnicity and religion as the fundamental reasons for the underutilization of Maternal Health Services (MHS), however, it must be pointed out that the state has very low number of skilled health workers with only 45 midwives in public facilities to handle more than the annual estimated half a million pregnancies [2,8]. Health facilities were largely lacking basic equipment's and consumables as contained in the state health strategic plan for 2010 – 2015 [2,8]. Moreover, states in the North east geopolitical zone were reported to be having the lowest number of health facilities and staffing which is compounded by maldistribution of health resources [9,22]. Furthermore, this weakness was recently reported by Lembani and his colleagues (2014), that the insurgence by terrorist Islamic fundamentalist (Boko Haram) in the past 10 years has further resulted in the destructions and closer of many health facilities, with many skilled health workers preferring to work in areas free from the activities of the terrorist group [22]. This reinforces the fact that, social and economic services (education, agriculture, commerce, security etc) are equally disrupted which affected geographical and economic accessibility and the utilization of modern health facilities as many has to live in internally displaced camps that could not adequately address the challenges of pregnancy and its related complications. Furthermore, the fact that the vast majority of the respondents were in the poor/poorest wealth quintile (77.4%); had no formal education (82.8%), living in rural areas (73%), has no health insurance (99.8%) and lack any autonomy (90.5%) in terms of ability to independently take decision on health issues, freedom to go out of their matrimonial homes without seeking permission and not gainfully employed will further present as geographical, economic and cultural barriers to utilization of MHS. This scenario has been similarly attributed as one of the major scenarios that affect the utilization of antenatal, natal and post-natal services in other parts of Nigeria [4,20,23,24,25] and other low income countries [26]. Although ethnicity and religion are plausible reasons for the lack of autonomy which may results in delays to take decision and reaching the hospital in good time, however, the 2008 DHS data is just quantitative and therefore does not provide insights as to what has transpired at home or on the way to health facility and therefore indicate the need for qualitative studies. Moreover, a study in southwestern Nigeria, among the Yoruba ethnic group who are largely Christians, has further indicated that the role of ethnicity and religion is inconsistent with our finding as intentional home deliveries that were conducted by unskilled health workers accounted for nearly 70% of all deliveries reviewed [27]. Reasons cited include nearness, lack of transportation, and cost indicating the root causes as factors of social exclusion and economic barriers rather than religion and or ethnicity. Overall, the present study and reasons cited

by the study in the south western Nigeria further reinforces the fact that optimal utilization of MHS depends on geographical and economic accessibility [27]. It further demonstrate the relevance of the WHO position that the "toxic combination of bad policies, economics, and politics is in large measure, responsible for the fact that a majority of people in the world do not enjoy the good health and that Primary health care, which integrates health in all of government's policies, is the best frame work for doing" [28]. Political will and commitment (policy development, implementation and monitoring) influences the distribution of resources and bear on individual, family and community members ability to have access (geographical, economic, and cultural) to qualitative health care services. Economic policies such as liberalization of trade, structural adjustment program, commercialization and privatization of public utilities and outright withdrawal of subsidies on key sectors of the economy (agriculture, education, water and health) resulted in higher unemployment and poverty, thereby affecting individual capacity to access health care services. For instance, studies in Nigeria reported that, there was a higher maternity utilization before the introduction of Structural Adjustment Programme in 1988, when health care was free or highly subsidized and a subsequent reversal when fees were introduced [29,30].

5. Limitations of the Study

Since the study design is cross sectional, it only provided insights on the factors associated with the use of delivery services and not causative agents. The DHS data used for the study does not contain information (qualitative data) on reasons for delays in decision making to seek for modern health services, delays to reach a functional health facility and delay in commencing appropriate services, which could have provided better understanding of the root causes of home deliveries.

6. Conclusions and Recommendations

The use of Maternal Health Services (MHS) is influenced by factors operating at individual, community and health system levels. Family wealth quintile, religious affiliation, highest educational attainment, availability of skilled health workers, and distance to health facility has shown to have positive impact on the use of institutional delivery services. Family wealth income, availability of skilled health worker and proximity to health facility demonstrated significant statistical association with the place of even after controlling for covariates like age, ethnicity, husbands education attainment, parity, religion and frequency of ANC visits.

There is the need to consider engaging other sectors like education in order to increase female literacy rate which in the long term will enhance women autonomy in decision making regarding their health, economic independence, improved health cultural capital and better access and utilization of MHS. In the short term government and partner agencies may consider redistributing health resources based on need. Furthermore, studies on the role of religion and ethnicity on the use of MHS and how based to engage traditional and religious leaders need to be conducted in order to develop local strategies to enhance female autonomy and use of MHS.

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None.

Competing Interest

The authors declare that they have no competing interests.

Authors' Contribution

The authors have both contributed in the design, analysis and writing of the article.

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