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Socioeconomic and geographical inequalities in births by caesarean section persist in the context of free maternal health care: Evidence from a cross-sectional survey of Southwestern and North Central, Nigeria

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Abstract

Background

User fee exemption for maternal and child health care service policy was introduced with a focus on providing free caesarean sections (CS) in Nigeria from 2011 to 2015. This policy had a positive impact on access to facility-based delivery, but its effect on socioeconomic and geographical inequality remains unclear. This study's main objective is to examine access to birth by CS in the context of free maternal health care. Specifically, the study examines socio-demographic and geographical inequality in access to birth by CS among women who gave birth between 2011 and 2015 under the free maternal health care policy using a population-based survey data obtained from two of the six main regions of the country.

Methods

Data were obtained from 1227 women who gave birth during the period the policy was in operation selected using cluster random sampling between May and August 2016. Adjusted and unadjusted binary logistic regression models were used to examine whether there is socio-demographic and geographical inequality in access to birth by caesarean section.

Results

The overall caesarean section rate of 6.1% was found but varied by income (14.1% in monthly income of over $150 versus 4.9% in income of $150 and below), education (11.8% in women with higher education versus 3.9% among women with secondary education and less) and place of residence (7.8% in urban areas versus 3.6% in rural areas). Women who earn a monthly income of $150 or less were 48% less likely to have a birth by CS compared to those who earn more. Compared to women who were educated to tertiary level, women who had secondary education or less were 54% less likely to have birth by caesarean section.

Conclusion

This study shows that inequality in access to CS persists despite the implementation of free maternal health care services. Given the poor access to facilities with capabilities to offer CS in most rural areas, free maternal healthcare policy is not enough to make birth by CS universally accessible to all pregnant women in Nigeria.

Keywords: Caesarean section, free maternal health care, inequality, Nigeria

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Background

Sub-Saharan Africa has a heavy burden of maternal deaths. Over 66% of all global maternal deaths occur in sub-Saharan despite accounting for less than 10% of the world's population[1]. Most maternal deaths are preventable with the use of quality obstetric care including caesarean section[2]. However, the cost of maternal health care services, distance, and sociocultural reasons, among other factors, precludes women from accessing care [3-11].

Caesarean section (CS) is a lifesaving intervention that should be available for all women [12]. However, the use of caesarean section is sub-optimal in sub-Saharan Africa, especially among women in the lowest wealth quintile [13-15]. Sandall et al. noted that CS is a medical intervention that is underutilised in some low-resource settings and over-utilised in many parts of the world[16]. While the rate of utilisation of CS is as high as 44.3% in Latin America and the Caribbean region, the Africa region has the lowest rate of utilisation at 4.1%[12]. The limited access to caesarean section is linked with an increase in maternal mortality and neonatal mortality [17,18]. According to Ronsmans et al., the caesarean section rate of less than one percent among women in the lowest wealth index in sub-Saharan Africa contributes about 80,000 maternal deaths per year[14].

Although many factors preclude women from accessing birth by CS[19], the unaffordability of this life-saving intervention is among the main reasons for the low demand of CS [14,20-23]. Free maternal health care was introduced in many sub-Saharan African countries[24,25] to combat this and make this intervention universally available. While a study shows that access to birth by CS slightly increased following the implementation of user fee removal in Senegal[26], geographical and socioeconomic inequalities in access to birth by CS persist after the introduction of user fee removal policy in Mali and Benin[25]. Given the mixed results on the state of inequality in access to CS in the context of user fee removal for maternal health in the literature, further studies are needed to examine this link further.

Nigeria has a heavy burden of maternal deaths. Nigeria alone accounts for 19% of global maternal deaths, thus, making the country one of the most dangerous places on earth for a woman to deliver a baby[1]. User fee removal for maternal and child health was introduced in the country under the subsidy re-investment programme of the federal government to address the poor maternal outcomes in Nigeria, beginning from 2011 to 2015. Besides this, each state also implemented a limited in scope free maternal health care intervention. However, there is a paucity of data on the prevalence of birth by caesarean section in the context of free maternal healthcare. In other words, the effect of free maternal health care on access to birth by CS remains unclear.

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What is more, we do not know how free maternal health care has impacted inequality in access to CS. This study's main objective is to examine access to birth by CS in the context of free maternal health care. Specifically, the study examines socio-demographic and geographical inequality in access to birth by CS among women who gave birth between 2011 and 2015 under the free maternal health care policy using a population-based survey data obtained from two of the six main regions of the country.

Methods

Study area and study design

The data analysed in this study was part of a more extensive study that evaluated the free maternal health programme in Nigeria. The study was a cross-sectional study in which data were obtained through a household survey conducted in two of the six main regions of Nigeria. The full details of the methodology are published elsewhere [24]. The two regions and states were purposively selected because of the uniqueness of their free maternal health care policy.

The Ondo state, Ekiti state and Nasarawa state government implemented free maternal and child health programme to complement the effort of the federal government. Universal free maternal and child health care was introduced in Ondo by the state government in 2010. The policy covers free caesarean section in government hospitals. Ondo state has the worst maternal outcomes of all the Southwestern Nigerian states. This made the state government implement maternal and child health programme known as the "Abiye initiative". Abiye means safe motherhood in the local language. However, the free maternal healthcare in Ekiti state was not universal. The policy was deliberately targeted at poor people who are most likely to seek care in primary health centres. Given this context, only the users of primary health care are covered in Ekiti State [24]. Women with delivery complications or those who require an emergency CS are referred to government hospitals for free care. Even though universal free maternal and child health care was introduced in Nasarawa state, the skewed distribution of health facilities in the state means the poor are the least likely to benefit [24]. Maternal health care utilisation is low in Nasarawa state, and access to health care is disproportionately skewed to urban areas.

Study population and sampling strategy

The study population are women within the reproductive (15-49 years) who gave birth within five years preceding the survey (2011-2015). The data were obtained from May to August 2016. A total of 1227 women were recruited from Ekiti and Ondo state in the southwestern

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region and Nasarawa state in the north central region. The sample size was determined using the sample size calculator at a confidence level of 95%, precision level of ±5%, a maximum variation of 50%, an infinite population and 10% adjustment for possible attrition. A sample of 409 participants is required to achieve representativeness and to be able to draw a valid conclusion in each state.

Participants were selected using a three-stage cluster random sampling method. The states were clustered into enumeration areas and stratified into rural, and urban areas. Simple random sampling was used to select enumeration areas from the list of EAs in the 2006 census. A total of 25 enumeration areas are needed per state to reach the sample size. In each EA, at least 15 to 30 women were interviewed with probability proportional to size per state. Given that new houses have emerged since the 2016 census, participants were recruited from every 10^{th} household in each enumeration area until the total sample of 1227 was reached. Households in which there were no women who met the inclusion criteria were skipped, and only one woman was selected in each household.

Data collection

The research assistants who were graduate students and understood the local languages were explicitly trained for the purpose of this study. The training involved ethical issues in research, especially the rights of the participants to privacy, respect, anonymity and confidentiality. Also, they were trained on the objectives of the study and how to administer the instrument. These trained research assistants administered the instrument to women who gave birth in the last five years preceding the survey. The questionnaire was piloted among 20 women in another state not included in the study. The feedbacks gotten from the pilot study helped rephrased ambiguous questions.

Measures

Dependent variable

The main outcome variable of this study is birth by caesarean section. Women who met the inclusion criteria and consented to participate in the study were asked whether their most recent childbirth was delivered by caesarean section or by vaginal birth.

Independent variable

The main independent variables of this study are education, income and place of residence. Participants were asked to state their highest level of education and their monthly income. Place

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of residence was categorised as urban and rural areas based on the population of the community and infrastructure located in the community. Age was measured as a continuous variable and later categorised into 15-35 years and 36-49 years.

Data analysis

The data obtained were captured into the Statistical Package for the Social Sciences (Version 24). Descriptive statistics were used to summarise the data. Mean and standard deviation was calculated for continuous variables, while simple frequency counts and percentages were estimated for categorical variables. Bivariate and multivariate logistics regression models were used to examine the socioeconomic and geographical inequality in access to birth by caesarean section. The bivariate model was estimated in order to examine the net effect of each independent variable on the outcome variable, while the multivariate logistic regression was used to examine the effects of user fee exemption policy on socio-economic and geographical inequalities in births by caesarean section while controlling for other covariates. The analyses were performed at a 95% confidence interval and only *p*-value <0.05 was considered to be statistically significant. Sampling weight was assigned at various levels of analysis to account for over and under sampling of some areas within the study settings.

Results

The mean age of study participants was 30.4 (SD=6.3) years. Most participants were Christians (76.9%), married (95.9%), own a mobile phone (89.1%) and watch television (91.6%).

Table 1: Socio-demographic characteristics of study participants

Variable	Frequency	Percent
States		
Ekiti	400	33.0
Ondo	402	33.1
Nasarawa	411	33.9
Place of residence		
Urban	384	31.7
Peri-urban	331	27.3
Rural	498	41.1
Level of education		
No schooling	93	7.7
Primary	207	17.1
Secondary	572	47.2
Higher education	339	28.0
Religion		
Christian	933	76.9
Islam	276	22.8
Traditional religion	4	0.3
Marital status		
Currently married	1163	95.9

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Formerly married	12	1.0
Never married	38	3.1
Own a mobile phone		
Yes	1080	89.1
No	132	10.9
Own a TV		
Yes	1111	91.6
No	102	8.4
Own a Bank Account		
Yes	602	49.6
No	611	50.4
Access to Internet		
Yes	338	27.9
No	875	72.1
Parity		
1	290	23.9
2	293	24.2
3	292	24.1
4	203	16.7
5-13	150	11.1

Prevalence and correlates of birth by caesarean section among childbearing women

As shown in Figure 1, the prevalence of caesarean births was 6.1%. The prevalence of caesarean section was highest among older women (aged 36 years and over) (8.1%), women residing in Nasarawa State (7.5%), urban residents (7.8%), women who earned over 20,000 naira (14.1%) and women who had higher education (11.8%) (Table 2).

Table 2: Association between demographic factors and caesarean section among childbearing women

Variables	Caesarean birth	Vaginal birth	P-value
Age			
15-25 years	15 (4.9)	292 (95.1)	0.257
26-35 years	38 (5.9)	609 (94.1)	
36-49 years	21 (8.1)	237 (91.9)	
State			
Ekiti	17 (4.3)	383 (95.8)	0.136
Ondo	26 (6.5)	375 (93.5)	
Nasarawa	31 (7.5)	380 (92.5)	
Place of residence			
Urban	56 (7.8)	659 (92.2)	0.002
Rural	18 (3.6)	479 (96.4)	
Level of education			
No schooling	0 (0.0)	93 (100.0)	<0.001
Primary	10 (4.8)	197 (95.2)	
Secondary	24 (4.2)	413 (95.8)	
Higher education	40 (11.8)	226 (88.2)	
Religion			
Christian	64 (6.9)	631 (94.2)	0.128
Islam	10 (3.6)	127 (96.9)	

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Traditional	0 (0.0)	4 (100.0)	
Marital status			
Currently married	73 (6.3)	1089 (93.7)	0.440
Formerly married	0 (0.0)	12 (100.0)	
Never married	1 (2.6)	37(97.4)	
Monthly Income			
No income - 20,000 Naira	52 (4.9)	10004 (95.1)	<0.001
Above 20,000	22 (14.1)	134 (85.9)	
Parity			
1	24 (8.3)	265 (91.7)	0.002
2	26 (8.9)	267 (91.1)	
3-13	24 (3.8)	606 (96.2)	

Multivariate analysis

The results of the unadjusted and adjusted regression are presented in Table 3. Rural residence, secondary education level and below, and monthly income below 20,000 were independently associated with a lower likelihood of having a caesarean birth. While parity of one and two children was associated with a higher likelihood of having birth by CS. Women who had one or two children were over twice more likely to have a caesarean section birth compared to women who had three or more children. Younger women (age 15-35 years) were 52% less likely to have a birth by caesarean section.

Rural place of residence was significantly associated with lower odds of birth by CS in the unadjusted model. While the relationship was no longer significant in the adjusted model, the direction of the effect remains. Younger age was associated with a lower likelihood of birth by CS, and the association reached a significant level in the adjusted model.

Secondary education and below was significantly associated with lower odds of having a CS birth and the magnitude and direction of effect persist even in the adjusted model. Compared to women who were educated to tertiary level, women who had secondary education or less were 54% less likely to have birth by caesarean section.

Monthly income of 20,000 Naira and below was associated with a lower likelihood of having a CS birth. The magnitude and direction of the effect remain in the adjusted model. Women who earn a monthly income of 20,000 naira or less were 48% less likely to have a birth by CS compared to those who make more.

Table 3: Binary logistic regression showing determinants of caesarean section among childbearing women in the context of free maternal healthcare

Variables	UOR	AOR
Age		
15-35 years	0.66 (0.39-1.12)	0.48 (0.26-0.88)*

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36-49 years (ref)	1	1
Place of residence		
Rural (ref)	0.44 (0.26-0.76)*	0.71 (0.40-1.26)
Urban	1	1
Education level		
Secondary education and below	0.30 (0.19-0.49)***	0.46 (0.27-0.78)*
Higher education (ref)	1	1
Income level		
20,000 Naira and less	0.32 (0.19-0.54)***	0.52 (0.29-0.94)*
Above 20,000 Naira (ref)	1	1
Parity		
1	2.29 (1.28-4.10)*	2.71 (1.40-5.25)*
2	2.46 (1.39-4.36)*	2.54 (1.36-4.72)*
3-13	1	1

****P*-value less than 0.001, **P*-value less than 0.05, ref-reference, UOR-unadjusted logistic regression, AOR-adjusted logistic regression

Discussion

Free maternal healthcare was introduced in Ekiti state, Ondo state and Nasarawa state to provide universal access to life-saving intervention for pregnant women. This study examines the prevalence of CS and inequality in access to birth by CS in the context of free maternal health care in these states. The study found a CS prevalence rate of 6.1% (4.3% in Ekiti state, 5.9% in Ondo state and 7.5% in Nasarawa state). Despite the implementation of user fee removal policy, the prevalence of CS found in the study settings is well below the WHO's 10%-15% acceptable rate of CS [27]. However, the rate of CS among women with higher education and those whose monthly income is above 20,000 Naira (150 dollars) is within the CS rate recommended by WHO [27]. The CS rate of over 15% is said to have no health benefit while a CS rate of less than 10% could be detrimental to the health of women [28].

Despite the removal of user fee for maternal health in the study setting, women in the poorest stratum still had unequal access to lifesaving intervention such as CS. This is evidenced by the finding of this study, which shows that women whose monthly income is below $150 and below were less likely to give birth by CS compared to those who earn more. This finding is consistent with a study conducted in Mali and Benin, which revealed geographical and income inequality in access to birth by CS despite the introduction of free maternal health care [25]. Also, a study conducted in Morocco showed that women who gave birth by CS paid more than women who did not despite free maternal health care policy [29]. It is possible that the rate of CS may have slightly increased as a result of the free maternal health care policy, although not a finding of this study but based on findings of a previous study [26]. Nonetheless, our findings

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unequivocally show that inequality in access to CS persists despite free maternal health care policy.

Besides income, educational level and place of residence were other proxy measures of inequality in access to CS in this study. We observed a significantly lower access to CS among women who resided in rural areas; thus, indicating that geographical inequality in access to birth by CS persists. A previous study conducted in a south-eastern Nigeria state revealed geographical inequality in access to birth by CS [30]. Residing in rural areas presents a serious challenge to accessing birth by CS given the capacity of the available facilities and their staff. In many rural areas, pregnant women may have to be referred to an urban centre due to lack of capacity in local clinics. This problem is further exacerbated by the lack of ambulance in rural clinics in the study settings [31]. The lack of ability to perform CS in most rural areas and unavailability of ambulance means that women residing in rural areas would experience delay in accessing CS, a live-saving intervention they urgently need. Such delays lead to maternal morbidity and mortality and probably explain why maternal deaths are far too common in the country.

The analysis also reveals significant lower access to CS among women with lower levels of education. Level of education is an important measure of inequality. A study had shown that less educated women are more likely to refuse CS even when medically indicated, this according to the study is as a result of concerns about the cost and perceived threat to life during the surgery[19]. The fear of danger to life during CS is real, given the high number of deaths and complications recorded during CS in sub-Saharan Africa [32]. Maternal deaths following CS in low and middle-income countries are 100 times higher than in high-income countries [32]. However, it is vital to educate women about the safety of CS to improve uptake of the service when indicated. While free maternal healthcare addresses the financial barrier hindering access to maternal health care services, it does not address the geographical and knowledge barriers.

Implications for policy and practice

Providing universal access to CS is an important policy and will save many pregnant women's life. However, this policy alone is not enough to eliminate inequality in access to birth by CS. It is important to improve the capacity of health care providers in delivering this lifesaving intervention given the robust evidence indicating that many clinicians in the study setting are

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not adequately trained to provide the service[32]. Improving the quality of CS services will inspire confidence in pregnant women who otherwise may attribute the pronouncement of CS with death and complications [19].

Caesarean section birth is currently underutilised in rural areas in the study settings despite the implementation of free maternal health care. To improve utilisation of birth by CS among women who reside in rural areas, increasing access to skilled healthcare providers who can identify the need and perform this life-saving intervention is needed.

Limitations

While this study provides important data on the state of CS in the context of free maternal health care policy, it is not without limitations. This study did not establish the reason a woman had a CS or prior use of CS. It is possible that women with higher education and those with a monthly income of over $150 could have opted for elective CS.

Conclusion

This study shows that inequality in access to CS persists despite the implementation of free maternal health care services. Given the poor access to facilities with capabilities to offer CS in most rural areas, free maternal healthcare policy is not enough to make birth by CS universally accessible to all pregnant women in Nigeria.

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and towns the study was conducted. All participants signed the consent form to indicate their voluntary participation in the research. The rights of participants to confidentiality, anonymity, respect and privacy were ensured during data collection, data analysis and dissemination of the findings.

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