

Impact of Mothers Level of Education on Caesarean Deliveries in Ghana

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Abstract: *The role of education in the development of a nation is widely emphasised by many countries especially Ghana. Women are now four times more likely to have caesarean birth than 30 years ago. Caesarean section (CS) is a life saving procedure in cases of obstructed labour, maternal distress and fetal distress. Many countries have high rates of caesarean sections which exceeded the World Health Organization (WHO) recommended 5% -15%, thus putting a lot of burden on the health expenditures of government. The study utilized the Ghana Demographic Health Survey (GDHS) -2013 data set. The logistic model was used in the analysis of the data due to the outcome variables which are bi- nary. Interestingly, mother's level of education is also positively associated with caesarean delivery. Also, it was observed that highly educated mothers prefer caesarean delivery with odds ratio of about 1.24 times. The study recommends that government policies on education should ensure compulsory attainment of higher level of education among the citizenry, more especially the girl child. Furthermore, sensitization of the economic cost and burden of unnecessary (non-clinical) caesarean deliveries should be intensified. caesarean section, Logistics, delivery, education.*

Keywords: caesarean section, Logistics, delivery, education

1. Introduction

Childbirth, also known, as delivery is the culmination of a period of pregnancy, with the expulsion of one or more newborn infants from a woman uterus. Every year about 500, 000 women die due to pregnancy and childbirth, 7 million have serious long-term complications and 50 million have negative outcomes following delivery. Most of these issues occur in the developing world. Before the 20th century and in some countries to the present day childbirth has more typically occurred at home. Childbirth routinely occurs in hospitals in much of western societies (Ong et al., 2003)

Childbirth is either normal delivery mode or Caesarian section, which is due to complications that may arise during pregnancy. A cesarean section, or C-section, is the delivery of a baby through a surgical incision in the mother's abdomen and uterus. Most often, the need for a caesarean delivery is not determined until after labor begins. Once a woman has had a cesarean delivery, future deliveries are often also done by cesarean. That's because surgery done on the uterus increases the risk of it rupturing during a future vaginal delivery. Caesarean section is due to many reasons, ranging from dire emergency to planned choice. Before modern obstetrics caesarean births represents births that are often resulted in tragedy, (Cheng, 2011). According to (Mussarat, Qurashi, and Roohi, 2013) , women are now four times more likely to have caesarean birth than 30 years ago. So many factors contribute to this observation. Many programmes have been developed to reduce the rate of caesarean delivery.

In recent times it is very rare for a mother or baby to die from the birth process (Arba, Darebo, and Koyira, 2016). Modern techniques for surgical births save lives; caesarean section is a modern remedy and lately caesarean

delivery (CD) rates are rising in many parts of the world (Lakew, Tachbele, and Gelibo, 2015). In recent years some women have expressed the wish to have their babies by caesarean section even though there is no compelling medical reason- (C-section on demand or request). Some advance the argument that caesarean delivery is an indicator for availability of and accessibility to maternal health care services (Exavery et al., 2014). The premise is that surgical interventions such as caesarean delivery are key to avoid maternal mortality and morbidity due to pregnancy complications. Caesarean section is a life saving procedure in cases of obstructed labor, eclampsia and intractable hemorrhage.

The most common indications for cesarean section are previous caesarean de- livery, dystocia (non-progressive labour), malpresentation including breech, and non-reassuring fetal heart rate/fetal distress. In some situations, a c-section is necessary for the well-being of the mother, the baby, or both Sometimes it's clear that a woman will need a cesarean even before she goes into labor. Caesarean section is key to preventing the estimated 287 000 maternal and 2.9 million neonatal deaths that occur worldwide every year(United Nations, 2013)

Since caesarean delivery is not without imposed risk to the parturient and the neonate, the question remains, why has the annual incidence rate of caesarean increased by more than 50 percent since 1996 as reported by (United Nations, 2015; WHO UNICEF UNFPA, 2014; United Nations, 2013). A number of hypotheses exist regarding the dra- matic increase in caesarean over the past decade. First, the demographics of the pregnant women have changed such that delayed childbearing is associated with complications of pregnancy such as hypertension, diabetes mellitus, placenta abruption, and placenta pre- via and as well as preterm births. All of these are factors associated

with increased risk of caesarean delivery (Cheng, 2011). Caesarean delivery (CD) rates are rising in many parts of the world, especially in middle- and high-income countries. Caesarean delivery has become the most common major surgical procedure in many parts of the world, with approximately 18.5 million Caesarean deliveries performed annually (Caulfield et al., 2016). Caesarean section on demand is on the ascendency. Approximately about 50% of countries have Caesarean Section rates greater than 15%, which is above the optimal arguably the procedure is over used, (WHO, 2002).

Mothers with very little education tend to have very little information about certain health services available such as caesarean sections. As a result they keep a lot of information about their health to themselves even if they are suffering (Ganle et al., 2014b; Ganle et al., 2014a). However, some women rather abuse the services even if it was not needed at a particular period (Ganle, 2015a; Ganle et al., 2016). According to a study with the latest data from 150 countries, currently 18.6% of all births occur by caesarean section, ranging from 6% to 27.2% in the least and most developed regions, respectively with an increase in Africa by 4.5% from 2.9% to 7.4% (Betrán et al., 2016).

1.1 General Objectives

To describe the prevalence and influence of education on births by caesarean section in Ghana

2. Literature Review

Primary caesarean section among women in the USA is rapidly increasing irrespective of the race and age for past years (Menacker, Declercq, and Macdorman, 2006) It is believed that there was an increase in the caesarean delivery that was either associated to mild or no clinical indications (Qin et al., 2012). Although, Caesarean procedure was common among wealthy and well-educated women it varies among socioeconomic groups, (Feng et al., 2010; Feng, Xu, and Ronsmans, 2011). According to a study by Béhague, Victora, and Barros, 2002 in Brazil, women from families with higher level of incomes and more years of education prefer caesarean sections more often. Caesarean delivery (CD) rates are on the increase especially in middle-income and high-income countries and may be driven by non-clinical factors and therefore call for the examination of clinical conditions related to inappropriate caesarean delivery, (Stivanello et al., 2014). Caesarean delivery rates do not show an additional benefit for the mother or the baby, and some studies have reported that high caesarean delivery rates might be linked to negative consequences for maternal and child health (Tappis et al., 2016). In addition, reasons for the increase in caesarean birth are multifactorial and include the increasing number of women with prior caesarean delivery, the increase in multifetal gestations etc and approximately 18.5 million caesarean deliveries performed annually (Sialubanje et al., 2015; Vidler et al., 2016).

In contrast, others have emphasized health system factors, arguing that the rise in demand for caesarean section is largely stimulated by health-care providers and results from

perverse financial incentives that encourage costly procedures (Tadele and Lamaro, 2017). Total expenditure on caesarean section has certainly risen dramatically and the procedure may have become an important source of revenue for hospitals and health-care providers. Education improves health, while health improves learning potential. Education and health complement enhance and support each other; together they serve as the foundation for a better world (Kyei-Nimakoh, Carolan-Olah, and McCann, 2016).

Caesarean delivery initially was very scarce in Ghana years back, however studies reveal an increase in Caesarean procedures to be on the rise. Interestingly in Ghana the rate of Caesarean Section (CS) is 6.9% (Amoakoh-Coleman et al., 2015). The estimated cost per year for caesarean section is \$3, 190, 301 for an estimated number of 23, 967 with a percentage of 0.7% (World Health Organization, 2016). This has been on the ascendency since 2008 and therefore with this observation, much attention must be given to the rate of caesarean section which therefore informs the need for this research study.

2.1 Data and Source

In this study, we use the Ghana Demographic and Health Survey (DHS) data collected by the Ghana Statistical Service (GSS). This nationally representative dataset is collected every five years on health and population. We specifically use the 2014 dataset which includes data on Household and women (15-49 years). The study has over 9, 000 observations.

2.2 Variables

The main outcome variables of this study is whether a woman delivered through Normal process (Vaginal Delivery) or caesarean section. The independent variables are mother's age group, household income levels, geographical location (regional and residential location), total number of children ever had. Again, facility delivered, antenatal visits, religious practices or affiliation of women, access to media (household has and listen to radio and household owns and watch television) and National Health Insurance (NHIS) status and weight are other variables that we control in the study. The main explanatory variable is the educational level or attainment of the mother. Table 1 shows the definition of all the variables.

2.3 Definition and description of variables

The definition of all the variables from the pooled data is shown in Table 1. Some of the explanatory variables are categorical, while dummies were created for others with one (1) equals to value of interest and zero otherwise.

Table 1: Description of variables for the analysis

<i>Variable</i>	<i>Definition/Description</i>
Caesarean Delivery	Dummy equals 1 delivered through caesarean section, 0 otherwise
Antenatal Visit	ANC is define as care for pregnant or expectant mothers in a health facility before delivery and therefore the number of visits is noted with 0- 3 visits considered as no visit and 4 or more visit

	considered as required by the World Health Organization(WHO)
Postnatal care	is the care given after after delivery and dummy equal 1 if attended postnatal care and 0 otherwise
Place of delivery	Dummy equals 1 if woman gave birth in a health facility, 0 otherwise.
Educational Level	Which is the educational attainment of woman, none is lowest and secondary/higher is the highest level
Age of Mother	Age of mother which describes the age in years of the mother and grouped as less than 20, 20-34 and 35 or more
Occupation	Women engaged in economic activity for income; dummy equals 1 if working and 0 otherwise
Wealth	Describes the wealth level of the household of woman and it ranges from poorest to richest according to the wealth index.
Total Number of Children	Which is the number of viable children a woman has, and it ranges from 0 as the lowest to 4 or more as the highest
NHIS	Dummy equals 1 if woman has and uses the NHIS, 0 otherwise
Private Facility	Dummy equals 1 if woman gave birth in a private health facility, 0 otherwise.
Residence	It describes the residential location of woman which is either rural or urban
Region	Describes the geographical location of woman, Ghana has ten administrative geographical regions.
Religion	It describes the religious affiliation or religious practice of the mother or woman
Radio	Dummy equals 1 if household has radio and woman listen to radio as well, 0 otherwise
Television	Dummy equals 1 if household has Television and woman watches Television as well, 0 otherwise

with no education constituted about 24.28%, those who had primary level of education is about 18.59% and a little above 37% had middle/JHS/JSS levels of education and mothers with secondary/higher education constitute about 19.58%. Though encouraging but more is needed to improve the literacy rates of the girl child. Moreover out of about 4, 294 respondents on the antenatal variable, about 86.05% attended the required number of antenatal visits as recommended by the world health organization (WHO) and 13.95% not achieving the required visits.

Postnatal care which is one of the important healthcare services for the welfare of children (Mohan et al., 2015) was considered for this study. About 83.99 % of the mothers attended postnatal clinic. This is expected due to the number that attended the ANC required visits; it may have some direct relationship. Furthermore as defined, the fertility age range of women is 15-49 years. About 18.69% are less than 20 in this study; while 47.66%, 33.65% represent 20–34 and 35 or more year groups respectively. Occupation plays a vital role in the life of women both economically and socially, Schultz,

Table 3: Summary Statistics of Explanatory Variables
Variable frequency Percentage (%) Explanatory variables

Variables	Frequency	Percentage (%)
Explanatory variables		
Educational Level		
None	2, 281	24.28
Primary	1, 747	18.59
Middle/JHS/JSS	3, 528	37.55
Secondary/Higher	1840	19.58
Maternal care Service		
Antenatal required visits	3, 694	86.05
Postnatal care	3, 607	83.99
Age of Mother		
less than 20	1, 756	18.69
20-34	4, 478	47.66
35 or more	3, 162	33.65
Occupation [working]		
	7, 020	74.83
Wealth		
Poorest	2, 335	24.85
Poorer	1, 758	18.72
Middle	1, 902	20.24
Richer	1, 771	18.85
Richest 1, 629 17.34		
Total No. of Children		
0	2, 885	30.7
1	1, 303	13.87
2-3	2, 316	24.74
4 or more	2, 883	30.68
NHIS[yes]		
	6, 197	65.95
Residence		
Urban	4, 602	48.98
Rural	4, 794	51.02
Region		
Western 1, 027 10.93		
Central	940	10.01
Greater Accra	999	10.63
Volta	795	8.46
Eastern	907	9.65
Ashanti	1, 040	11.07
Brong Ahanfo	1, 004	10.69
Northern	1, 042	11.09
Upper East	914	9.73

3. Preliminary Results

Tables 2 and 3 shows the summary statistics for the pooled data. An average of about 80 percent of women gave birth through the normal process from an observation of 9396 available data. The various variables of interest to this study was considered and presented in Table 3.

Table 2: Summary Statistics of Outcome Variable

Variable	frequency	Percentage (%)
Outcome variables		
Caeserean Delivery (CS)	488	11.36
Normal Delivery	8, 328	88.64

3.1 Dependent Variable

The results revealed about 11.36% of the respondents delivered through the caeserean section. This percentage is approaching the WHO recommended value of 15% and considering the fact that, the data has a higher rural respondents the study expected a lower rate of caeserean deliveries. About 88.64% delivered through the normal process.

3.2 Explanatory Variables

The study with reference to Table 4 also found, mothers

Upper West	726	7.73
Religion		
Christianity	7,170	76.31
Islamic	1,726	18.37
Traditional/Other	500	5.32
Access To Media		
Radio[yes]	6,179	65.76
Television[yes]	5167	54.99
Private Facility		
No	2,810	90.47
Yes	296	9.53
Antenatal Visits		
0	131	3.05
1	54	1.26
2	115	2.68
3	277	6.45
4+	3,258	75.87

1997. Mothers who were involved in income generating ventures or engaged in economic activities were found to be about 74.83% out of a population of 9,381. Most mothers in economic or income generating activities sometimes utilize maternal care depending on available times. Also the wealth index of household has an influence in the utilization of healthcare by mothers or women. The poorest category constitutes about 24.85% out of 9,396. Households in the categories of poorer, middle, richer and richest have 18.72%, 20.24%, 18.85% and 17.34% respectively.

The number of children of a woman has an influence in most health decisions she may undertake, especially on antenatal care, postnatal care and delivery type and sometimes birth control practices, (Osili and Long, 2008; Schultz, 1973). Mothers with no child constitute about 30.70% in our data. Also mother with 1, 2-3 and 4 or more children constitute about 13.87%, 24.74% and 30.68% respectively. The respondents in the data who are registered members of the National Health Insurance scheme and uses that during visits to health facilities are about 65.95% out of the 9,396.

Residential location of the respondents exposes them to various services and practices, women from the urban area is made up of about 48.98% and rural dwellers is about 51.02% about of 9,396 respondents as shown in Table 4.

The political and administrative location of the respondents in this study includes the ten regions of Ghana. The study found Western, Central, Greater Accra and Brong Ahafo regions has about 10% each of respondents out of 9,396. Also, Volta, Upper East, and Upper West regions had less than 10% respondents and Ashanti and Northern regions are represented with about 11% each.

As expected Christianity was over 76 %, while 18.37% and 5% represent Islamic religion affiliates and Traditional/ others religions respectively among respondents as shown in Table 4. Religion plays a major impact on the lives of people, especially mothers and their health seeking behaviour, (Ganle, 2015b). Both radio and television are binary variables which describes household ownership and utilization of that by the respondent. About 65% had radio in their households and also listen to radio at least once a week, but about 35% do not have access to radio.

Also, respondents whose households has television and at the same time views television at least once a week is 54.99%. Nearly 46% of this mothers do not have and equally cannot have access to television in their homes. Interestingly, about 90% of respondents delivered in a government health facility, the remainder represent private health facility delivering among the respondents. The government facility could be a Teaching hospital, regional hospital, district hospital, health post and or clinic. These facilities are classified as Tertiary, Secondary and primary healthcare delivery centers respectively.

Antenatal visits, this represent the number of times an expectant mother seeks care for self which ranges from 0 to 4+ (more than 4), Table 4 revealed about 3% had no visit, those with 1 visit are 1%, 2 visits 2.6%, 3 visits is about 6.4%, 4 visits is about 10.69% and over 75% had 4+ visits.

Table 4: Statistics of Caeserean Delivery and Educational Level of Mothers

Caeserean Delivery	Educational level				Total
	None	Primary	Middle/JSS/JHS	Secondary/Higher	
No (0)	1,333	795	1,258	420	3,806
Percentage (%)	93.94	91.48	85.93	77.49	88.64
Yes (1)	86	74	206	122	488
Percentage (%)	6.06	8.52	14.07	22.51	11.36
Total	1,419	869	1,464	542	4,294
Percentage (%)	100.00	100.00	100.00	100.00	100.00

A summary of Caeserean delivery among the mothers level of education with reference to Table 5, revealed that about 6.06 % of the women who had no education also had caeserean deliveries. While those who had caeserean deliveries and primary level of education were 8.52%, 14.07% of mothers with Middle/JHS/JSS also gave birth through CS. Also, 22.51% of the mothers with secondary/ Higher education had CS in their past but immediate delivery.

3.3 Logistic Model

Logistic fits a logistic regression model of dependent variable on independent variables, where dependent variable is a 0/1 variable (or, more precisely, a 0/non — 0 variable), (Spitznagel, 2007; Gurka and Edwards, 2007). Logistic displays estimates as odds ratios; to view coefficients, one must use logit after running logistic (Peterson, Cameron, and Trivedi, 1999; Wooldridge, 2002). The logistic regression model specifies

$$p = \Lambda(x^T \beta) = \frac{e^{x^T \beta}}{1 + e^{x^T \beta}} \quad (1)$$

where $\Lambda(\cdot)$ is the logistic cumulative distribution function where by, Equation 1, can be transformed as

$$\frac{p}{1-p} = e^{x^T \beta} \quad (2)$$

Here the left handside of Equation 2 (ie $p/(1 - p)$) measures the probability that $y = 1$ relative to the probability that $y = 0$ and is called the odds ratio or relative risk. Statistical Software packages use the equality in

2. Suppose the *j*th regressor increases by one unit. Then $e^{x'\beta}$ increases to $e^{x'\beta+\beta_j} = e^{x'\beta} * e^{\beta_j}$. It follows from equation 2 that the odds ratio has increased by a multiple (e^{β_j})

3.4 Regression Models

The linear regression model below utilizes intuitions of Equation 2 given us the results of the study. In this study we apply Stata 14.2 to analysis equations 3 using the intuition of equation 2.

$$CS = \beta_0 + \beta_1 edulevel + \beta_2 Age + \beta_3 Occ + \beta_4 Wealth + \beta_5 TotChild + \beta_6 NHIS + \beta_7 Res + \beta_8 Reg + \beta_9 Reli + \beta_{10} AccMedia + \beta_{11} ancvisits + \beta_{12} PrivFac + E \quad (3)$$

With reference to Table 6, the results for caeserean section using equation 3, also gave varied results. Interestingly, reveals mothers with Primary level has odds of 0.99 of giving birth through caeserean section. Also, secondary/Higher level educated mothers have odds of 1.25 times of having caeserean section during delivery. It is observed that educated mothers may prefer caeserean delivery and the higher the level of education the higher the magnitude using no level of education as the base variable. Furthermore, it showed that mothers' with age between 20-34 years has odds of about 2.301 times of given birth through caeserean section, while mothers between the ages of 35 or more years also have odds of 5.5431 times of giving birth through the caeserean section and they are found to be significant.

Table 5: Results for the Analysis of Caeserean Delivery

Variables	Caeserean De	SE
Educational Level	[None]	
Primary	0.9944	-0.1804
Middle/JHS/JSS	1.0956	-0.182
Secondary/Higher	1.2499	-0.248
Age of Mother[less than 20]		
20-34	2.3201 **	-0.8156
35 or more	5.5431***	-2.0775
Occupation (working)	1.0199	-0.1438
Wealth [Poorest]		
Poorer	0.9301	-0.1962
Middle	1.1871	-0.2739
Richer	1.394	-0.3737
Richest	2.1613 ***	-0.6457
Total no children[0]		
1		
2-3	0.5911***	-0.0783
4 or more	0.3973***	-0.0681
NHIS(yes)	1.137	-0.1365
Residence(Rural)	0.997	-0.1438
Region [Western]		
Central	1.0077	-0.2133
Greater Accral	0.9554	-0.1978
Volta	0.7271	-0.1807
Eastern	0.964	-0.216
Ashanti	0.9907	-0.2006
Brong Ahafo	0.7489	-0.1634
Northern	0.5767*	-0.1641
Upper East	0.5096***	-0.1356

Upper West	0.5177**	-0.1466
Religion[christianity]		
Islamic	1.1717	-0.1784
Traditional/Other	1.3838	-0.3816
Access To Media		
Radio(yes)	1.2623*	-0.1547
Television(yes)	0.8146	-0.1247
Private Facility (yes)	0.7504	-0.1312
Antenatal no of Times[0]		
1	0.5518	-0.687
2	0.443	-0.3895
3	0.53	-0.3725
4	0.7703	-0.5127
R-squared	0.0661	
Observations	3, 100	

Standard errors in parentheses (), base or reference variables in square brackets [].
 *** p<0.01, ** p<0.05, * p<0.1

Also, regression model revealed that working mothers has odds of 1.0199 times delivery through caeserean section though the results is not statistically significant. Furthermore mothers from richest households have the odds of 2.1613 times of giving birth through caeserean section and is statistically significant. Also, the odds ratio decreases as the mothers' number of children increases. It revealed that mothers with 2-3 and 4 or more children have odds of 0.5911 and 0.3973 times of giving birth through the caeserean section respectively and statistically significant. As expected mothers' with the NHIS are positively associated with caeserean delivery, also it showed the NHIS holders have odds of 1.1370 times of delivery through caeserean section. The NHIS members enjoy a pack- age within the scheme described as free maternal healthcare (FMHC) which practically gives them a fee-free service.

In addition, rural dwellers have odds of 0.9970 times of giving birth through the caeserean section. This results on the rural residents could practically be an issue of inadequate availability of services since there is a gap between urban and rural dwellers in accessing healthcare services in Ghana. Also, geographical location in terms of regional levels and using the Western region as base a variable showed the odds of 0.5767, 0.5096 and 0.5177 times representing Northern, Upper East and Upper West respectively. The results is statistically significant for the regions as mentioned.

Mothers affiliated to Islamic and Traditional/Other religions respectively have odds of 1.1717 and 1.3838 times of given birth through the caeserean section. However, the study revealed varied relationships for mothers who had access to the media. Mothers with access to radio in their households has odds of 1.2623 times of undergoing caeserean section, this results is statistically significant. Surprisingly, mothers who attended Private health facility have odds of 0.7504 times of delivery through the caeserean section though not significant. Again, it is recommended that expectant mothers are to have 4 ANC visits but can have more if complications and other medical conditions are observed. The odds of 0.5518, 0.4430, 0.5300, 0.7703 and 0.8560 times for mothers who visited ANC for 1, 2, 3, 4 and 4+, respectively. This result practically gives a strong indication of the importants of maternal healthcare

services and the need to direct more efforts in increasing access to this programmes.

4. Conclusion

This analysis is motivated by several observational studies that identified education as a key contributor to the rise in caesarean delivery rates. This investigation is based on cross sectional data from Ghana Demographic and Health Survey 2013 data, which contains information on the delivery types and health seeking and utilization of maternal health by mothers or women. The study took into account the educational level and other socio-economic and demographic characteristics for a sample of women between the ages of 15 and 49 years. The study found a positive relationship between the mother's level of education and caesarean deliveries. Mothers with Higher educational level (ie Sec- onadry/higher) has a higher magnitude as compared to Primary and Middle/JHS/JSS, while using no education level as the base variable. However, the results is not sta- tistically significant at 1%, 5% and 10% confidence level as expected. Also, mothers age and those with radio in their household are significantly and positively associated with caesarean deliveries with odds ratio of magnitudes higher than 1. The increase in rates of caesarean delivery at the institutional (facility) level is not associated with any clear reason in this study it maybe linked with increased morbidity by expectant mother. There is an urgent need to provide women and care providers with information on the potential individual risks and benefits associated with caesarean delivery. High caesarean rates, with its related declining clinical rates, are resulting in rapid increase in the cost and government expenditure on health in Ghana.

5. Recommendation

Also, some caesarean deliveries appear to be related to a range of social, cultural, economic and legal factors, including women's demand, without a clear clinical indication. As the current increase in cesarean delivery has great impact on maternal and child health, there are also social and economic effects associated with rise in cesareans that are not yet well understood, advanced maternal age is an area where health professionals should give more education and guidance during health visits and outreaches since maternal age is also a risk factor to caeseraen deliveries. If effective ANC is sought, the resulting awareness of pregnancy-associated risks and consequences, and the services received are likely to encourage women to seek appropriate delivery care sources, hence improve pregnancy outcomes. This is important and should be promoted. Therefore, both the demand side and supply side are critical when it comes to institutional delivery care utilization. Interventions aimed at increasing uptake of maternal health services should address both the demand and availability of quality services. In addition, government and policy makers should strategize and implement programmes that contribute to increasing access to education. Evidence-based knowledge, practices and methods to reduce unnecessary caesarean sections should be communicated to medical professionals and women in general. Also the government and other

stakeholders should improve the quality of existing educational facilities and promote policies that will ensure the achieve- ment of education for a larger number of women. Furthermore, policy makers should as well promote educational initiatives relating maternal care utilization and dangers to non-clinical caesereans, especially for women living in urban areas. These analyses serve as a first step towards the understanding of how cesarean delivery continues to rise in Ghana and worldwide, but much work remains to be done.

The study recommends further research at a higher educational level on the relationship between education and other human decisions, these are very complex some- times, maybe the utilization of panel data which was not readily available for this study will be considered in the near future. Also, data on the ability, performance, school type and reasons for the levels attained could be considered if readily available.

References

- [1] Amoakoh-Coleman, Mary et al. (2015). "Predictors of skilled attendance at delivery among antenatal clinic attendants in Ghana: A cross-sectional study of population data". *BMJ Open* 5.5.
- [2] Arba, Mihiretu Alemayehu, Tadele Dana Darebo, and Mengistu Meskele Koyira (2016). "Institutional Delivery Service Utilization among Women from Rural Districts of Wolaita and Dawro Zones, Southern Ethiopia; a Community Based Cross-Sectional Study". *PLoS one* 11.3.
- [3] B´ehague, Dominique P, Cesar G Victora, and Fernando C Barros (2002). "Consumer demand for caesarean sections in Brazil:informed decision making, patient choice, or social inequality? A population based birth cohort study linking ethnographic and epidemiological methods". 324.April, pp. 1–6.
- [4] Belizan, J M et al. (1999). "Rates and implications of caesarean sections in Latin America: ecological study." *BMJ (Clinical research ed.)* 319.7222, pp. 1397–1400.
- [5] Betr´an, Ana P et al. (2016). "The Increasing Trend in Caesarean Section Rates: Global, Regional and National Estimates: 1990-2014". *PLoS ONE* 11.2, pp. 1–12.
- [6] Caulfield, Tanya et al. (2016). "Factors influencing place of delivery for pastoralist women in Kenya: a qualitative study". *BMC Women's Health* 16.1, pp. 1–11.
- [7] Cheng, Yvonne (2011). "Cesarean Delivery: Factors Affecting Trends". PhD thesis. Uni- versity of California, Berkeley, pp. 3–120.
- [8] Exavery, Amon et al. (2014). "Access to institutional delivery care and reasons for home delivery in three districts of Tanzania". *International Journal for Equity in Health* 13.48, pp. 1–11.
- [9] Feng, Xing Lin, Ling Xu, and Carine Ronsmans (2011). "Factors influencing rising cae- sarean section rates in China between 1988 and 2008". *Bulletin of the World Health Organisation* May 2011, pp. 30–39.
- [10] Feng, Xing Lin et al. (2010). "An impact evaluation of the Safe Motherhood Program in China". *Health Economics* 19.S1, pp. 69–94.
- [11] Ganle, John K et al. (2014a). "Inequities in accessibility to and utilisation of maternal health services in Ghana after user-fee exemption: a descriptive study." *International journal for equity in health* 13.

- [12] Ganle, John Kuumuori (2015a). "Ethnic disparities in utilisation of maternal health care services in Ghana: evidence from the 2007 Ghana Maternal Health Survey". *Ethnicity & Health* 7858.June 2015, pp. 1–17.
- [13] (2015b). "Why Muslim women in Northern Ghana do not use skilled maternal health-care services at health facilities: a qualitative study." *BMC International Health and Human Rights* 15.1.
- [14] Ganle, John Kuumuori et al. (2014b). "A qualitative study of health system barriers to accessibility and utilization of maternal and newborn healthcare services in Ghana after user-fee abolition". *BMC Pregnancy and Childbirth*. Pp. 1–17.
- [15] Ganle, John Kuumuori et al. (2016). "Addressing health system barriers to access to and use of skilled delivery services: perspectives from Ghana". *International Journal of Health Planning and Management* 31.4.
- [16] Ghana Statistical Service (2012). "2010 Population and Housing Census". *Ghana Statistical Service*, pp. 1–117.
- [17] Gurka, Matthew J. and Lloyd J. Edwards (2007). "8 Mixed Models". *Handbook of Statistics* 27, pp. 253–280.
- [18] Kyei-Nimakoh, Minerva, Mary Carolan-Olah, and Terence V. McCann (2016). "Millennium development Goal 5: Progress and challenges in reducing maternal deaths in Ghana". *BMC Pregnancy and Childbirth* 16.1.
- [19] Lakew, Serawit, Erdaw Tachbele, and Terefe Gelibo (2015). "Predictors of skilled assistance seeking behavior to pregnancy complications among women at southwest Ethiopia: A cross-sectional community based study Obstetrics". *Reproductive Health* 12.1.
- [20] Menacker, Fay, Eugene Declercq, and Marian F Maccorman (2006). "Caesarean Delivery: Background, Trends, and Epidemiology". *Seminars in Perinatology* 30.5, pp. 235–241.
- [21] Mohan, Diwakar et al. (2015). "Determinants of postnatal care use at health facilities in rural Tanzania: multilevel analysis of a household survey". *BMC Pregnancy and Childbirth* 15.1.
- [22] Mussarat, Nazia(Dr), Saima(Dr) Qurashi, and Mahnaz(Prof/Dr) Roohi (2013). "Lower Segment Caesarean Section(LSCS);" *Professional Medical Journal* 20.6, pp. 916–923. Ong, Bill Y et al. (2003). "Severe fetal bradycardia in a pregnant surgical patient despite normal oxygenation and blood pressure." *Canadian journal of anaesthesia* 50.9, pp. 922–5.
- [23] Osili, Una Okonkwo. and Bridget Terry Long (2008). "Does female schooling reduce fertility? Evidence from Nigeria". *Journal of Development Economics* 87.1, pp. 57–75.
- [24] Peterson, John J., A Colin Cameron, and Pravin K Trivedi (1999). "Regression Analysis of Count Data". *Technometrics* 41.4, p. 371.
- [25] Qin, Cheng et al. (2012). "Clinical Indications and Determinants of the Rise of Cesarean Section in Three Hospitals in Rural China". *Maternal and Child Health Journal* 16.7, pp. 1484–1490.
- [26] Schultz, T. Paul (1997). "Demand for Children in Low Income Countries". *Handbook of Population and Family Economics*, pp. 349–430.
- [27] Schultz, Theodore W. (1973). "The Value of Children: An Economic Perspective". *Journal of Political Economy* 81.S2, S2.
- [28] Shah, Rajani et al. (2015). "Factors affecting institutional delivery in rural Chitwan district of Nepal: A community-based cross-sectional study". *BMC Pregnancy and Childbirth* 15.1.
- [29] Sialubanje, Cephas et al. (2015). "Improving access to skilled facility-based delivery services: Women's beliefs on facilitators and barriers to the utilisation of maternity waiting homes in rural Zambia". *Reproductive Health* 12.1.
- [30] Spitznagel, Edward L. (2007). "6 Logistic Regression". *Handbook of Statistics* 27, pp. 187–209.
- [31] Stivanello, Elisa et al. (2014). "Determinants of cesarean delivery: a classification tree analysis." En. *BMC pregnancy and childbirth* 14.1, p. 215.
- [32] Tadele, Niguse and Tafesse Lamaro (2017). "Utilization of institutional delivery service and associated factors in Bench Maji zone, Southwest Ethiopia: community based, cross sectional study". *BMC Health Services Research* 17.1.
- [33] Tappis, Hannah et al. (2016). "Bypassing Primary Care Facilities for Childbirth: Findings from a Multilevel Analysis of Skilled Birth Attendance Determinants in Afghanistan". *Journal of Midwifery and Women's Health* 61.2.
- [34] United Nations (2013). "Goal 5: Improve maternal health". *Millennium Development Goals Report*. Organisation for Economic Cooperation and Development (OECD), pp. 29–38.
- [35] (2015). *World Fertility Patterns 2015*. Tech. rep., pp. 1–30.
- [36] Vidler, Marianne et al. (2016). "Utilization of maternal health care services and their determinants in Karnataka State, India". *Reproductive Health* 13.1, pp. 2–37.
- [37] Villar, Jos'e et al. (2006). "Caesarean delivery rates and pregnancy outcomes: the 2005 WHO global survey on maternal and perinatal health in Latin America." *Lancet (London, England)* 367.9525, pp. 1819–29.
- [38] WHO (2002). "Essential Antenatal, Perinatal and Postpartum Care: Training Modules". *WHO Regional Office For Europe*, pp. 1–392.
- [39] WHO UNICEF UNFPA (2014). *WHO — Trends in maternal mortality: 1990 to 2010*.
- [40] Wooldridge, Jeffrey M. (2002). "Econometric analysis of cross section and panel data". *Booksgooglecom* 58.2, p. 752.
- [41] World Health Organization (2016). "WHO recommendations on antenatal care for a positive pregnancy experience". *World Health Organization Press*, pp. 1–172.