THE ECONOMIC CONSEQUENCES OF THE CHANGING MODE OF CHILD DELIVERY IN GHANA

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Abstract

The Ghana National Health Insurance Scheme (NHIS) was enacted in 2003 and the free maternal health program under the scheme in 2008. This was to provide free health facility delivery both vaginal and caesarean section (CS) for all pregnant women to improve maternal and child health in the country. Available studies have shown an increasing trend in the CS rate in Ghana over the years, apparently as a result of the health insurance scheme. Specifically the health facility CS rate increased from 13.5 % in 2014 to 17.5 % in 2014 which is about an 86% increase.

This paper examines the factors influencing the changing mode of child delivery in Ghana using the Ghana Demographic and Health Survey round 5 and 6. The study employed a binary logistic regression as well as the propensity score matching technique with the dependent variable being the mode of child delivery - vaginal or CS. The matching estimation approach used was able to randomize the data and so make unbiased comparison of insured and uninsured patients possible.

The results showed that NHIS has a significant impact on the changing mode of child delivery in the country. The study also revealed a strong association between CS and the wealth, age and educational background of the mother, size of child, birth order and antenatal visits. Unexpectedly, exposure to media did not have any significant relationship with the changing mode of delivery.

Keywords: Caesarean Section, National Health Insurance Scheme, Child Delivery, Ghana

Introduction

Caesarean Section (CS) delivery has become the most common surgical operation among women over the last two decades. It accounts for a total of 18.5 million (representing about 14.45%) out of the 128 birth in 2010 (Gibbons et al., 2010) and 18.6 % in 2014 (Betrán et al., 2016) worldwide. This rate has been predominantly high in developed and heavily populated nations such as Brazil, recording about 48.4 % (Datasus, Nascidos vivos in Victora et al. 2011), USA 30.3 %, Italy 38.2 % in 2008 (Gibbons et al. 2012) and China 34.9% in 2014 (Li et al.,2017) and recently in developing countries. A number of socioeconomic, clinical and provider factors have been revealed to be associated with this increase worldwide and as such questions about the economic implications about modes of child delivery have been raised recently (Fraser et al., 1997; Paterson, 1998; Howard, 1999).

In Ghana, to improve maternal and child health, the National Health Insurance Scheme (NHIS) was enacted in 2003 and the free maternal health program under the scheme in 2008

to provide free health facility delivery both vaginal and CS for all pregnant women. This is mainly to the fact that majority of these deaths and morbidities result from obstetric complications. Available studies have shown an increasing trend in the CS rate in Ghana over the years, apparently as a result of the health insurance scheme. A Ghana Demographic Health Survey (GDHS) shows that 13.5 % of all deliveries in 2014 (thus an increase by about 86 % from the year 2008) and 17.5 % among deliveries that received skilled attendance (GDHS report, 2014) were by CS. A possible reason given to this finding is the improvement in access to obstetric care or the widespread belief of the safety nature of the process (Scott, 2006 and Zhang et al., 2008). Notwithstanding, Lo (2003) and Wagner (2000), have also shown that women prefer CS to vaginal births for personal and cultural reasons.

This increasing trend in CS was not the main goal of the free maternal delivery program. Furthermore, the increasing trend of CS in the country raises serious questions concerning the economic as well as the health consequences of women, health care system and the society at large. A review by Henderson et al. (2009) as well as Amporfu (2014) revealed CS to be more expensive than normal delivery. This may increase child delivery cost's share of the country's health budget, and has a potential of diverting both human and financial resources from other arguably higher priority interventions in an emerging country like Ghana. Also it has been argued that CS rate above the WHO recommended (10-15 %) range could cause more harm than good (WHO, 1985).

In addition to the rising direct cost of child delivery intervention, there are also the indirect and opportunity costs to the Ghanaian economy in the form of the value of lost earnings by patients or loss of productivity to the economy. This is due to the inability of some patients to work as a result of health care activities as well as additional hospital charges resulting from the extended stay in the hospital after delivery (He et al., 2016), postnatal complications and re-admissions (both maternal and neonatal). There is also the issue of psychological cost on women and the fact that CS deliveries come with a high risk of future complications and discomfort after birth.

Again, increasing CS rate has been a major public health problem because it increases the health risk for mothers and babies. A number of studies Betrán (2007), Villar et al. (2006), Hall and Bewley (1999), support the possibility of CS having a negative impact on maternal and neonatal health due to its inappropriate use (Wagner, 2000).Babies born by CS are more likely to have increased risk of respiratory problems (WHO, 2010) as well as increased risk of genetic diseases such as autism which has no known cure. On the other hand, it has been argued that reducing CS rates would have a detrimental effect on mothers and infants health, and that patients' choices should be considered (Sachs and Castro, 2003).

There is therefore a growing interest among health policy makers in the country to gain an informed insight into the determinants of the rise of CS in Ghana, the probabilities that the trend will continue and the economic consequence of such a development.

Some studies have been done on modes of child delivery in Ghana in recent years. These include studies by Adageba et al. (2008), Danso et al. (2009), and Amporfu (2014). But these studies have been based on small samples from hospital registers owing to perhaps lack of reliable administrative records at the national level. Bonfrer et al. (2016) also assessed the

effects of NHIS on CS rates using GDHS. But this was just a few years after the enactment of the NHIS and the free maternal delivery program under the NHIS had just been extended to the whole country. There is therefore a high possibility that the effects might have changed overtime. The study reported in this paper is based on two rounds of the GDHS data that cover the period 2008 to 2014. Research carried out on the quality of CS data in Demographic and Health Survey datasets reveal that the data is reliable as long as only institutional births are included in the analysis (Holtz and Stanton, 2007). The study therefore constitutes a more comprehensive attempt to provide understanding of preferred modes of child delivery at a national level. It seeks to make the following contributions to existing knowledge in the field.

First of all, assessing the economic consequences of mode of child delivery will inform policy on the proper use of NHIS as well as the effect of obstetric practice on health service resources. This will enable the government, National Health Insurance Authority (NHIA) and other stakeholders to know the costs as well as the factors associated with the various mode of child delivery to make informed decisions. This will help create a better picture of the mechanisms through which the changing mode of child delivery can be addressed to help improve maternal and new born health to achieve the stated Sustainable Development Goals (SDGs) and improve the welfare of individuals in the country.

Also, this study adds to the growing literature by accessing the economic consequences of mode of delivery on the Ghanaian economy of which most of the literature have not paid much attention to. Lastly, this study considers social exposure as well as network factors which have not been fully explored in the Ghanaian context and the extent to which different community settings contribute to the observed increase in CS. The closest study in the sub region is by Leone et al. (2008), which looked at diffusion on CS in some selected developing countries however, Ghana was not included.

By providing a strong country-specific diagnostic, which takes into account country context and history in investigating how maternal and new born health can be improved, the study will help in prioritizing and shaping policies to fit Ghana's needs. This will enable individuals, especially poor women to have confidence in the health facilities as well as bridging the inequality gap and improving these health outcomes for the development of the economy.

The rest of this paper is organized as follows; section two presents the theoretical foundation for the study, both theoretical and empirical. This is followed by the methodology in section three. The analysis and results in section four with section five discussing the findings of the study. Finally, section six provides the conclusion for the study.

Literature review

CS surgery is a health care service that has been increasing in importance all over the world (Stanton and Holtz, 2006; Betrán et al., 2007; Souza and Gülmezoglu, 2010). But in order to examine the factors behind the growing importance of CS, it is essential to first understand the decision making process underlying the demand for health care in general. The decision

to undergo CS is in two forms; the initial decision by the woman to visit the physician or to request for the procedure and the final decision by the physician to undertake the procedure. The reverse could occur where the physician recommends it to the woman and then the woman decides alone or with other family members to agree or not. The final decision however rests with the physician. It is therefore reasonable to look for the models that distinguish between the respective decision makers and assess the different set of explanatory variables at each level or stage.

Empirically, the increase of CS has been attributed to multiple factors ranging from clinical/medical to non-clinical/medical factors

Medical indications of CS

Globally, both earlier and recent works have endorsed the medical factors as the main factors underlying necessary CS deliveries. The most consistent medical CS indicator found across the world is previous CS (Rahman et al., 2015; Kringland et al., 2009; Shah et al., 2009; Leone et al., 2008; Ajeet et al., 2011). These studies concluded that women with a previous CS are more likely to undergo the procedure for their next baby. Since previous CS as an indicator for CS has been consistent in the literature, some studies have assessed the factors influencing the procedure among women with previous CS but the findings are inconclusive. A study found a high probability of CS (Adanu and McCarthy, 2007) while another study found the reverse (Cecatti et al., 2000).

Other clinical indications of CS in the literature aside previous CS are: pre-eclampsia, induced labour, referral status, higher health facility classification scores (Shah et al., 2009), foetal distress, foetal mal-presentation including breech (Gulati & Hjelde, 2012), prolonged labour, length of the baby (Rahman et al., 2015), pregnancy complications (Narzary et al., 2015), weight (Adanu and McCarthey 2007; Narzary et al., 2015) and size of the baby (Narzary et al., 2015). Multiple births, that is giving birth to more than one child at a time has been found to be an important factor influencing the likelihood of CS (Khawaja et al., 2007; Kringland et al., 2009). The height of the woman which is used as a proxy for their pelvic size has been mentioned in the literature to affect CS. For example, Malabarey et al. (2012) found CS rates to be high for women with small pelvic size. However, in the case of Brazil, Cecatti et al. (2005) examined determinants of CS and found medical factors to be less significant even in cases where the women had a previous CS. This possibly reveals the high social and economic determining nature of delivery among Brazilians.

Non-medical indications of CS

Most recently, CS surgeries have been found to be eminent for non-medically indicated reasons and as such many studies have examined the exact factors behind this new trend. From the literature these factors stretch from socioeconomic, demographic, psychological, physician or health facility characteristics among others.

A prominent socioeconomic factor in the literature is the wealth or income level of the individual. On the one hand, families with higher incomes are generally believed to have higher use of health services because they have the means in terms of purchasing power to afford the cost involved. On the other hand, higher income families, according to Ching (1992), can afford preventive care and so are able to reduce their real need for health care services. This variable – wealth or income level - has been found to affect CS delivery positively in most countries. For instance in Ghana, Callaro et al. (2013) and Tuncalp et al.

(2013) found CS rates to be consistently high among those with high income compared to their poor counterparts even after the user fee exemptions.

Similarly among sub Saharan Africa (SSA) countries, Leone et al. (2008) and Ronsmans et al. (2006) found women from wealthier backgrounds to have a higher probability of undergoing an elective CS. These evidences have not been different from other countries like Brazil (Belizan et al., 1999 and Cecatti et al., 2005). Finger (2003) and Behaque et al. (2002) attributed the Brazilian situation to the fact that CS is perceived as a symbol of high social status in the country. Others are China (Klemetti et al., 2010 and Sufang et al., 2007), Bangladesh (Rahman et al., 2015) and Jordan (Al-Rifai, 2014). These findings reflect the importance of households' ability to pay for CS as in the determination of the procedure.

Some empirical studies suggest that education may influence CS decisions, although the available evidence remains inconclusive. In Ghana, Tuncalp (2013) and Gulati and Hjeide (2012) found higher rates of CS among highly educated women. Furthermore, Khawaja et al. (2004); Khawaja et al. (2009) , Mishra and Ramananthan (2007), Sufang et al. (2007), Klemetti et al. (2010), Huang et al. (2013) and Rahman et al. (2015) found women's educational level to be highly and positively correlated with CS. Possible reasons for this relationship include the fact that increase in maternal educational levels have the tendency to increase their use of health facility services (Padmadas et al., 2000). Also, in Ghana a GDHS report revealed that highly educated women have higher probabilities of delivering with the assistance of a health professional (GDHS report, 2008) who is able to perform CS hence their exposure to the procedure. Again, educated women are more likely to delay motherhood which increases their chance of complications, thus increasing the probability of delivery by CS (Mishra and Ramanathan, 2007). According to Khawaja et al. (2004), highly educated women in Egypt are more likely to represent the higher social classes in the country and as such are able to afford the expenses entailed by the use of private services with the perception of receiving better quality of care.

On the other hand, Al-Rifai (2014), Tollånes et al. (2007) and Kringeland et al. (2009) found women with low levels of education (primary education only) to be more likely to undergo CS. Kringland et al. (2009) attributes this trend to an increasing vulnerability of the lowest level of educational group owing to knowledge and power. This is because educated women are said to be in control and capable of giving birth according to their preference. Yet still Khawaja & Al-Nsour (2007), Danso (2009) and Ajeet et al. (2011) did not find any association between mothers' education and delivery preference.

Occupation has also emerged in some studies as an influencing variable. Gulati and Hjeide (2012) found employed women to be highly prone to CS in Ghana. Similarly, a number of authors unveiled that employed women (Kozhimannil et al., 2014; Naseriasl et al., 2014).), those employed in the professional and service sectors (Sufang et al. (2007), high salaried positioned and unskilled workers (Simoes et al., 2005) were more likely to undergo CS. According to Hung et al. (2002), high CS deliveries are related to occupations that require a prolonged standing and higher level of physical efforts. Also Marcoux et al. (1999), made it clear that women exposed to high job strain are likely to experience complications during delivery increasing their chance of a CS delivery. Again, long working hours in a stressful occupation was found to adversely affect pregnancy as well as its outcomes. All these studies reveal an association between stress and higher CS. Simoes et al. (2005) therefore attributed

the high probability of CS among unskilled workers to the less conscious health behaviour and fewer resources to help counter the stress of working while pregnant among lower socioeconomic status women. Nonetheless, high CS rates were also found among women without jobs (Kringland et al., 2009).

In addition, a number of studies have examined the impact of health insurance in Ghana on CS delivery. For instance, Bonfrer et al. (2016) employed the GDHS 5 to assess the impact of NHIS on CS and found a positive impact of 6 percentage points. This confirmed the study by Amporfu (2014) who found a high correlation between CS and NHIS regardless of the risk type of patients. Also in Moocco and Mali, Bennis and De Brouwere (2012) and El Khoury et al. (2012) respectively found a positive significant effect of insurance on CS utilization. Again in rural China, where the government takes care of the health expenditure by most people through a health insurance scheme as well as other settings, Long et al. (2012); Klemetti et al. (2010); Bogg et al. (2010) and Stewart-Hall (2000) found insurance to be a significant predictor of CS.

This positive correlation between CS and health insurance is probably due to the exemption of user fee policy for all deliveries in these countries. In addition to this user fee exemption policy in Ghana, registration onto the scheme if free for all pregnant women. Furthermore, this positive impact of health insurance of CS is highly significant among the wealthiest quintile compared to the poor (Bonfrer et al. 2016; Bennis and De Brouwere 2012; El Khoury et al. 2012). This has been attributed to the hidden financial cost (such as transportation and informal costs) associated with the procedure, which the poor still cannot afford (Bennis and De Brouwere 2012; El Khoury et al., 2012).

Another critical variable that greatly influences the likelihood of CS in the literature is antenatal care (ANC) visits. Within the field of reproductive health care, ANC provides a platform for important health-care functions, including health promotion, screening and diagnosis, and disease prevention. It has been established that by implementing timely and appropriate evidence-based practices, ANC can save lives (WHO, 2016). Therefore, ANC visits could be used as an indicator for the amount and quality of care received. On one hand, higher ANC visits could lead to early identification and management of obstetric care which could lower the risk of complications at birth, hence lower the risk of CS. On the other hand, ANC may have a higher tendency of increasing the risk for CS since women with higher pregnancy complications are more likely to visits health facilities frequency. It could also mean that women with better access to medical care may use health services more frequently and hence are at a higher risk of CS deliveries possibly raising the issue of over medicalization. Majority of the studies in this review found a positive relationship between CS and the number of ANC visits (Khawaja et al., 2004; Leone et al., 2008; Behague et al., 2002; Sufang et al., 2007; Khawaja and Al-Nsour, 2007; Klemetti et al., 2010 and Narzary et al., 2015). However, Khawaja et al. (2004) found the situation to be different for Dominican Republic where women with more visits had a lower risk of CS than those with fewer visits.

Maternal age is also related to the likelihood of CS and studies have revealed an increase in CS with increase in maternal age, meaning that older women are more likely to undergo CS (Bell et al., 2001; Peipert and Bracken, 1993; Khawaja et al., 2004; Khawaja et al., 2009; Rahman et al., 2015; Leon et al., 2008; Tyberg et al., 2013; Tuncalp et al., 2013; Narzary et

al., 2015). A major reason given for the high rate of CS among older women is that, they are more likely to have experienced a previous CS or have a higher chance of having delivery related complications which are all associated with the procedure. Others have also attributed it to their tendency to having bigger babies (Webster et al., 1992; Padmadas et al., 2000; Mishra and Ramanathan, 2002). Peipert and Bracken (1993) have also reported higher likelihood of CS among older women even without any complications. However, Leon et al. (2008) did not find any significant relationship between CS and maternal age in Columbia. Gulati and Hjelde (2012) found younger women to rather have significantly more emergency CS than older women.

Parity, also known as birth order, has been one of the important maternal characteristic found to influence the likelihood of CS delivery. Women with low birth order have been found to undergo CS more likely (Webster et al., 1992; Padmadas et al., 2000; Mishra and Ramanathan, 2002; Khawaja et al., 2004; Khawaja et al., 2007; Kringland et al., 2009; Rahman et al., 2015; Long et al., 2012). This is mostly explained by the greater risk associated with low parity women. For example Gulati and Hjelde, (2012) reveal that women with no previous birth experience to have difficult labours, with higher rates of the indications 'failure in progress' and 'arrest of labour'.

The literature on mode of child delivery has shown variability between delivery places denoting the nature of delivering facility. Belizan et al. (1999); Khawaja et al. (2004); Leone et al. (2008); Rahman et al. (2015) and Narzary et al. (2015) have revealed CS to be high in private facilities. Again differences have also been found between urban and rural hospitals, for example Long et al. (2012) and Klemetti et al. (2010) found higher level or county hospitals to be highly associated with CS deliveries. This has been attributed to the profit oriented motive of the private facilities which is likely to cause them to recommend more CS. Other possible reasons for this association are the presence of near birth complications, preference for better quality care, the availability of the necessary medical technology for this surgical intervention (McCourt et al., 2007; Khawaja et al., 2004).

Differential access to health care facilities has been found to strongly influence CS. Studies have found women residing in urbanised areas to have higher risk of undergoing CS (Belizan et al., 1999; Rahman et al., 2015; Khawaja et al. (2009); Sufang et al., (2007); Padmadas et al., 2000; Mishra and Ramanathan, 2002). Khawaja et al., 2004) also show that there is a high CS rate in socio-economically advantaged regions. This could be associated with the issues related to disparities in the distribution of health facilities in the country where urbanised hospitals are highly equipped. Moreover, Lauer et al. (2010) found the capacity of the health systems to deliver a surgical obstetric care to impact CS positively.

In addition, religious affiliation has been shown to influence the decision to undergo CS (Mishra and Ramanathan, 2001; Choudhury, 2008; Ghosh, 2010; Narzary et al., 2015; Mboho, 2013; Kamal, 2013). Studies by Tebeu et al. (2011) and Kringland et al. (2009) have also revealed a higher probability of CS among married women. This could probably be that married women are more likely to get support from their husbands in terms of income to pay for CS.

Again, Leone et al. (2008) showed that an individual's exposure to information within a broader community network has some correlation with CS delivery. This is based on the fact that women connected to social networks acquire a higher level of self-esteem and are likely to discuss any health related issues more widely and make informed choices and decisions (Boulay & Valente, 1999; Langer et al., 1993).

Finally, negative experience from previous pregnancy, fear of normal delivery (Kringland et al. 2009), labour pain, better plan for maternity leave, preferred delivery date, more convenient way to deliver (Loke at al. 2015) and previous infertility (Chibu et al., 2007) are factors that have also been found to increase the likelihood of CS.

This increasing importance of non- medical factors do not make it the most important factors since the literature suggests a higher probability of unnecessary CS associated with these factors which could be avoided. The literature suggests that physicians may be swayed by these non- medical factors to undertake CS based on financial incentives. However, in the case of Ghana where physician income is not tied to the services rendered especially in public health facilities, there is no financial incentive for them to induce such performance. They are therefore likely to be requested by the patient and physicians are likely to give in to such pressure if the patient has NHIS because CS is affordable to such patients (Amporfu, 2012).

Nonetheless, there could also be the possibility of supplier inducement since physician's inducement is not likely to be a function of income alone, a second variation relates to the area of physician/ population density; increase in health care utilization amidst the shortage of medical officers and midwives. This will increase their workload as there will be too many patients per doctor. Physicians will therefore employ other measures to reduce this burden hence adopting medical procedures that is time efficient hence recommend CS. This is possible in the case of Ghana since evidence show positive correlation between health insurance and use of maternal care service (Ensor and Ronoh, 2005; Smith and Sulbach, 2008; Blanchet et al., 2012). Other factors that are likely to persuade a physician to undertake CS on non-medical grounds are leisure, convenience and on delivering the appropriate amount of care.

If this is the case in Ghana, and the trend continues then the government will be incurring extra costs to CS deliveries deemed unnecessary which will be very detrimental to the economy.

Methodology and Data

Theoretical Framework

The main framework underpinning this study is the modification of Grossman's demand for health by Muurinen 1982 and Wagstaff 1986 which is built on the intertemporal utility function. The theory of demand for health is based on three fundamental economic principles, namely; the indifference map, the production function and the budget constraint. The model used in this study is based on the health production function concept of the theory of demand for health. A health production function describes the relationship between combination of health inputs, both medical and non-medical, and resulting health output.

This according to Grossman (1972) is specified as

H=F(X)…….…….....…… (1)

Where H is a measure of individual health output and X is a vector of individual inputs to the health production function F. The elements of the vector includes: nutrient intake, income, consumption of public goods, education, time devoted to health related procedures, initial individual endowments like genetic makeup, and community endowments such as the environment.

It is postulated that people/nations produce health by utilizing socioeconomic variables. Hence health is a function of socioeconomic variables. Mathematically, this is written as follows:

Health = f (socio-economic variables)…..…….….. (2)

Based on the objective of this study to examine the determinants as well as the cost of mode of delivery and with the help of literature, the following model is specified:

$$Delivery\_mode = \beta_0 + \beta_1 Age + \beta_2 MEdu + \beta_3 MOccu + \beta_4 Wealth + \beta_5 resident + \beta_6 NHIS +$$
$$\beta_7 ANC + \beta_8 autonomy + \beta_9 childsize + \beta_{10} birthorder + \beta_{11} multiplebirth + \beta_{12} \text{Re}\, gion + e.....(3)$$

Empirical estimation model

To estimate the determinants of mode of delivery in Ghana, the study adopts a binary choice approach since the dependent variable is assumed to be dichotomous in nature. That's either CS or normal delivery. And as such using an ordinary least squares method of estimation may not hold because this is a linear function with binary outcome since the error term will not be normally distributed. The empirical model used in this study is adapted from the works of Asamoah et al., (2011).

Propensity Score Matching (PSM)

However, since NHIS is not solely independent but influenced by other factors that are likely to also affect CS as well as selectivity bias, the propensity scores matching was used to estimate the actual impact of NHIS on mode of child delivery. There is usually the issue of selection bias when comparing women with insurance and those without especially when the insurance is voluntary. This is because high risk consumers have a higher tendency of purchasing or subscribing to insurance (Rothchild and Stilglitz 1976). Therefore in this study where CS is captured under NHIS, those who subscribe to the scheme may have some unobserved characteristics that could affect their decision to undergo CS or not. The study therefore employs the propensity score matching technique to help deal with this selection problem.

Data source

The study uses secondary data from the Ghana Demographic and Health Survey (GDHS) implemented by the Ghana Statistical Service (GSS), the Ghana Health Service (GHS) and the National Public Health Reference Laboratory of the GHS. The ICF Macro through the MEASURE DHS programme provided technical support for the survey and the United States Agency for International Development (USAID), the Government of Ghana, the United

Nations International Children's Emergency Fund (UNICEF), the United Nations Population Fund (UNFPA) and the Danish International Development Agency (DANIDA) supported the survey financially. The primary objective of the GDHS is to generate reliable information on fertility, family planning, infant and child mortality, maternal and child health, and nutrition. In addition, the dataset contains information on the characteristics of the respondents and the household. The GDHS is a cross-section and not a panel data set and to data date, six rounds of the GDHS have been collected 1988, 1993, 1998, 2003, 2008 and 2014. However, each round of data collection uses similar procedures. All women aged 15-49 years who are either permanent residents of the household or visitors who stayed in the household the night before the survey were eligible to be interviewed, whilst in half of the households, all men aged 15-59 who are either permanent residents of the household or visitors who stayed in the household the night before the survey are interviewed. The study considered women who have given birth over the last 12 months from the last two rounds (2008 and 2014). This will enable us get relatively accurate information of the NHHIS status of the women during child delivery.

Results and Discussion

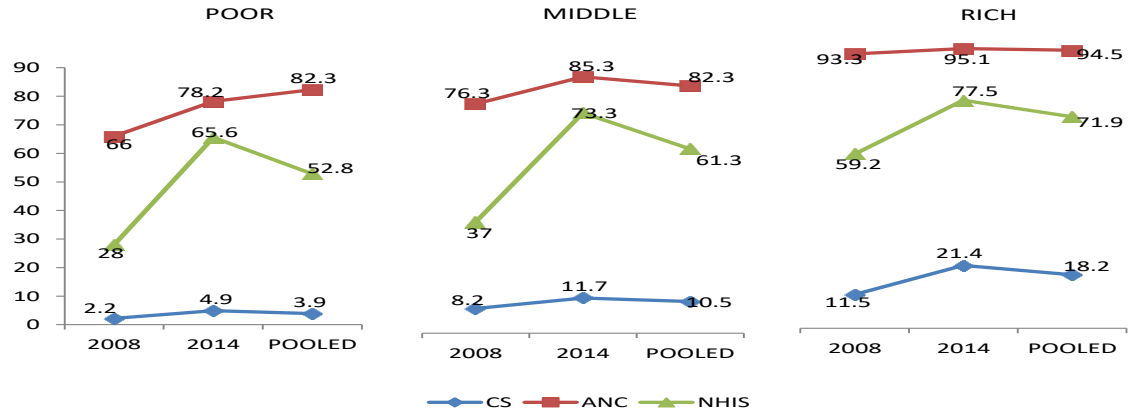
Descriptive Statistics

Overall there has been an increase in NHIS enrolment, CS and ANC utilization over the past years. The CS delivery averages make great variation in terms of economic status, educational level, place of residence and NHIS status. From Figure 1 below, women from the top two wealth quintiles are 14.2% points more likely to undergo CS than their bottom two wealth quintiles counterparts over the years on average. For 2014, the difference in CS delivery between these two groups (rich and Poor) of 16.5% points is pronounced than 2008. The CS rate of 21.4% recorded by the rich exceeds the WHO recommended 10-15% rate while the 4.9% of the poor is far less than the minimum limit. This could mean that the rich are over utilization CS (thus using even when not needed) whiles the poor are underutilizing it or do not even get it when needed for saving lives. It could also mean that the poor are more likely to eat healthy foods compared to the rich who are more likely to eat junk foods and hence are more likely to healthy thus avoiding complications during pregnancy such as anaemia.

Over the years the percentage of women who delivered by CS increased as the educational attainment of women increased or improved with those with the highest level of education in 2014 being pronounced than 2008. While 4.5% and 7% of women with no schooling and primary education had CS, on average 13.4% and 33% of them with secondary and higher educational level respectively delivered by CS (Table 1). Also from Table 1, the overall likelihood of delivering by a CS varies across place of residence, with those in the urban areas being approximately 8.7% points more likely to deliver by CS than those in the rural areas.

The rural - urban gap is more pronounced in 2014 with a 10.4 % points. Furthermore CS increased among those with NHIS as well as those without over the years, with those with NHIS recording the highest CS than their counterparts on average.

Figure 1 : National Health Insurance Scheme (NHIS) enrolment, at least four times antenatal care (ANC4) and caesarean section (CS)



Author's computation from the GDHS 2008 & 2014

From Figure 1 above, NHIS enrolment increased within the wealth quintiles over the years with the rich recording a higher percentage. The gap between the rich and poor reduced from 31.2% points in 2008 to 11.7% points in 2014 and that between the rich and the middle class being from 22.2% points to 4.2% points. Again, those who had at least four ANC visits increased with the wealth quintiles over the years. The rich recorded the highest with a difference between the rich and poor being pronounced in 2008. This shows a reduction in the gap between the rich and poor in terms of recommended ANC utilization over the years.

Table 1: CS by wealth, Residence, Education and NHIS

		2008 %	2014 %	Overall %
Wealth	Poor	2.2	4.9	4
	Middle	8.2	11.7	11.7
	Rich	11.5	21.4	21.4
Education	No Education	3.8	4.9	4.5
	Primary	3.2	9.4	7
	Secondary	9.6	15	13.4
	Higher	18.6	37.4	33
Residence	Rural	4.7	7.7	6.6
	Urban	9.5	18.1	15.3
NHIS	Yes	11.2	14.2	13.5
	No	3.4	7.6	5.4

Author's computation from the GDHS 2008 & 2014

In conclusion, in aggregating the sample into rich and poor, not much difference is found with regards to NHIS enrolment and ANC utilization however, the proportion of CS for the rich is more than a double of that of the poor. Also the study observed that majority of the women who attend ANC as well as those who undergo CS are mostly NHIS holders.

Estimation result

The aim of the study is to explore the factors influencing the changing modes of child delivery in Ghana. The logistic regression results for the two rounds of GDHS are presented in the Table 2 below. Models 2 and 4 are the bivariate analysis of the NHIS on CS delivery for 2008 and 2014 respectively. Models 1 and 3 include all relevant explanatory variables ranging for health and socioeconomic, this however reduces the number of observations. Models 5 and 6 are the bivariate and multivariate analysis respectively for the pooled data. The NHIS variable shows a positive relationship with CS in all the models but it is not significant in model 1. Maternal occupation, female autonomy, exposure to television, radio and newspaper, marital status and place of residence were not significant in any of the regressions though they all carried the expected signs.

The probability of NHIS increasing CS ranged between 6 % and 8% in the bivariate analysis. After controlling for other socioeconomic and community variables in the multivariate analysis, having NHIS increased the probability of undergoing CS by 6.7% in model 6 and 5.5% in model 3 compared with women without NHIS. From Table 3, the PSM estimates to assess the impact of NHIS on CS delivery showed a positive significant impact for all the three models underscoring the results from the logistics regression. The average treatment effect on the treated (ATT) effect shows that participation in NHIS increases the probability of a CS delivery. Model 1 in Table 3 (GDHS, 2008) records the highest impact of about 7.5% increase and model (GDHS, 2014) records about a 5.5% increase in the CS procedure as a result of their participation in NHIS. Thus it is possible to increase access to CS through the accessibility and affordability possessed by women through their participation in NHIS.

This confirm the works of Bonfrer et al. (2016), Amporfu (2014), Bennis and De Brouwere 2012, El Khoury et al. (2012), Long et al. (2012); Klemetti et al. (2010); Bogg et al. (2010) and Stewart-Hall (2000) who found insurance to be a significant positive predictor of CS. The positive relationship between NHIS and CS might be the fact that for a developing country like Ghana, a reason for a low CS rate could be lack of health personnel and the issue of affordability on the part of patients. Hence with the introduction of NHIS which give patients free access to delivery by CS, affordability could have been the major reason for the lower levels of CS in the country. Also this free maternal CS could be an incentive for women to request for CS hence the increase as asserted by Amporfu (2014). On the other hand it could also imply that physicians or midwives could recommend CS easily for women with some complications such as being in labour for a long time if they possess a valid NHIS

Table 2 : Logistic regression for the determinants of caesarean section

	Round 6		Round 5		**Round 5&6**	
VARIABLES	Model 1 CS	Model 2 CS	Model 3 CS	**Model 4 CS**	**Model 5 CS**	**Model 6 CS**
NHIS **(No)**						
Yes	0.032	0.067***	0.055***	0.078***	0.067***	0.081***
	(0.020)	(0.019)	(0.019)	(0.018)	(0.022)	(0.013)
Wealth **(Poorest)**						
Poor	0.017		-0.003		0.008	
	(0.022)		(0.020)		(0.016)	
Middle	0.052*		0.048*		0.049**	
	(0.027)		(0.026)		(0.020)	
Rich	0.082**		0.025		0.057**	
	(0.033)		(0.025)		(0.023)	
Richest	0.118***		0.088**		0.101***	
	(0.043)		(0.041)		(0.031)	
Education **(None)**						
Primary	0.043		-0.038		0.014	
	(0.029)		(0.027)		(0.022)	
Secondary	0.038*		-0.017		0.018	
	(0.021)		(0.023)		(0.017)	
Higher	0.137**		0.009		0.083**	
	(0.054)		(0.049)		(0.039)	
Mothers age **(< 19)**						
20-29	0.047**		-0.022		0.025	
	(0.023)		(0.034)		(0.019)	
30-39	0.118***		0.041		0.092***	
	(0.034)		(0.041)		(0.027)	
40 and above	0.152***		0.074		0.127***	
	(0.056)		(0.062)		(0.044)	
Birth order **(1)**						
2	-0.075**		-0.017		-0.054**	
	(0.033)		(0.029)		(0.024)	
3	-0.111***		-0.025		-0.079***	
	(0.036)		(0.031)		(0.026)	
4	-0.101**		-0.073***		-0.088***	
	(0.040)		(0.027)		(0.028)	
5+	-0.100**		-0.047		-0.077**	
	(0.042)		(0.031)		(0.030)	
Multiple birth **(No)**						
Yes	0.276***		0.228**		0.255***	
	(0.090)		(0.100)		(0.072)	

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Author's computation from the GDHS, 2008 &2014

Table 2 : Logistic regression for the determinants of caesarean section (continued)

	Round 6		Round 5		Round 5&6	
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
VARIABLES	**CS**	**CS**	**CS**	**CS**	**CS**	**CS**
Marital status **(single)**						
Married/ Union	0.000		0.003		-0.006	
	(0.038)		(0.038)		(0.029)	
Antenatal care **(< 3 visits)**						
4+	0.058**		0.038*		0.052***	
	(0.023)		(0.020)		(0.016)	
Child size **(Average)**						
< Average	0.088***		0.029*		0.063***	
	(0.019)		(0.016)		(0.014)	
> Average	0.078***		0.035		0.060***	
	(0.025)		(0.028)		(0.020)	
Residence **(Rural)**						
Urban	0.003		-0.031		-0.008	
	(0.024)		(0.022)		(0.018)	
Exposure to tv (No)						
Yes	-0.022		0.007		-0.013	
	(0.053)		(0.041)		(0.037)	
Exposure to radio **(No)**						
Yes	-0.012		0.021		0.001	
	(0.055)		(0.047)		(0.040)	
Exposure to newspaper **(No)**						
Yes	-0.115		0.098		-0.001	
	(0.128)		(0.089)		(0.090)	
Occupation **(none)**						
Not paid	-0.018		-0.027		-0.020	
	(0.031)		(0.039)		(0.024)	
Cash only	0.016		-0.029		0.005	
	(0.025)		(0.029)		(0.020)	
Cash and in-kind	0.012		0.017		0.012	
	(0.033)		(0.042)		(0.026)	
In-kind only	-0.054		-0.078***		-0.055**	
	(0.036)		(0.028)		(0.027)	

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Author's computation from the GDHS, 2008 &2014

Table 2 : Logistic regression for the determinants of caesarean section (continued)

	Round 6		Round 5		Round 5&6	
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
VARIABLES	**CS**	**CS**	**CS**	**CS**	**CS**	**CS**
Region **(G. Accra)**						
Western	-0.014		-0.051		-0.025	
	(0.034)		(0.041)		(0.025)	
Central	-0.003		0.011		0.001	
	(0.041)		(0.045)		(0.031)	
Volta	-0.053		-0.049		-0.046*	
	(0.035)		(0.039)		(0.026)	
Eastern	-0.047		-0.029		-0.037	
	(0.032)		(0.041)		(0.024)	
Ashanti	-0.035		0.024		-0.008	
	(0.033)		(0.038)		(0.025)	
Brong-Ahafo	-0.015		-0.067*		-0.029	
	(0.035)		(0.040)		(0.026)	
Northern	-0.082**		-0.086**		-0.081***	
	(0.034)		(0.033)		(0.023)	
Upper East	-0.022		-0.091***		-0.048*	
	(0.044)		(0.034)		(0.028)	
Upper West	-0.021		-0.069*		-0.039	
	(0.047)		(0.038)		(0.032)	
Round 6					0.060***	
					(0.023)	
Round_NHIS					-0.043	
					(0.035)	
Observations	2,252	2,252	1,139	1,139	3,391	3,391

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Author's computation from the GDHS, 2008 &2014

With respect to maternal age, the likelihood of delivering by CS varies positively with maternal age. This relationship is not significant in model 3 but highly significant in model 1 as well as model 5. The chance of a CS delivery increased as the age category increased for the estimations though the 20-29 category did not have any significant effect in model 5. This study supports the works by Bell et al., 2001; Peipert and Bracken, 1993; Khawaja et al., 2004; Khawaja et al., 2009; Rahman et al., 2015; Leon et al., 2008; Tyberg et al., 2013; Tuncalp et al., 2013; Narzary et al., 2015. However, it contradicts the works of Leon et al. (2008) who did not find any significant relationship between CS and the age of the woman. From the study majority of the women had attained a post- secondary education and hence a possible reason for the positive relationship between age and CS might be that these women may have delayed delivery. This therefore makes them more exposed to delivery complications which may require a CS procedure.

The estimated results for the birth order dummies suggests that an increase in the birth order or parity decreases the chance of a CS and the proportion of the decrease widens as the birth

order increases. In model 1 where this negative influence is greatest, compared to women with first parity, those with the second, third ,fourth parity were 7.5%, 11%, 18% less likely to undergo CS and those of fifth or more parity had 22.2% chance. Also in model 3 only women with a birth order of four had a significant chance of experiencing CS by 7% (0.073). This validates studies by Webster et al. (1992); Padmadas et al. (2000); Mishra and Ramanathan (2002); Khawaja et al. (2004); Khawaja et al. (2007); Kringland et al. (2009); Rahman et al. (2015); Long et al. (2012) and a major reason attributed to this relationship is the greater risks or complications (such as difficult labours among others) among low parity women leading to a higher CS rate in this group.

Education has a positive correlation with CS delivery but this is not significant in model 3 primary education is not significant in models 1 and 5. However, the influence of education on CS becomes significant and more pronounce beyond the primary level. In model 1, women with secondary and post-secondary education were 3.8% and 13% more likely to undergo CS respectively compared to those with no education. For the estimates in model 5, there was an 8.3 chance of women with higher educational level to deliver by a CS. This confirms the studies by Tuncalp (2013) and Gulati and Hjeide (2012) who found higher rates of CS among highly educated women. Similarly, Khawaja et al. (2004); Khawaja et al. (2009) , Mishra and Ramananthan (2007), Sufang et al. (2007), Klemetti et al. (2010), Huang et al. (2013) and Rahman et al. (2015), also found a positive correlation between women's educational level and CS. According to the GDHS report, 2008, possible reason for this association is the fact that women with higher levels of education are more likely to deliver with the assistance of a health professional with the ability or qualification to perform CS. There is also the fact that educated women are more likely to delay motherhood which increases their chance of complications, thus increasing the probability of delivery by CS (Mishra and Ramanathan, 2007). Nonetheless this contradicts the findings of Khawaja & Al-Nsour (2007), Danso (2009) and Ajeet et al. (2011) who found no association between mothers' education and delivery preference.

Wealth status of women was directly and significantly associated with CS delivery. This direct effect increases as the wealth quintile increases in all the estimations with the results for model 1 being more pronounced. Also compared to the poorest wealth quintile the poor did not have any significant effect for all the years. Specifically, the middle wealth group was 5.2%, 4.8% and 4.9% more likely to under CS compared to their poorest counterparts in models 1, 3 and 5 respectively. Again, women from the top wealth quintile were 12%, 8.8% and 10% more likely to undergo CS for models 1, 3 and 5 respectively compared to their poorest counterparts. The works of Callaro et al. (2013) and Tuncalp et al. (2013); Leone et al. (2008) in Ghana, Ronsmans et al. (2006); Belizan et al. 1999) and Cecatti et al. (2005) in SSA, Klemetti et al., 2010 and Sufang et al., 2007) in China, Rahman et al. (2015) in Bangladesh and Al-Rifai (2014) in Jordan have all established similar findings. These findings could possibly reveal that although the free NHIS remove significant financial barriers to accessing maternal health care, there is still an issue of unequal access among the wealth groups. Those from the wealthier households can afford to pay for any extra medication needed and are thus more likely to have access to the service.

Women with the recommended four times or more ANC visits were more likely to undergo CS compared to their counterparts across the three regressions. This positive relationship

increased by two percentage points from 2008 (3.8%) to 2014 (5.8%), depicting an increasing effect of ANC on CS in the country. This confirm the works of Khawaja et al. (2004); Leone et al. (2008); Behague et al. (2002); Sufang et al. (2007); Khawaja and Al-Nsour (2007); Klemetti et al. (2010) and Narzary et al. (2015). Recently in Ghana ANC visit has been on the rise possibly due to the increased education on the service as well as been free under the NHIS. Therefore, this positive relationship could mean that most of the women who did not have access to ANC were those with higher pregnancy complications hence the increase in CS with them on board. Nonetheless it could also mean that the free access to medical care may warrant the frequent use of and hence increasing the chance of delivering by CS possibly due to the raising issue of over medicalization. However, Khawaja et al. (2004) revealed the contrary where women with more visits had a lower risk of CS than those with fewer visits.

Having a multiple birth was the strongest predictor of CS delivery over the years. Compared to those who gave birth to a single baby, those who had twins or more had a higher probability of undergoing CS. From models 3, 5, and 1, women were 22.8%, 25.5% and 27.6% more probable to deliver by CS respectively. This is in line with the findings of Khawaja et al. (2007) and Kringland et al. (2009). Twin deliveries have been found to be a major obstetrical challenge in that they are associated with high risk of abnormal outcome such as higher perinatal mortality associated with low birth weight and preterm delivery (Sebire, 1997).

As expected, the size of a child influenced the probability of a woman under-going a CS procedure. Compared to average sized babies, women with less or greater than the average size baby have a higher chance of delivering by CS. With the exception of greater than average babies in model 3, this relationship was significant across the different regressions. Surprisingly, the probability was higher for babies with a less than average size recording 8.8% in model 1 and 6.3% in model 5. This is in line with the work Narzary et al. (2015).

With regards to the region of residence, compared to the greater Accra region, women from the northern region were 8.6%, 8.2% and 8% less likely to undergo CS in models 3, 1 and 5. Also women from the Upper West region were 9.1% and 4.8% less likely to deliver by CS respectively in models 3 and 5. In addition, Upper West and Brong-Ahafo regions were 6.9% and 6.75% significantly less likely to experience a CS in model 3. This could probably be explained by the fact that these four regions constitute the poor regions in Ghana and as such less likely to have complete maternal health care services that could undertake CS.

Table 3

PSM for round 5, 6 and the pooled data			
	Round 5	Round 6	Round 5&6
	Model 1	Model 2	Model 3
VARIABLES	CS	CS	CS
_treated	0.075***	0.055***	0.071***
	(0.014)	(0.015)	(0.010)
Constant	0.028***	0.067***	0.047***
	(0.009)	(0.012)	(0.008)
Observations	1,143	2,253	3,396
R-squared	0.025	0.006	0.014
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Author's computation from the GDHS 2008 & 2014

Conclusion and Recommendations

In many parts of the world including Ghana, the rate of CS has been rising over the years and this has been seen as a developmental spillover since the development of a country leads to better health care and hence increase in the rates. The CS procedure is associated with some complications even though it saves lives, hence the concern of it being offered only when needed. This study examined the possible factors associated with the changing mode of child delivery in Ghana using the GDHS 2008 and 2014. As anticipated, the results of this investigation support the assumption that a CS delivery is significantly associated with NHIS and several observed individual, household- and community-level characteristics.

With the CS rate being higher among NHIS holders, concerns have been raised about the risk of over-medicalization birth (by physicians as well as requests from women) and this has a great impact on the scarce economic resources of the economy. Therefore medical audit, quality assessment and supportive supervision should be considered to improve the quality of care as well as the proper use of NHIS that is likely to minimize CS rate. Specifically, the government and the NHIA should explore and assess the quality of maternal care provided at the health facilities by monitoring hospital data and corresponding strategies. Also, physicians should be encouraged or even monitored to ensure that they do not yield to pressure from patients as well as using analgesic drugs to reduce labour pains. This is because most patients choose CS to avoid labour pain.

The study also revealed that ANC has been increasing over time and CS tends to be high among those with four or more visits. It is therefore recommended that prenatal classes be used as a forum to provide complete and reliable information to pregnant women on the need to choose vaginal delivery than CS unless it is medically required. In addition with education being a major determinant of CS whereby the highly educated women tend to be more prone to deliver by CS health awareness and educational programs should focus on educating

women on appropriate delivery types when their health and specific status will be known. Again pregnant women should be encouraged to eat more nutritious and balanced diet food to avoid some complications that may lead to a CS procedure. The government as well as stakeholders should educate the public on the need to choose vaginal delivery whenever possible. A vaginal delivery promotion could be launched by the government.

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