THE IMPACT OF THE NATIONAL HEALTH INSURANCE SCHEME ON MATERNAL HEALTH CARE IN GHANA

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ABSTRACT

Despite significant gains in reducing maternal and infant mortalities across the world, Low and Middle-Income Countries continue to struggle in ensuring proper health care for mothers and children. To achieve the Sustainable Development Goals 3 of enhancing quality health care for women and children, the World Health Organization (WHO) admonishes countries to guarantee universal health coverage for their citizenry. Universal health coverage among other things, helps in alleviating the financial burden of women in accessing better health care during pregnancy and after childbirth. It is in light of this that countries including Ghana introduced the free maternal health policy under National Health Insurance Scheme (NHIS) to provide free maternal services for expectant and lactating mothers.

Using interrupted time series analysis (itsa), this study examined any improvement at the national and regional levels, in delivery assistance by skilled birth attendants and postnatal care before and after the implementation of the free maternal health care within the NHIS. Findings from the study indicate that the NHIS had improved supervised deliveries by skilled birth attendants in all the 10 Ghanaian regions except for postnatal care. A greater number of NHIS-insured women utilized the services of skilled birth attendants during delivery after the commencement of the NHIS, unlike women with no insurance with the NHIS. On the contrary, the NHIS had no statistical association, nationally and in the 3 out of 10 regions, with postnatal care, despite an uptick post-NHIS, which suggests that a higher number of NHIS non-insured women received postnatal care compared to NHIS-insured women.

With national and regional variations in maternal health care, the study brings to the fore, the need to increase enrollment in the NHIS and also identify and address other challenges affecting health care utilization such as long distances to health care centers, long waiting times at health facilities, unmotorable roads networks, which tend to undermine access to affordable health care for mothers and children.

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To the faculty, staff and students in the Department of Community Health and Epidemiology, thank you for your warmth and kindness.

DEDICATION

To my late father, Mr. Francis Owusu for your encouragement to study hard
To my mother, Mrs. Augustina Owusu for your sacrifices and prayers
To my adorable wife and son, Dora and Kwaku, you inspire me daily

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Health insurance: A way to distribute the financial risk associated with the variation of individuals' health care expenditures by pooling costs over time through pre-payment and over people by risk pooling (OECD, 2004).

Life expectancy at birth: Number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life (World Development Indicators Database, 2019).

Maternal health: Refers to the health of women during pregnancy, childbirth, and postnatal period (WHO, 2020).

Maternal mortality ratio (MMR): number of women who die from pregnancy-related causes while pregnant or within 42 days of pregnancy termination per 100,000 live births (World Development Indicators Database, 2019).

Multicollinearity: When covariates within a model are not independent from each other which could lead to biased estimation (Yoo et al, 2014).

Postnatal period: Begins immediately after the birth of the baby and extends up to six weeks (42 days) after birth (WHO, 2008).

Skilled birth attendant (SBA): An accredited health professional such as a midwife, doctor or nurse who has been educated and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns (WHO, 2004).

Total fertility rate (TFR): The total number of births a woman would have by the end of her childbearing period if she were to live to the end of her childbearing years and bear children in accordance with age-specific fertility rates of the specified year (World Development Indicators Database, 2019).

Under-five mortality: The probability per 1,000 births that a newborn baby will die before reaching age five, if subject to age-specific mortality rates of the specified year (World Development Indicators Database, 2019).

Universal Health Care (UHC): Ensuring that all people have access to promotive, preventive, curative, rehabilitative and palliative health services they need, of sufficient quality to be effective, while also ensuring that the use of these services does not expose the user to financial hardship (WHO, 2018).

CHAPTER 1: INTRODUCTION

There have been reductions in maternal and infant mortalities across the world since the 1990s. Nonetheless, in Africa and other low and middle-income countries (LMICs), maternal mortality is the leading cause of death among women of reproductive age (Kuruvilla et al, 2014). Allocation of funds in improving maternal health care services should therefore be a topmost priority of governments in LMICs. This will not only ensure the reduction of high costs in accessing health care, but also enhance the general wellbeing of mothers and children. Hence, the role of health insurance in improving maternal health care and the lives of expecting mothers and newborns across the world cannot be overemphasized. Aside the reduction of facility user fees and expenditures in health care, health insurance may increase the number of antenatal visits, deliveries supervised by skilled health personnel and deliveries in health facilities (Feijen-de Jong, 2012).

Relying on national demographic health surveys in assessing health insurance coverage in 30 LMICs and the impact on maternal health care in 8 countries in sub-Saharan Africa (Burundi, Gabon, Ghana, Namibia and Rwanda) and Asia (Albania, Cambodia and Indonesia), Wang et al, (2014) concluded that health insurance had a statistically significant and positive association with deliveries in health facilities in 4 out of the 8 countries (Cambodia, Ghana, Indonesia and Rwanda). In addition, 8 percent of Ghanaian women with health insurance had 4 or more antenatal visits, whereas women in Indonesia recorded a 3-percentage increase in antenatal visits. However, Wang et al, (2014) underscored the low coverage of health insurance in most countries. It tends to reason that higher coverage of health insurance will likely lead to higher patronage of maternal health care services such as antenatal, delivery at health facilities, postnatal and the like. Thus, health insurance will significantly contribute to the increased utilization of maternal health care services.

1.1 Overview of National Health Insurance Scheme and maternal health care in Ghana

One of the major global health concerns is access to universal health care (Alhassan et al, 2016). Universal health care (UHC) is defined by the World Health Organization as "ensuring that all people have access to promotive, preventive, curative, rehabilitative and palliative health services they need, of sufficient quality to be effective, while also ensuring that the use of these services does not expose the user to financial hardship" (WHO, 2018).

In response to the clarion call for the provision of affordable and quality health care to the public, most developing countries, including Ghana, Rwanda and Kenya, have initiated social health intervention programs through health insurance projects (Scheil-Adlung et al, 2006). Nonetheless, Ghana became the first country in sub-Saharan Africa to implement a national health insurance plan with the primary focus of ensuring access to UHC (Rajkotia et al, 2011). Ghana's National Health Insurance Scheme (NHIS) was introduced in 2003, but became operational in 2004, to replace the out–of–pocket expenditure of healthcare services (Alhassan et al, 2016). Another objective of the scheme was to ensure the accessibility of affordable and quality health care for all, especially for the poor (Fenny et al, 2015). Accessibility refers to ensuring that health insurance is available to all registered members, regardless of their socio – economic status, whereas affordability guarantees inexpensive health care services (NHIA annual report, 2013).

Under the NHIS, premium exemptions are granted to some groups of people including minors (below 18 years), seniors (above 70 years), and pregnant women. Also, free maternal health care as part of the NHIS begun in July 2008 (Blanchet et al, 2012). This initiative was to reduce the financial burdens of pregnant women, while providing access to quality maternal care services such as antenatal care, deliveries by skilled birth attendants and postnatal care (Blanchet et al, 2012). Thus, under the health policy, expectant mothers are entitled to four prenatal services, supervised delivery, one postnatal visit and childcare for three months after delivery (Escobar et al, 2010; Dixon et al, 2014). However, before the implementation of the free maternal health care, the NHIS only offered free delivery services (Twum et al, 2018). Financing the NHIS emanates from different sources (Kotoh et al, 2018). Workers in the formal sector pay 2.5% contributions of their social security scheme through payroll deductions, 2.5% value added taxes on some goods and services, funding from government and payments from adults in the

informal sector who are not contributors to the Social Security and National Insurance Trust (Kotoh et al, 2018).

Informal sector refers to "all economic activities by workers and economic units that are – in law or in practice – not covered or insufficiently covered by formal arrangements. Their activities are not included in the law, which means that they are operating outside the formal reach of the law; or they are not covered in practice, meaning – although they are operating within the formal reach of the law, the law is not applied or not enforced; or the law discourages compliance because it is inappropriate, burdensome, or imposes excessive costs" (ILO, 2014). On the other hand, businesses activities within the formal sectors are fully registered with state institutions and regulated by laws (Addai, 2011).

Since its establishment, an increasing number of people have subscribed to the NHIS. Active membership (constitutes new members and those with renewed NHIS cards) increased from 1.3 million in 2005 to close to 10.5 million in 2014, representing about 40% of Ghana's population covered by the NHIS as shown in Figure 1.1 (NHIS Annual report, 2013; Wang et al, 2017).

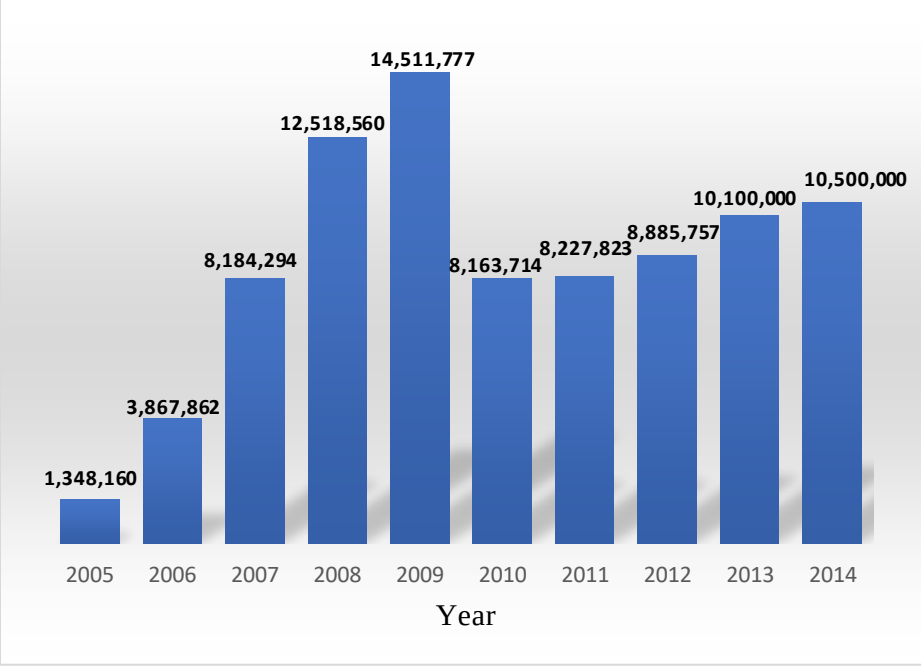

Figure 1.1: Ghana's NHIS membership trend from 2005-2014 (Source: NHIS annual report, 2013; Wang et al, 2014)

In assessing Ghana's NHIS in terms of fulfilling its core mandate of providing access to affordable and quality health care, Witter et al, (2009) use existing data and conducted interviews in the national, regional and district levels, between 2005 - 2009. Findings from their studies suggest some correlation between increasing enrollment in the NHIS and improvements in certain key health indicators (Witter et al, 2009). The average life expectancy in 2013 was 61 years, maternal mortality rate (MMR) had reduced from 467 deaths per 100,000 live births in 2000 to 321 deaths per 100, 000 in 2013, while under-five mortality rates also decreased from 101 deaths per 1,000 live births in 2000 to 67 deaths per 1,000 live births in 2013 (Wang et al, 2017).

These three key indicators improved further in 2017. Ghana's life expectancy rate in 2017 was 64 years, with maternal mortality rate at 308 deaths per 100,000 live births in 2017, and under -five mortality rates at 46 deaths per 1,000 live births in 2019 (World Bank, 2020). These results seem to suggest that prior to the inception of the NHIS, Ghana's maternal and general health care were in a deplorable state and that the NHIS could improve Ghana's health care. Table 1.1 shows Ghana's averages on some key health indicators compared to other countries in sub – Saharan Africa (SSA) from 1960–2013.

Table 1.1: Health Outcome Indicators in Ghana, 1960–2013

	Ghana							*Percentage Change (%)*					*Sub-Saharan African*
	1960	*1970*	*1980*	*1990*	*2000*	*2010*	*2013*	*1960-1970*	*1970-1980*	*1980-1990*	*1990-2000*	*2000-2010*	*2013*
Life expectancy	46	49	52	57	57	61	61	6.52	6.12	9.62	0.00	7.02	58
Maternal mortality ratio (deaths per 100,000 women aged 15-49 years.)	N/A	N/A	N/A	634	467	325	321	N/A	N/A	N/A	-26.34	-30.41	573
Total fertility rate	6.7	7	6.5	5.6	4.7	4.1	3.9	4.48	-7.14	-13.85	-16.07	-12.77	5
Under- five mortality (deaths per 1000 live births)	211	202	166	127	101	75	67	-4.27	-17.82	-23.49	-20.47	-25.74	89

Source: World Development Indicators Database (2019).

1.2 Study Rationale and Objectives

Although some studies suggest that the NHIS may be an effective health intervention tool in improving access to health services (Witter et al, 2009), there is little evidence on the impact of free maternal health care services under the NHIS on specific maternal health outcomes and services. Some of these health services and outcomes include antenatal and postnatal services, supervised delivery in a health facility, maternal mortality, stillbirths and live births, etc. Much focus has been on the effects of NHIS on accessing other health care services, with little discussion on the influence of the NHIS on maternal health across the 10 regions of Ghana.

Thus, this study will compare the maternal care (supervised delivery by skilled birth assistants and postnatal care) before and after the free maternal health policy within the NHIS. Such comparison will give insight into the effectiveness of the free health care policy under the NHIS on overall maternal health care in Ghana.

The objectives of this study are to:

1. Examine the improvement, if any, in maternal health care before and after the implementation of the free maternal health care policy within the NHIS
2. Examine regional differences in maternal outcomes and services after the commencement of the free maternal health care policy within the NHIS

This study hypothesizes that:

1. Women insured under the NHIS are more likely to seek the services of skilled birth attendants during pregnancy compared to uninsured women.
2. Women insured under the NHIS are more likely to receive postnatal care compared to uninsured women.

CHAPTER 2: LITERATURE REVIEW

This chapter reviews literature on the role of NHIS on maternal health care namely supervised delivery by skilled birth attendants and postnatal care. The theoretical framework of this study is also discussed.

Globally, sub-Saharan Africa and Southern Asia account for more maternal deaths with close to 86% of the world's total in 2017 (WHO, 2020). Notwithstanding, across the world, 400 million people do not have access to quality health care and close to 6% of residents in LMICs living in abject poverty must pay before receiving basic health care (Sanogo, 2020). To address these challenges, among other reasons, the Sustainable Development Goals (SDGs) were drafted to serve as a blueprint in ensuring a better future for all. One of the targets for the SDGs is the promotion of good health and wellbeing for everyone, including improvement in maternal health for women across the world. In addition, the WHO aims to reduce the average maternal deaths in the world by less than 70 deaths per 100,000 live birth by 2030 and to encourage universal health coverage for all and sundry (WHO, 2020).

Health insurance is defined as "a way to distribute the financial risk associated with the variation of individuals' health care expenditures by pooling costs over time through pre-payment and over people by risk pooling" (OECD, 2004). Thus, the role of health insurance is critical in ensuring positive health outcomes. According to the WHO, maternal health "refers to the health of women during pregnancy, childbirth and postnatal period" (WHO, 2020). This definition suggests that maternal health comprises of antenatal care, supervised delivery by a health professional and postnatal services.

2.1 Supervised delivery

The SDG 3 aims to reduce maternal and neonatal mortality while improving maternal and child health care with the assistance of skilled birth attendants (SBA) (U.N., 2020). Studies have showed a direct association between number of deliveries by SBA and a decrease in maternal deaths (Scott, 2009). A SBA is defined as "an accredited health professional such as a midwife, doctor or nurse who has been educated and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns" (WHO, 2004).

Globally, about 63% of pregnant women receive assistance during delivery from SBA (Lewis, 2008). Whereas SBA services are widespread within the health care systems of developed countries, only 47% and 61% of expectant mothers in Africa and Asia respectively, deliver with the support and care of SBA (Lewis, 2008). In Ghana for instance, although the coverage of SBA has moderately improved from 40% in 1988 to 55% in 2010, 45% of pregnant mothers are unattended to by SBA during delivery (Ganle, 2014). A study by Ganle et al, (2014), revealed that despite Ghana's free maternal services under the NHIS, there are inadequate and uneven number of SBA, coupled with long waiting times at hospitals, poor services, transportation challenges to health care facilities and the like. These challenges stifle the essence of the free maternal health care in providing access to quality and affordable maternal services which is crucial in reducing maternal and neonatal mortalities and ensuring the wellbeing of mothers and newborns.

In their study, Dzapkasu et al, (2012) saw an increase in deliveries at health facilities supervised by SBA as well as wider insurance coverage among pregnant women in Brong – Ahafo Region in Ghana after the roll – out of the free maternal health care within the NHIS. However, the study could not determine the effect of NHIS on facility deliveries assisted by SBA in other regions, which my study examined. Similarly, Allegri et al, (2011) conducted a study in Nouna Health District in Burkina Faso to find out the reasons for seeking maternal care services (for example, antenatal care, delivery by SBA) after a significant reduction in user fees. Results indicated that out of the 435 pregnant women who delivered a year prior to the study, 72% delivered with assistance from SBA. The study concluded that although user fee reduction enhanced access to maternal care, the policy alone was not enough in ensuring that all women, regardless of their sociodemographic backgrounds, can readily access maternal care such as delivery by SBA. Other barriers like lack of transportation to health facilities, cultural and religious factors, other than financial predicaments, could impede access to services by SBA.

Using the 2006/2007 Namibian Demographic and Health Survey, Zere et al, (2011) also explored the determinants for inequities in SBA during deliveries. After controlling for confounders like education, wealth, place of residence; either urban or rural, delivery by SBA among women with insurance was 20% more than those without insurance. Findings from these

studies highlight the crucial role of health insurance in assessing maternal health care such as supervised delivery.

2.2 Postnatal care

Worldwide, health issues related to pregnancy and childbirth account for over 287,000 maternal deaths, with 99% of such deaths occurring in LMICs (WHO, 2010). Between 50% and 71% of mothers lose their lives after delivery, especially within the first few hours (WHO, 2005). Thus, the early hours, days and months after birth, usually referred to as postpartum periods, are very crucial to the survival of both the mother and child (WHO, 2008). Timely postnatal care for mothers and babies is therefore of much importance in curbing maternal and child mortalities (WHO, 2008). The WHO states that the postnatal period "begins immediately after the birth of the baby and extends up to six weeks (42 days) after birth "(WHO, 2008). Postnatal care is also critical in ensuring that mothers are educated on breastfeeding, family planning, immunization, and essential information regarding the general wellbeing of mother and children (WHO, 2008).

In LMICs however, majority of mothers and babies do not benefit from postnatal care especially within the first few days and weeks after birth (UNICEF, 2009). Also, unlike other maternal care services such as antenatal and supervised delivery by SBA, postnatal coverage is usually low in developing countries (Alfredo et al, 2012). For instance, in the Democratic Republic of Congo, out of 1762 women sampled from households in the indicator cluster surveys, 93% of women received antenatal care from SBA, but only 35% of women received postnatal care (Abel Ntambue, et al, 2012). In addition, postnatal care coverage in SSA is about 53% compared to 86% in North Africa (Sanogo, 2020).

Using the 2012 Gabon Demographic Health Survey, postnatal care was about 14 percent higher among insured women than those without insurance (Sanogo, 2020). In evaluating Ghana's NHIS on maternal care services, Browne et al, (2016) found that out of the 2987 women selected from the 2008 Ghana Demographic Health Survey, postnatal care increased by 61 percent among insured women. Comparatively, my study however, utilized 6 Demographic health surveys in Ghana to examine the impact of NHIS on postnatal care.

2.3 Theoretical framework

This study adapts the behavioral healthcare utilization model (Andersen, 1995). This model was used because it gives insight to reasons why individuals will patronize specific health care services. This forms a basis for having a health insurance card to utilize maternal care such as delivery at health facility and postnatal care. Under this model, factors that influence health care utilization are identified and grouped as predisposing, enabling and need factors. Predisposing factors consist of sociodemographic characteristics, whiles resources like income that helps individuals to access health care constitute the enabling factors. The need factors are physical conditions like illnesses that require the urgency for health care.

From this explanation, age as a covariate of this study is categorized as a predisposing factor, supervised delivery by SBA and postnatal care assigned as need factors with health insurance considered as an enabling factor. This study is therefore, guided by the theoretical framework as displayed in Table 2.1 with factors indicated operationalized by the variables shown.

From Figure 2.1 below, women within the reproductive age, who are more likely to get pregnant may consider registering for health insurance to meet their needs for professional assistance during delivery and for postnatal care after delivery.

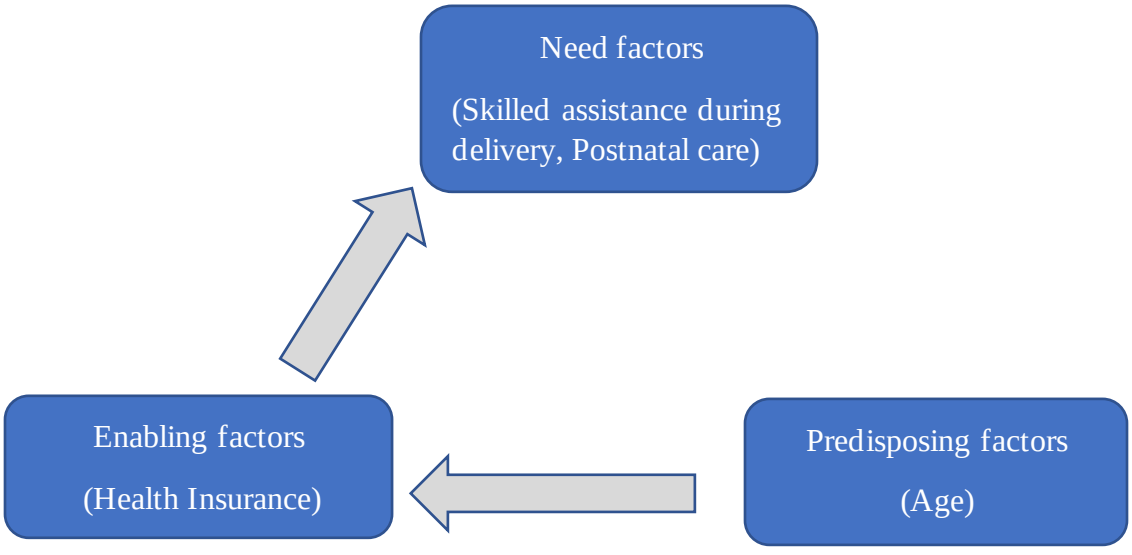

Figure 2.1: Theoretical framework using the Health Care Utilization Model. [Source: Andersen (1995)]

CHAPTER 3: METHODOLOGY

In this chapter, a brief history of Ghana is discussed. Also, the study design, source of data, description of variables, methods and data analyses are detailed.

3.1 Study Setting and Population

3.1.1 Profile of Ghana

Ghana, is a democratic country, situated on the west coast of Africa. It is also the first country in Sub – Saharan Africa (SSA) to gain independence from British colonial rule on March 6th, 1957 (GDHS, 2014). With an estimated land area of 238, 587 kilometres, Ghana shares boundaries with three French speaking countries; Togo to the east, Cote D'Ivoire to the west and Burkina Faso to the North, with the Atlantic Ocean to the south. Currently, it has an estimated population of 30.42 million (World Population Prospects, 2019).

Ghana has a relatively stable presidential political system, with executive powers vested in the president, who is elected every four years and serves two terms. An independent parliament and judiciary are key institutions whose primary roles are to enact and interpret the laws, respectively (GDHS, 2014).

Also, Ghana had 10 regions with 216 districts (Ghana Statistical Survey [GSS], 2013b). The regions include Ashanti, Brong – Ahafo, Greater Accra, Western, Eastern, Volta, Central, Northern, Upper East and Upper West (GSS, 2013b). About 50% of the entire population reside in the Greater – Accra, Ashanti and Eastern regions (GSS, 2013b). However, in December 2018, residents in the Brong – Ahafo, Western, Volta, Northern and Upper East voted in a referendum to form 6 additional regions - North East (575,558 people), Bono East (581,368 people), Oti (742,664 people), Savannah (599,852), Ahafo (927,960 people) and Western North (1,168,235 people) which makes Ghana's current region to be 16 (GSS, 2019).

Note: The study focused on only 10 regions since the surveys from which data was collected were *conducted before 2018.*

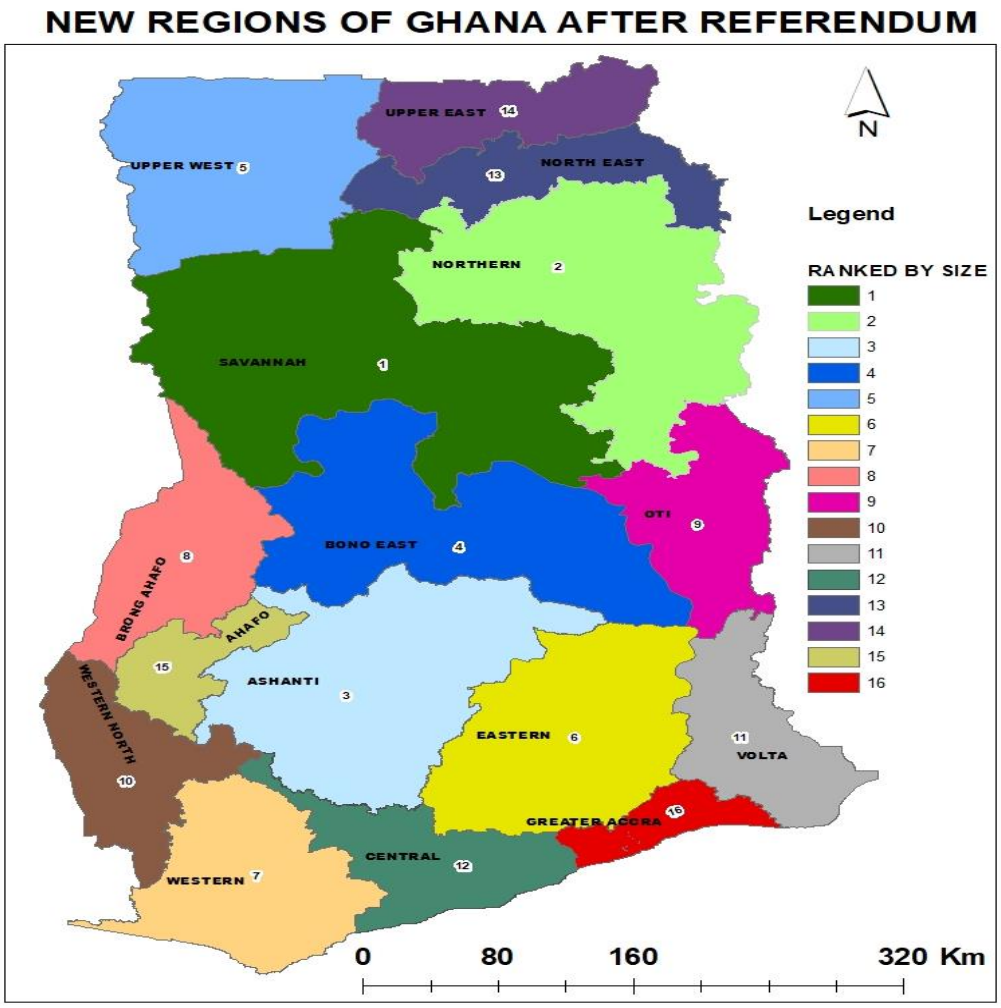

Figure 3.1: Map of Ghana and her location on the African continent [Source: Ghana Statistical Service, (2019)].

3.2 Study Design

This study used interrupted time series (itsa) design which involves variables that are measured repeatedly at consistent intervals over several observations followed by an intervention. One of the benefits of itsa is the ability to assess the pattern or trend of the outcome variable over time after the intervention has been implemented. (Velicer & Fava, 2003). Trend in this case refers to a decrease or increase in the slope of the dependent variables following the intervention. Thus, itsa was applied in the study to ascertain the trend in the outcome variables (delivery assistance by SBA and postnatal care) that were measured in different time points after the roll out of the NHIS.

3.3 Data sources

To meet the stated objectives of this study, five rounds of data were retrieved from the Ghana Demographic and Health Surveys (GDHS), spanning from 1993 to 2014 (Ghana Demographic Health Survey, 2014). To complement GDHS dataset, 2011 Ghana Multiple Indicator Cluster Survey 4 (MICS) was obtained from United Nations MICS website (UNICEF, 2020). The datasets were pooled together as follows:

1. Three years (1993, 1998 and 2003) prior to the rolling out of the free maternal health service
2. Three data time periods (2008, 2011, and 2014) post-implementation of the NHIS

3.3.1 Ghana Demographic Health Survey

The Ghana Demographic Health Survey (GDHS) is a nationally representative sample survey primarily designed to provide information on fertility, family planning, infant and child mortality, maternal and child health, and nutrition (GDHS, 2014). The GDHS implemented by the Ghana Statistical Service, begun at different time points from 1988 to 2017.

All variables collected as well as sampling techniques were derived from the primary source which is the GDHS (GDHS, 2014). The surveys were conducted in two stages. Stage 1 consisted of a multistage sampling design where selected clusters from population and health census preceding the surveys were used as sampling frames. Using systematic sampling with probability corresponding to size, the clusters made up of enumeration areas were selected from urban and rural areas.

In stage 2, stratified sampling was utilized. Interviews of women aged 15-49 years and men of ages 15-59 years in rural and urban areas were conducted across the 10 regions in Ghana. For this study, only information about women was considered. Questionnaires collected data pertaining to the levels, households, and women and men. The household questionnaire solicited information on age of members of each household, marital and educational status, relationship to household head, as well as death of children under 5 during the last 5 years. A household is defined as a "person or group of related and unrelated persons who usually live together in the same dwelling unit(s) or in connected premises, who acknowledge one adult member as the head of the household, and who have common cooking and eating arrangements" (GDHS, 2014 pg.11).

The women's questionnaire focused on information such as reproductive history, contraceptive knowledge and use, antenatal, delivery and postnatal care, infant feeding practices, child immunization and health, marriage, fertility preferences, attitudes about family planning, death of expectant mothers during the last 5 years, age, education and other demographic variables. It is noteworthy that some of these variables identified in the women's questionnaires are related to the predisposing, enabling and need factors which constitute the theoretical framework of this study earlier discussed. Women in their reproductive age (20-49 years) are more likely to get pregnant and solicit the services of SBA as well as postnatal visits after delivery. Age (used as a covariate in this study) in this case is termed as a predisposing factor, while assistance by SBA and postnatal services could be categorized as need factors which are the dependant variables for this study.

The MICS on the other hand, provides a nationally – representative data on certain indicators related to children and women in the 10 regions of Ghana and assesses progress towards achieving the SDGs (MICS, 2011). The urban and rural areas within these regions constitute the sampling frame with selection of sample done in two stages. First is the stratified probability design which selects census enumeration areas with probability commensurate to size. Second, using systematic sampling, (where sample members within a larger population are selected from a random starting point with fixed periodic intervals) households from enumeration areas are selected. Women within the ages of 15–49 and men aged 15 – 59 were interviewed. Interviews for women, covered a wide range of areas including maternal and

newborn health, postnatal checks, contraception, child mortality, NHIS, HIV/AIDS, malaria among others.

Independent (NHIS enrollment) and dependent variables for this study (delivery assistance by professional health workers and postnatal care) were the same from both surveys. Also, their definitions and measurements from both surveys were the same.

3.4 Sample size

There were variations in the sample sizes of the 6 data points. Data points in interrupted time series refer to time periods measured either in months or years where an outcome variable is observed after an intervention has been introduced with the assumption that it interferes with its trend (outcome variable). Only 6 data points were used because the study variables were not available in other data points from the GDHS and MICS which were the main sources of data for this study. The sample sizes for the data points represent women uninsured and those insured under NHIS.

Table 3 shows the sample sizes of the 6 data points.

Table 3: Number of insured women in households, national samples, GDHS and MICS

Year	1993	1998	2003	2008	2011	2014
Number of women	1671	2662	3196	2657	7340	5385

Source: Author's calculation based on data from GDHS and MICS

3.5 Study variables

3.5.1 Dependent variables

The outcome variables consist of supervised delivery and postnatal care and were also measured as categorical variables. *Supervised delivery* was categorized into *skilled* (coded as 1*)*, *unskilled* (coded as 2*)* and *none* (coded as 0). Women under the *skilled* category are those who received assistance during delivery from medical doctors, midwives, or nurses, while women who sought help during delivery from traditional birth assistants and persons other than skilled health professionals were classified as *unskilled*. Also, women who had no support at the time of delivery were categorized as *none*.

For postnatal care, women who were assisted by skilled personnel were coded as 1, whereas those under the unskilled category were coded as 0. The postnatal variable, however, did not have a *none* category in the 6 data points used.

3.5.2 Independent variable

3.5.2.1 Primary independent variable

In this study, the independent variable is the NHIS intervention and was measured as a categorical variable in the GDHS and MICS. Questionnaires from these national surveys asked women if they had a health insurance card or not. The predictor variable was operationalized as 1=women insured with NHIS (post – intervention period), and 0=women with no insurance with NHIS (pre – intervention period).

3.5.2.2 Other independent variable

Due to availability of data, in all the 6 data points, this study could only consider maternal age as a covariate or secondary independent variable. It was measured as a categorical variable ("15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49"). This study however merged the ages from 20 to 49 (used as reference) years which represent the reproductive ages of women and assigned a code of 1 with 0 assigned to ages 15-19.

3.6 Ethics Review

The study was exempt from the requirement of Research Ethics Board (REB) review and approval by the University of Saskatchewan's Research Ethics Board (REB) based on article 2.2 of the Tri-Council Policy Statement (TCPS2). Article 2.2 specifies *"Research that relies exclusively on publicly available information does not require REB review when: (a) the information is legally accessible to the public and appropriately protected by law; or (b) the information is publicly accessible and there is no reasonable expectation of privacy."*

3.7 Data Preparation

For a better analysis of results, a thorough assessment of data was conducted which included identification of missing values and variables that are inconsistent in the 6 data points used. After cleanup of data, all calculations were done using Stata/SE 16.0 with statistical significance set at α=0.05.

For the outcome variables, percentages of women who had delivery assistance from skilled personnel, unskilled persons, and ones with no assistance as well as those who had postnatal care or not were calculated for each of the 10 regions of Ghana. Similarly, percentages of women within the reproductive age of 20-49 resident in all 10 regions who had assistance from SBA and received postnatal services were also calculated.

3.8 Data Analysis

3.8.1 Interrupted time series – theoretical framework

To achieve the stated objectives, an interrupted time series analysis (itsa) was utilized. Itsa involves a before -and-after comparison of a trend in a particular outcome following an intervention introduced at a given point in time within a single population (Bernal et al, 2018). In this case, the pre-intervention period functions as the control, while the post-intervention serves as the treatment. In itsa, several observations for the pre and post intervention periods are used, which reduces confounding effects on the outcome since the general characteristics of the population tend to gradually change with time (Bernal et al, 2018). Nonetheless, in comparing pre and post intervention periods, other interventions, and occurrences within the same period as the intervention been studied cannot be disregarded, which could also explain the trend in outcome. This scenario could lead to history bias (confounding) and undermine internal validity of a study as argued by Campbell and Stanley, (1963).

One suggested technique to limit potential confounding from events occurring at the same time during the intervention in question is to include a control series such that there is a comparison pre and post intervention and comparison of an intervention – control group (Bernal et al, 2018). In this case, the intervention - control group in this study are uninsured women under NHIS in the 10 Ghanaian regions compared to the intervention group been women insured with NHIS in the 10 regions in Ghana, to ascertain the trend in delivery assistance by SBA and postnatal care among these two groups after the NHIS roll out. (NHIS is the intervention.)

The study also used the Effective Practice and Organization of Care (EPOC) Cochrane Group definition of an ITSA design (Bero et al, 2002):

1. There were at least three time points before and after the intervention, irrespective of the statistical analysis used,
2. The intervention occurred at a clearly defined point in time,

3. The study measured provider performance or patient outcome.

In an ITSA, at least three variables are required: (Bernal et al, 2017).

i. T: the time elapsed since the start of the study in which the unit representing the frequency with which observations are taken (e.g. month or year).

ii. X_t: a dummy variable indicating the pre-intervention period (coded 0) or the post-intervention period (coded 1),

iii. Y_t: the outcome at time t.

Thus, the following regression equation was used for the single group itsa:

$$Y_t = \beta_0 + \beta_1 T_t + \beta_2 X_t + \beta_3 X_t T_t + \varepsilon_t$$

"Y_t is the aggregated outcome variable measured at each equally spaced time point t, T_t is the time since the start of the study, X_t is a dummy (indicator) variable representing the intervention (preintervention periods 0, otherwise 1), and $X_t T_t$ is an interaction term" (Linden & Adams, 2011). β_0 represents the starting level of the outcome variable (Y), β_1 is the slope or trend of the outcome before the commencement of the intervention, β_2 is the level change in the outcome within the period immediately after the intervention and β_3 is the slope change following the intervention (the difference between the preintervention and postintervention slopes of the outcome) [Bernal et al, 2017]. "T" in the above model also refers to all time points before and after the intervention period, when data is gathered either in months or years (Barone – Adesi et al, 2011). Therefore, in this research, "T' will represent time points between the start of the study (1993, 1998, 2003) and after the intervention period (2008, 2011, 2014).

3.8.2 Model Building

The strategy for the model building was to include all variables of relevance to the study's conceptual framework and their theoretical/biological significance. The model building adopted a more relaxed criterion for inclusion in the multivariable modelling.

In the first step, univariate analyses were conducted where each independent variable was compared separately with the outcome variables and variables with p-values ≤ 0.20 are selected for the multivariable modelling. The second stage involved the inclusion of all variables that met the selection criterion in the first step in the multivariable model along with all variables of main interest and of theoretical/biological significance. Variables with p-values ≤ 0.05 are retained and added to the final model. Ordinary Least Squares regression (OLS) models were used for both

the single and multi -groups models to adjust for autocorrelation. For the national analysis of the outcome variables (supervised deliveries by skilled personnel and postnatal care), only one covariate (age), was included in the final model. Thus, since there is only one group (Ghana/national) under study with no comparison with other groups, a single group itsa model was conducted as shown below.

Nationwide model for supervised delivery by SBA/postnatal care (Single group itsa):

$$Y_t = \beta_0 + \beta_1 T + \beta_2 X_t + \beta_3 T X_t + \beta_4 age_t + \varepsilon_t$$

However, a multiple – group itsa model was fitted for the regional analysis. This is because of comparison between multiple groups (10 regions) to examine any trend or effect in the outcome variables after the introduction of the intervention.

Regional model for supervised delivery by SBA/postnatal care (Multiple – group itsa):

$$Y_t = \beta_0 + \beta_1 T_t + \beta_2 X_t + \beta_3 X_t T_t + \beta_4 Z + \beta_5 Z T_t + \beta_6 Z X_t + \beta_7 Z X_t T_t + \beta_8 age_t + \varepsilon_t$$

"Z is a dummy variable to denote the cohort assignment (treatment or control), and ZT_t, ZX_t, and ZX_tT_t are all interaction terms among comparable groups (treatment and control groups) with β_0 to β_3 represent the control group; β_4 to β_7 represent the treatment group. β_4: difference in the level between treatment and control prior to intervention; β_5: difference in the slope between treatment and control prior to intervention; β_6: difference in the level between treatment and control in the period immediately following intervention initiation; β_7: difference between treatment and control in the slope after initiation of the intervention compared with preintervention" (Linden, 2015).

3.9 Autocorrelation

One assumption of standard regression models is independence of observations. This assumption tends to be violated usually in time series data where continuous observations are normally similar to one another than the ones separated, a situation known as autocorrelation (Bernal et al, 2017). In this study, both dependent and independent variables were taken in years with an average gap of 4 years which is likely to reduce or eliminate the possibility of autocorrelation. Nonetheless, to adjust for autocorrelation and time -varying confounders such as age and other socioeconomic variables which are fairly constant and tend to change gradually with time, itsa's ordinary least squares (OLS) model Newey – West standard errors in Stata as well as random error ε_t were used to correct autocorrelation (Linden et al, 2011).

CHAPTER 4: RESULTS

In this chapter, results from the methodology discussed in chapter 3 are presented. In line with the stated objectives, descriptive statistics of percentage of women who had assistance from SBA during delivery and received postnatal care are showcased. In addition, regional variations in maternal care (delivery by SBA and postnatal care) pre- and post-NHIS are also discussed.

4.1 Descriptive results

Results from Table 4.1 indicate that prior to the roll out of the NHIS, 40% (N=2199) and 38% (N=3284) of NHIS non-insured women between the ages of 20-49 years in 1993 and 1998 had delivery assistance from SBA respectively. There was, however, an increase in the number of NHIS-insured women who were assisted by SBA from 2003 to 2014 except for 2011 with 41% (N=3773), 53% (N=2978), 52% (N=2872), 67% (N=5883) in 2003, 2008, 2011 and 2014 respectively.

Results from Table 4.1 also show a relative increase in the number of women who had delivery assistance by SBA post-NHIS in the 10 regions, compared to those who had the same maternal service pre-NHIS. For instance, in comparing women who sought the services of SBA during delivery in 2008 with those in 1998, a gradual increase was recorded in the 3 biggest regions in terms of population with 10.8% (N=2978) v 7.9% (3284) in Ashanti, 5.6% (N=2978) v 3.5% (3284) in Brong-Ahafo and 7.8% (N=2978) v 6.2% (3284) in Eastern regions.

Similarly, Figure 4.1 displays the trend of women who were assisted by SBA pre- and post-NHIS. A steady increase from about 40% in 1993 to close to 70% in 2014 in the number of women assisted by SBA during delivery was recorded in post-NHIS as compared to pre-NHIS. Expectedly, there was a decrease of women (from 51% in 1993 to 27% in 2014) who were assisted by unskilled birth attendants post-NHIS. A relatively low percentage of women had no professional assistance during delivery pre- and post-NHIS.

Table 4.1: Proportion of women who delivered babies with skilled birth attendants, unskilled birth attendants and none from 1993-2014

	1993			1998			2003			2008			2011			2014		
	Skilled	Unskilled	None	Skilled	Unskilled	None	Skilled	Unskilled	None	Skilled	Unskilled	None	Skilled	Unskilled	None	Skilled	Unskilled	None
	N =2199			*N=3284*			*N=3773*			*N=2978*			*N=2872*			*N=5883*		
Age																		
15-19	3.4	3.5	0.1	1.6	1.6	0.0	1.4	2.1	0.0	2.1	1.8	0.0	3.7	1.7	0.1	2.6	0.9	0.0
20-49	40.5	48.1	4.5	38.2	53.7	4.8	41.1	52.9	2.5	53.3	39.7	3.0	52.7	39.1	2.8	67.3	26.1	3.1
Regions																		
Ashanti	10.1	7.4	0.6	7.9	5.1	0.7	8.7	6.3	0.2	10.8	3.7	0.2	4.4	1.5	0.2	8.8	1.1	0.3
Brong-Ahafo	5.3	3.5	0.8	3.5	2.8	0.5	6.6	5.0	0.3	5.6	2.8	0.5	3.2	1.9	0.2	8.7	2.1	0.3
Central	4.0	6.4	0.1	3.7	5.3	0.2	2.4	3.8	0.1	4.3	3.1	0.1	8.1	5.0	0.2	7.3	2.7	0.3
Eastern	6.0	4.3	0.5	5.5	5.6	0.2	3.3	4.6	0.1	5.1	3.4	0.3	3.6	1.1	0.0	6.3	2.5	0.4
Greater Accra	7.2	1.5	0.3	6.2	1.9	0.3	7.1	1.6	0.1	7.8	1.4	0.1	4.8	0.5	0.1	7.1	0.6	0.1
Northern	1.8	9.4	0.4	1.2	9.0	0.4	2.9	12.7	0.7	4.1	11.2	0.6	8.5	16.7	0.9	5.8	8.8	0.8
Upper East	1.2	5.3	0.1	1.9	9.4	0.3	1.5	5.8	0.0	3.5	3.9	0.2	8.6	4.0	0.0	8.0	1.4	0.1
Upper West	0.8	2.4	0.4	2.0	6.1	0.8	3.1	5.9	0.7	4.8	4.6	0.6	8.5	6.2	0.7	5.6	2.9	0.1
Volta	3.7	6.2	0.9	3.0	4.9	0.5	3.3	3.8	0.2	4.4	3.7	0.1	2.9	1.6	0.4	5.3	2.8	0.1
Western	3.7	5.1	0.6	4.9	5.1	0.9	3.6	5.5	0.1	5.0	3.7	0.3	3.7	2.3	0.0	7.2	2.1	0.6

Source: Based on author's calculation from GDHS and MICS 1993-2014

Table 4.2: Proportion of women who received postnatal care from skilled and unskilled personnel from 1993-2014

	1993		1998		2003		2008		2011		2014	
	Skilled	Unskilled	Skilled	Unskilled	Skilled	Unskilled	Skilled	Unskilled	Skilled	Unskilled	Skilled	Unskilled
	N =1284		*N=1909*		*N=683*		*N=510*		*N=1472*		*N=3603*	
Age												
15-19	6.3	0.2	3.0	0.4	1.5	4.1	1.6	3.1	3.4	1.4	3.8	0.4
20-49	91.7	1.8	89.4	7.2	34.1	60.3	35.9	59.4	60.9	34.3	84.5	11.3
Regions												
Ashanti	16.4	0.1	13.8	0.4	5.3	8.9	3.7	9.8	4.5	1.4	9.8	0.7
Brong-Ahafo	8.6	0.1	7.8	0.0	5.6	4.7	2.5	3.1	6.1	2.2	10.8	1.1
Central	9.3	0.1	7.9	0.7	0.6	11.4	1.8	6.3	4.3	3.7	8.9	1.6
Eastern	10.2	0.9	9.2	1.0	2.5	6.1	3.5	5.1	1.8	1.4	7.5	1.3
Greater Accra	13.3	0.1	10.4	0.0	1.3	1.3	1.2	2.5	3.9	0.5	8.9	0.6
Northern	6.7	0.5	6.2	1.4	9.4	12.6	8.4	12.0	12.2	16.2	8.4	2.7
Upper East	9.5	0.0	11.7	2.6	2.2	4.2	7.6	6.7	12.7	1.4	11.2	0.5
Upper West	4.0	0.0	6.4	0.4	5.0	1.9	3.9	10.6	11.5	5.0	6.9	0.7
Volta	10.9	0.0	6.7	0.5	1.8	1.3	1.0	2.4	3.5	2.4	6.8	1.0
Western	9.0	0.4	12.3	0.7	2.0	11.9	3.7	4.1	3.7	1.5	9.1	1.4

Source: Based on author's calculation from GDHS and MICS 1993-2014

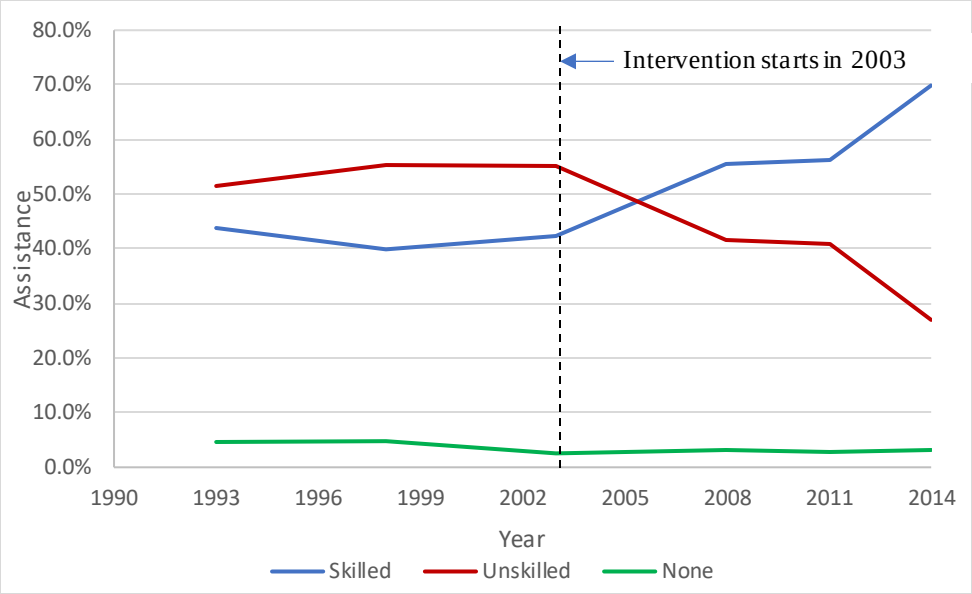

Figure 4.1: Graph showing the trend in the proportion of women assisted by skilled birth attendants, unskilled birth attendants and no assistance
(Source: Author's calculation from GDHS and MICS 1993-2014)

For postnatal care, as shown in table 4.2 and Figure 4.2, a gradual increase was reported in the number of women (20-49 years) who had postnatal care from skilled personnel post-NHIS from 35% (N=510) in 2008 to 84% in 2014 (N=3603) after a 34% decrease in 2003 (N=683) from 89% in 1998 (N=1909). A gradual decrease of women who received postnatal care from unskilled persons was however reported post-NHIS from 59% (N=510) in 2008 to 11% (N=3603) in 2014 after an increase of 60% (N=683) in 2003 from 7% (N=1909) in 1998.

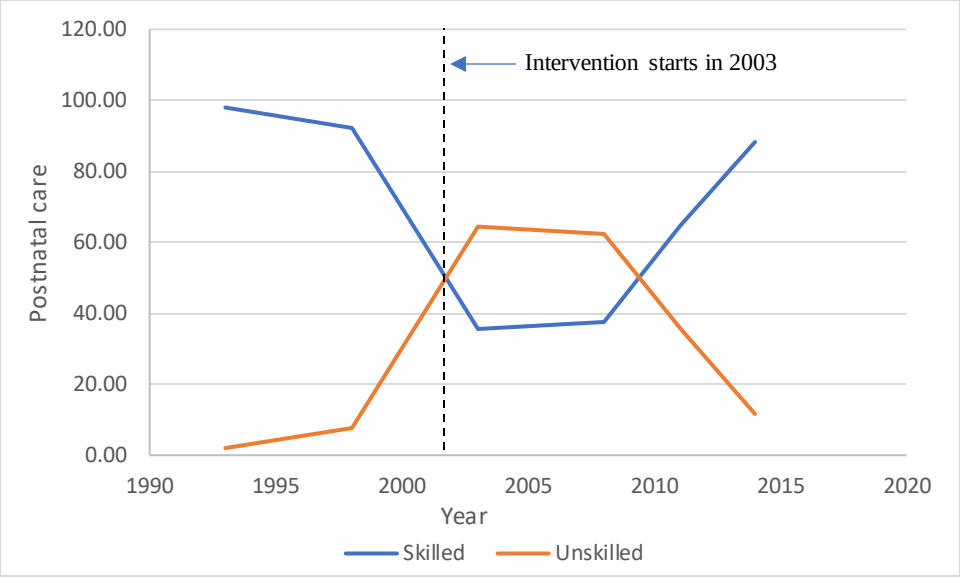

Figure 4.2: Proportion of women who received postnatal care from skilled and unskilled personnel after delivery
(Source: Author's calculation from GDHS and MICS 1993-2014)

4.2 Interrupted time series (itsa) results

With objectives 1 and 2 focusing on the trend of delivery assistance by SBA and postnatal care in Ghana's 10 regions pre and post-NHIS, the graphs below, using itsa, display single analysis of overall NHIS coverage in Ghana and its association with delivery by SBA and postnatal care. Regional analysis showing the associations between NHIS and delivery by SBA and postnatal care are also presented.

4.2.1 Supervised delivery (national analysis)

In figure 4.3, women who had delivery assistance by skilled birth attendants pre- and post-NHIS across the 10 regions of Ghana are displayed. Prior to the implementation of NHIS in 2003, there was a significant percentage decrease **(β= -1.44, 95% CI = [-1.97, -0.92, P <0.05)]),** of skilled birth attendants who assisted pregnant women. In the first year of the NHIS however, there appears to be a significant percentage **(β= 8.45, 95% CI = [0.26, 16.63, P <0.05)]),** increase of skilled birth attendants who assisted pregnant women during delivery.

Subsequently, the results show a significant increase **(β= 3.75, 95% CI = [2.71, 4.79, P <0.05)]),** in the annual trend (in relation to the pre-intervention period) of skilled birth attendants assisting pregnant women during delivery. The post-intervention trend also shows a significant

percentage increase **(β= 2.30, 95% CI = [1.49, 3.11, P <0.05)]),** of skilled birth attendants who assisted pregnant women during delivery.

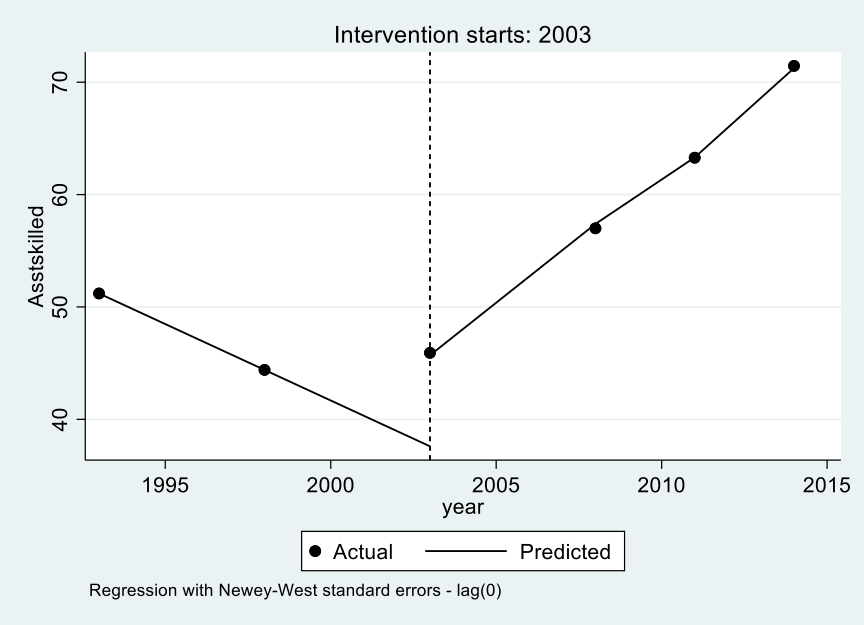

Figure 4.3: Proportion of women delivering babies with skilled birth attendant in Ghana from 1993-2014.

In figure 4.4 women who were assisted by skilled birth attendants during delivery pre- and post-NHIS across the 10 regions of Ghana with *age* as a covariate is presented. Prior to the implementation of NHIS in 2003, there was a non-significant percentage decrease **(β= -1.41, 95% CI = [-1.61, -1.21, P >0.05)])**, of skilled birth attendants who assisted pregnant women. In the first year of the NHIS however, there appears to be a significant percentage **(β= 8.41, 95% CI = [2.13, 14.69, P<0.05)])**, increase of skilled birth attendants who assisted pregnant women during delivery.

Subsequently, the results show a non-significant increase **(β= 3.74, 95% CI = [3.04, 4.44, P >0.05)]),** in the annual trend (in relation to the pre-intervention period) of skilled birth attendants assisting pregnant women during delivery. *Age*, as a covariate, had a non-statistically significant **(β= 0.07, 95% CI = [-0.19, 0.33, P >0.05)** association with delivery assistance from skilled birth attendants, which means a woman's age seems not to positively influence her decision to utilize the services of skilled birth attendants during delivery. The post-intervention trend, however, shows a significant percentage increase **(β= 2.32, 95% CI = [1.70, 2.95, P**

<0.05)]), of skilled birth attendants who assisted pregnant women during delivery after adjusting for *age*.

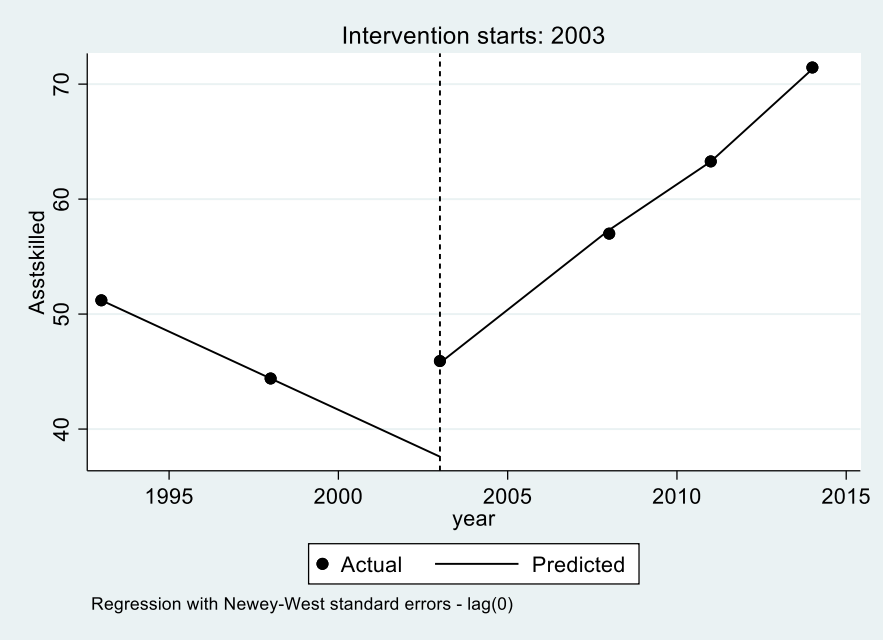

Figure 4.4: Proportion of women delivering babies with skilled birth attendant in Ghana (with age as a covariate) from 1993-2014.

4.2.2 Postnatal (National Analysis)

In figure 4.5, women who received postnatal care pre- and post-NHIS across the 10 regions of Ghana are displayed. Prior to the implementation of NHIS in 2003, there was a non - significant percentage decrease **(β= -0.62, 95% CI = [-19.52, 18.27, P >0.05)])**, in postnatal care for women after delivery. In the first year of the NHIS, there appears to be a non-significant percentage **(β= -60.31, 95% CI = [-354.20, 233.57, P>0.05)])**, decrease of postnatal care.

Subsequently, the results show a non-significant increase **(β= 5.44, 95% CI = [-31.83, 42.71, P >0.05)])**, in the annual trend (in relation to the pre-intervention period) among women who had postnatal care after delivery. The post-intervention trend also shows a non-significant percentage increase **(β= 4.81, 95% CI = [-24.17, 33.80, P >0.05)]),** in postnatal care for women after delivery.

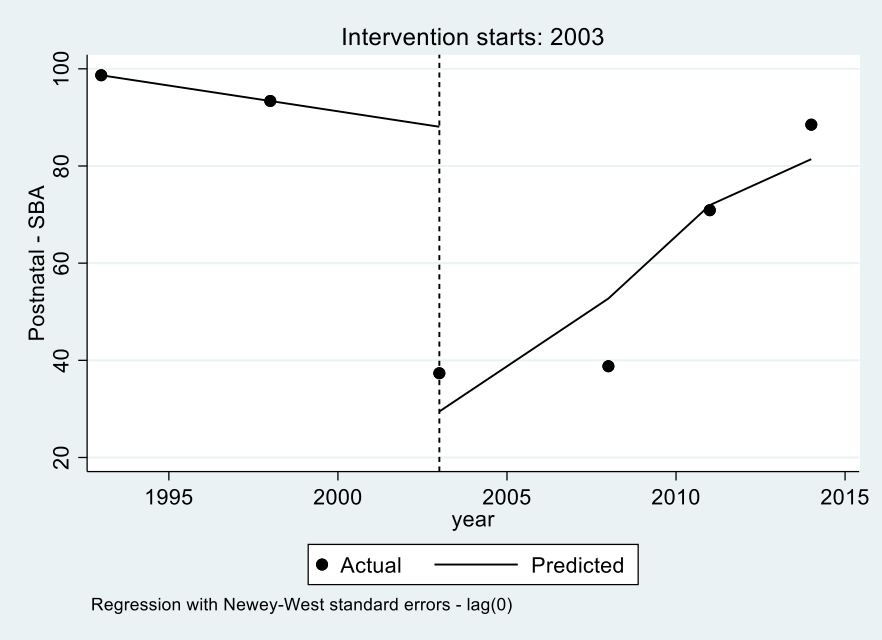

Figure 4.5: Proportion of women who received postnatal care in Ghana pre- and post-NHIS

In figure 4.6, women who received postnatal care pre- and post-NHIS (with age as a covariate) across the 10 regions of Ghana are shown. Prior to the implementation of NHIS in 2003**,** there was a non-significant percentage decrease **(β= -0.93, 95% CI = [-10.21, 8.34, P >0.05)]),** in postnatal care for women after delivery. In the first year of the NHIS, there appears to be a non - significant percentage **(β= -59.22, 95% CI = [-345.48, 227.02, P>0.05)])**, decrease of postnatal care.

Subsequently, the results show a non-significant increase **(β= 5.72, 95% CI = [-26.25, 37.70, P >0.05)]),** in the annual trend (in relation to the pre-intervention period) among women who had postnatal care after delivery.

Age, as a covariate, had a non-statistically significant **(β= -0.16, 95% CI = [-12.21, 11.88, P >0.05)** association with postnatal care, which means a woman's age seems not to influence her decision to utilize postnatal care after delivery. The post-intervention trend also shows a non-significant percentage increase **(β= 4.78, 95% CI = [-23.67, 33.25, P >0.05)])**, of postnatal care for women after adjusting for *age*.

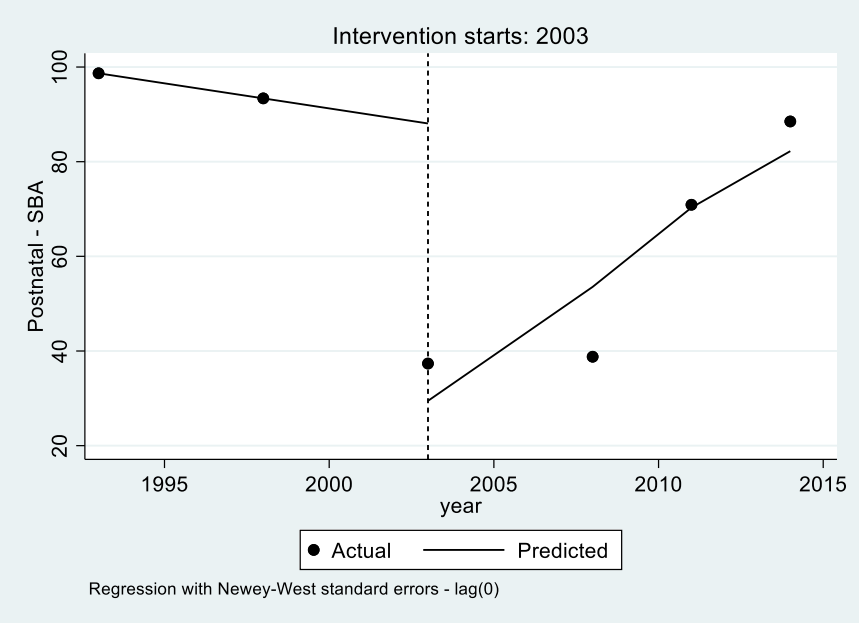

Figure 4.6: Proportion of women who received postnatal care in Ghana (with age as a covariate) pre- and post-NHIS

4.2.3 Supervised delivery (Regional Analysis)

The following charts also display the regional analysis of associations between NHIS and delivery by SBA and postnatal care with age as a covariate. Regions with significant associations with age and maternal outcomes are reported and those with no significant associations are recorded in the appendix.

In figure 4.7, the initial mean level difference between Western region and the other regions was not significant **(β= -1.38, CI = [-5.26, 2.49, P>0,05]),** and the difference in the mean baseline slope was also not significant **(β= 1.18, CI = [-2.44, 4.81, P>0.05]).** Health insurance coverage pre–NHIS had no statistically significant association **(β= 0.44, CI = [-0.07, 0.96, P>0.05])** with supervised delivery by skilled birth assistants.

During the first year of the commencement of the NHIS there was a non-statistically significant **(β= -14.77, CI = [-45.64, 16.08, P>0.05])** percentage decrease of skilled health personnel who offered delivery assistance to pregnant women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 3.39, CI = [2.27, 4.51, P<0.05])** of skilled health care providers who assisted expectant mothers insured under the NHIS. Thus, NHIS-insured women were more influenced to seek assistance from SBA during delivery compared to NHIS non-insured.

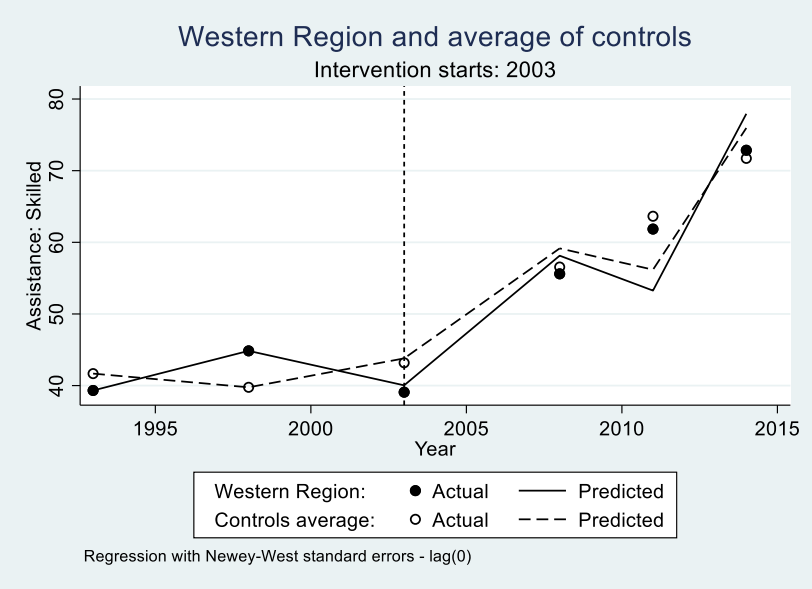

Figure 4.7: Proportion of women in Western region (Ghana) assisted by SBA during delivery pre- and post-NHIS

In figure 4.8, women who had delivery assistance from SBA (with age as a covariate) pre- and post-NHIS is displayed. The initial mean level difference between Western region and the other regions was not significant **(β= -2.80, CI = [-6.68, 1.06, P>0,05]),** and the difference in the mean baseline slope was also not significant **(β= 0.95, CI = [-2.19, 4.11, P>0.05]).** Health insurance coverage pre-NHIS had a statistically significant association **(β= 1.11, CI = [-0.07, 2.14, P<0.05])** with supervised delivery by skilled birth assistants. Age as a covariate, had a statistically significant **(β= -1.41, 95% CI = [-2.81, -0.01, P<0.05)** association with supervised delivery by SBA pre-NHIS, which means a woman's age seems to influence her decision to utilize postnatal care after delivery.

During the first year of the commencement of the NHIS**,** there was a non-statistically significant **(β= -13.22, CI = [-40.81, 14.36, P>0.05])** percentage decrease of skilled health personnel who offered delivery assistance to pregnant women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 3.24, CI = [2.38, 4.10, P<0.05])** of skilled health care providers who assisted expectant mothers insured under the NHIS. This suggests that a woman's age could influence her decision to seek assistance from SBA post-NHIS.

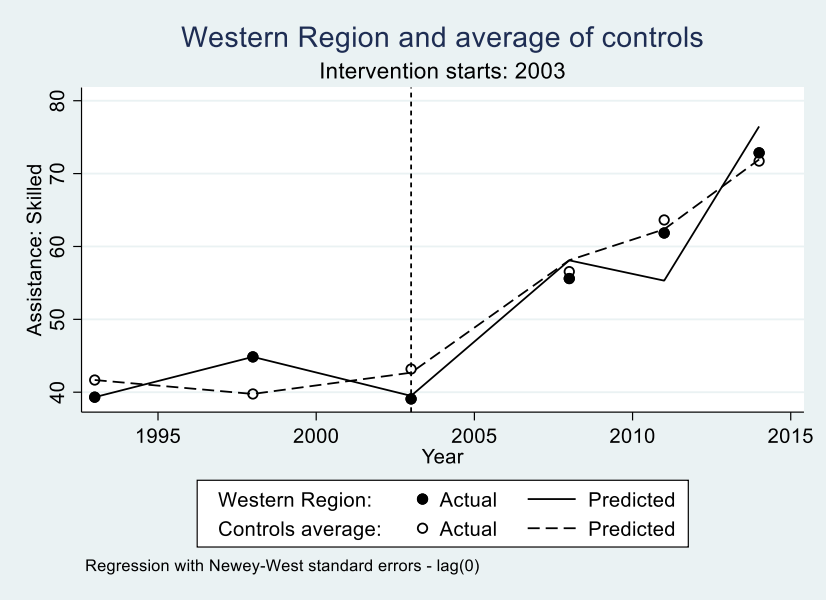

Figure 4.8: Proportion of women in Western region (Ghana) assisted by SBA during delivery (with age as a covariate) pre- and post-NHIS

In figure 4.9, the initial mean level difference between Volta region and the other regions was not significant **(β= -5.46, CI = [-18.3, 7.41, P>0,05]),** and the difference in the mean baseline slope was also not significant **(β= 0.81, CI = [-2.85, 4.47, P>0.05]).** Health insurance coverage pre–NHIS had no statistically significant association **(β= 0.43, CI = [-0.08, 0.95, P>0.05])** with supervised delivery by skilled birth assistants.

During the first year of the commencement of the NHIS there was a non-statistically significant **(β= 0.36, CI = [-31.08, 31.81, P>0.05])** percentage increase of skilled health personnel who offered delivery assistance to pregnant women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 1.86, CI = [0.89, 2.84, P<0.05])** of skilled health care providers who assisted expectant mothers insured under the NHIS. Thus, NHIS-insured women were more likely to seek assistance from SBA during delivery compared to NHIS non-insured.

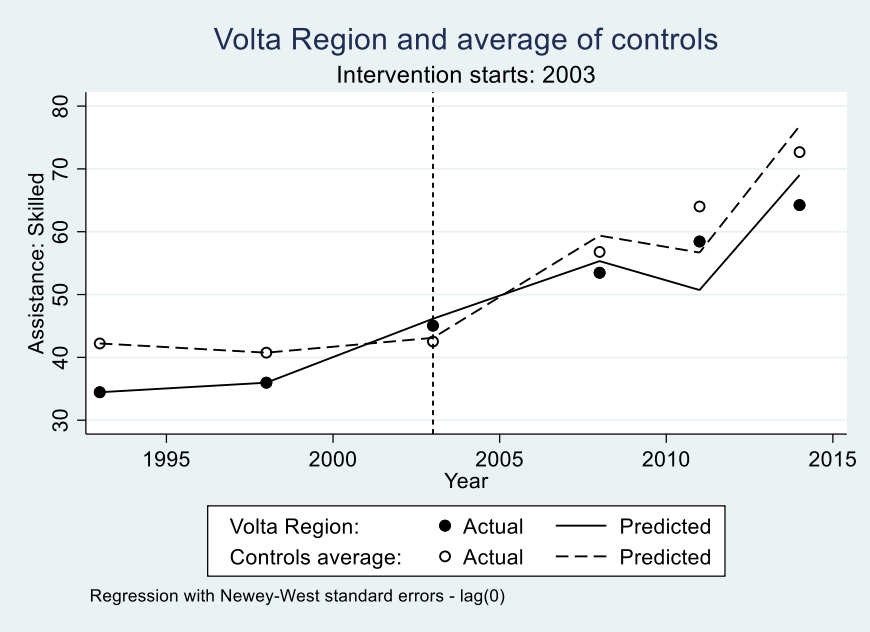

Figure 4.9: Proportion of women in Volta region (Ghana) assisted by SBA during delivery pre- and post-NHIS

In figure 4.10, women who had delivery assistance from SBA (with age as a covariate) pre- and post-NHIS is displayed. The initial mean level difference between Volta region and the other regions was not significant **(β= -0.76, CI = [-12.42, 10.89, P>0,05]),** and the difference in the mean baseline slope was also not significant **(β= 0.92, CI = [-2.22, 4.07, P>0.05]).** Health insurance coverage pre-NHIS had a statistically significant association **(β= 1.09, CI = [0.05, 2.13, P<0.05])** with supervised delivery by skilled birth assistants. Age as a covariate, had no statistically significant **(β= -1.39, 95% CI = [-2.82, 0.02, P>0.05)** association with supervised delivery by SBA pre-NHIS, which means a woman's age seems not to influence her decision to utilize postnatal care after delivery.

During the first year of the commencement of the NHIS**,** there was a non-statistically significant **(β= -4.21, CI = [-32.63, 24.21, P>0.05])** percentage decrease of skilled health personnel who offered delivery assistance to pregnant women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 1.26, CI = [0.47, 2.04, P<0.05])** of skilled health care providers who assisted expectant mothers insured under the NHIS. This suggests that a woman's age could influence her decision to seek assistance from SBA post-NHIS.

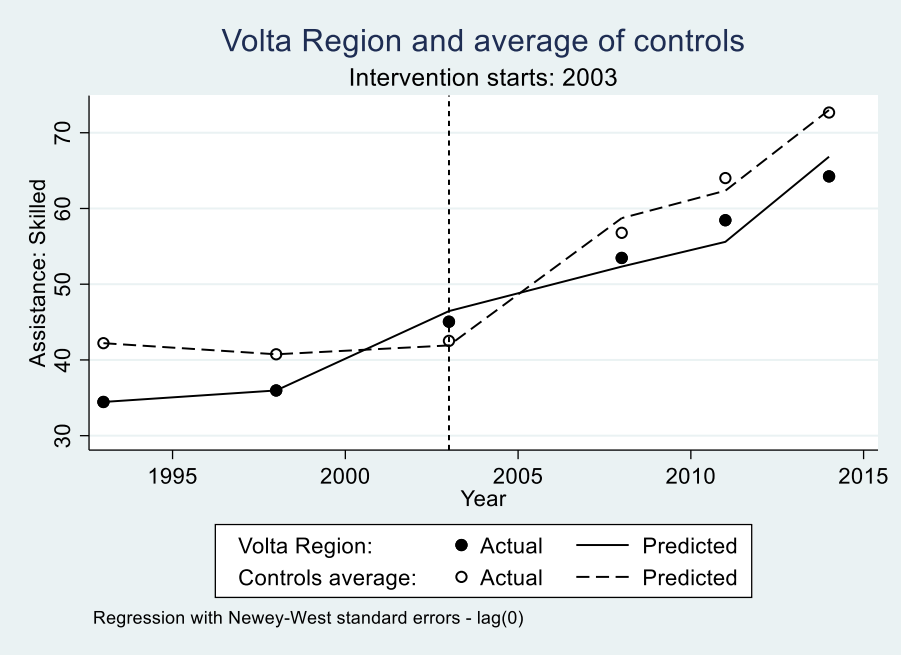

Figure 4.10: Proportion of women in Volta region (Ghana) assisted by SBA during delivery (with age as a covariate) pre- and post-NHIS

In figure 4.11, the initial mean level difference between Upper West region and the other regions was significant **(β= -21.62, CI = [-33.42, -9.82, P<0,05]),** and the difference in the mean baseline slope was not significant **(β= 0.45, CI = [-2.91, 3.82, P>0.05]).** Health insurance coverage pre–NHIS had no statistically significant association **(β= 0.46, CI = [-0.04, 0.97, P>0.05])** with supervised delivery by skilled birth assistants.

During the first year of the commencement of the NHIS there was a non-statistically significant **(β= 3.47, CI = [-25.56, 32.52, P>0.05])** percentage increase of skilled health personnel who offered delivery assistance to pregnant women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 3.01, CI = [2.24, 3.77, P<0.05])** of skilled health care providers who assisted expectant mothers insured under the NHIS. Thus, NHIS-insured women were more likely to seek assistance from SBA during delivery compared to NHIS non-insured.

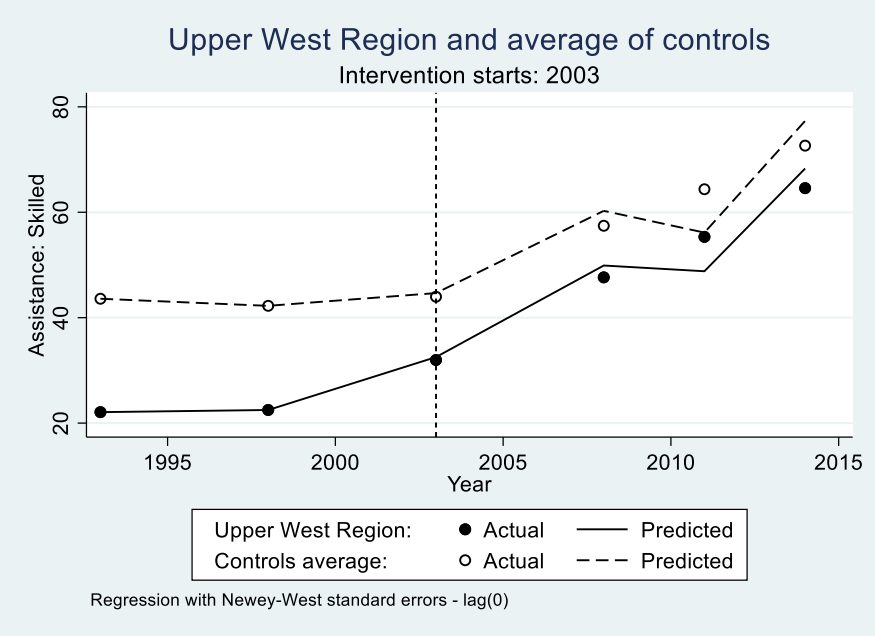

Figure 4.11: Proportion of women in Upper West region (Ghana) assisted by SBA during delivery pre- and post-NHIS

In figure 4.12, women who had delivery assistance from SBA (with age as a covariate) pre- and post-NHIS is displayed. The initial mean level difference between Upper West region and the other regions was significant **(β= -20.33, CI = [-29.32, -11.34, P<0,05]),** and the difference in the mean baseline slope was not significant **(β= 0.42, CI = [-2.37, 3.22, P>0.05]).** Health insurance coverage pre-NHIS had a statistically significant association **(β= 1.19, CI = [0.16, 2.22, P<0.05])** with supervised delivery by skilled birth assistants. Age as a covariate, had a statistically significant **(β= -1.52, CI = [-2.93, -0.10, P<0.05)** association with supervised delivery by SBA pre-NHIS, which means a woman's age seems to influence her decision to utilize postnatal care after delivery.

During the first year of the commencement of the NHIS**,** there was a non-statistically significant **(β= 0.13, CI = [-25.25, 25.52, P>0.05])** percentage increase of skilled health personnel who offered delivery assistance to pregnant women insured under the NHIS, whiles the post-intervention trend shows a statistically significant increase **(β= 2.11, CI = [1.07, 3.14, P<0.05])** of skilled health care providers who assisted expectant mothers insured under the NHIS. This suggests that a woman's age could influence her decision to seek assistance from SBA post-NHIS.

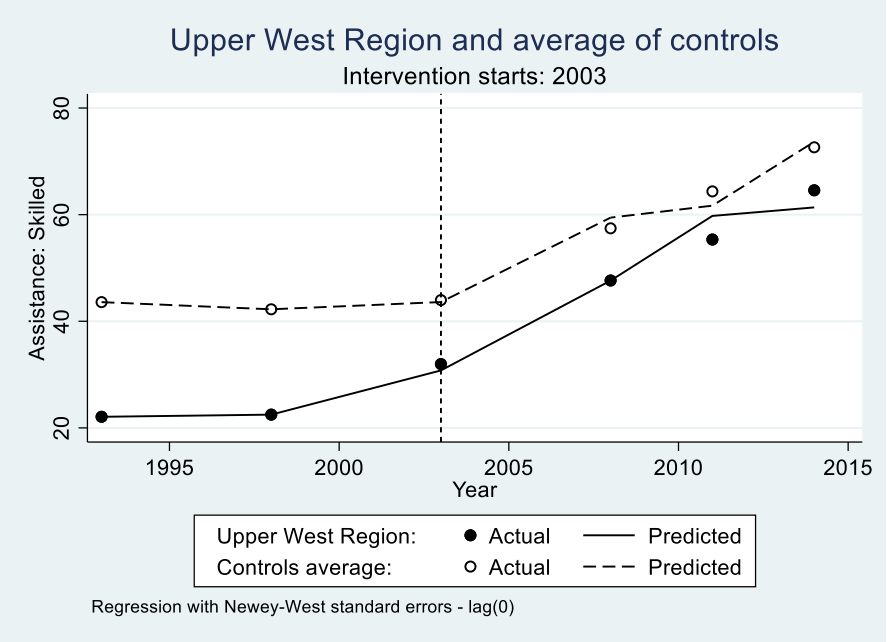

Figure 4.12: Proportion of women in Upper West region (Ghana) assisted by SBA during delivery (with age as a covariate) pre- and post-NHIS

In figure 4.13, the initial mean level difference between Upper East region and the other regions was significant **(β= -26.54, CI = [-37.99, -15.10, P<0,05]),** and the difference in the mean baseline slope was also not significant **(β= -0.40, CI = [-3.55, 2.73, P>0.05]).** Health insurance coverage pre–NHIS had no statistically significant association **(β= 0.45, CI = [-0.06, 0.97, P>0.05])** with supervised delivery by skilled birth assistants.

During the first year of the commencement of the NHIS there was a non-statistically significant **(β= 6.03, CI = [-21.53, 33.60, P>0.05])** percentage increase of skilled health personnel who offered delivery assistance to pregnant women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 5.79, CI = [5.00, 6.58, P<0.05])** of skilled health care providers who assisted expectant mothers insured under the NHIS. Thus, NHIS-insured women were more influenced to seek assistance from SBA during delivery compared to NHIS non-insured.

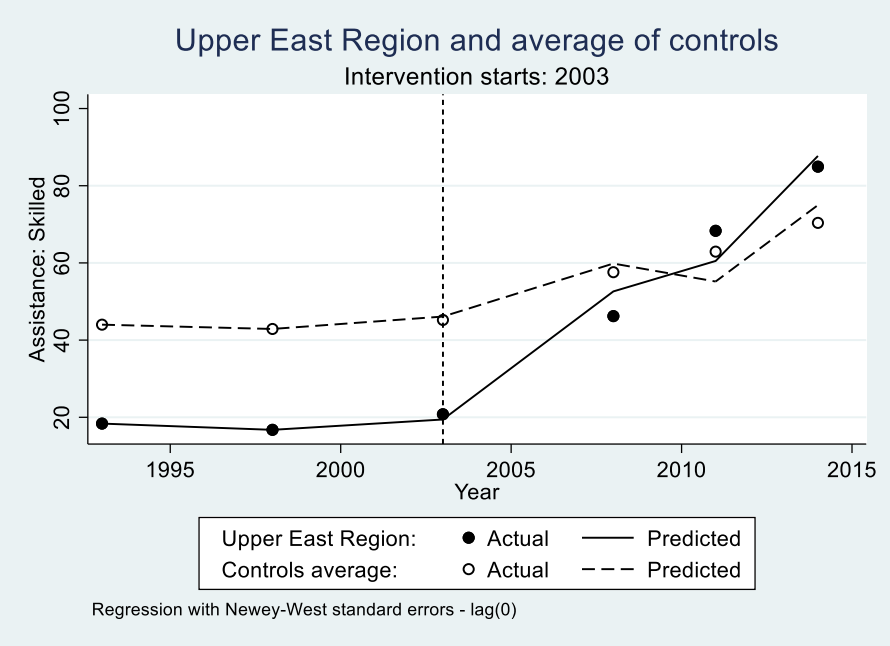

Figure 4.13: Proportion of women in Upper East region (Ghana) assisted by SBA during delivery pre- and post-NHIS

In figure 4.14, women who had delivery assistance from SBA (with age as a covariate) pre- and post-NHIS is displayed. The initial mean level difference between Upper East Region and the other regions was significant **(β= -26.85, CI = [-36.40, -18.31, P<0,05]),** and the difference in the mean baseline slope was not significant **(β= -0.91, CI = [-3.43, 1.59, P>0.05]).** Health insurance coverage pre-NHIS had a statistically significant association **(β= 1.12, CI = [0.10, 2.13, P<0.05])** with supervised delivery by skilled birth assistants. Age as a covariate, had a statistically significant **(β= -1.41, 95% CI = [-2.80, -0.02, P<0.05)** association with supervised delivery by SBA pre-NHIS, which means a woman's age seems to influence her decision to utilize postnatal care after delivery.

During the first year of the commencement of the NHIS**,** there was a non-statistically significant **(β= 12.95, CI = [-12.43, 38.34, P>0.05])** percentage increase of skilled health personnel who offered delivery assistance to pregnant women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 4.71, CI = [3.09, 6.34, P<0.05])** of skilled health care providers who assisted expectant mothers insured under the NHIS. This suggests that a woman's age could influence her decision to seek assistance from SBA post-NHIS.

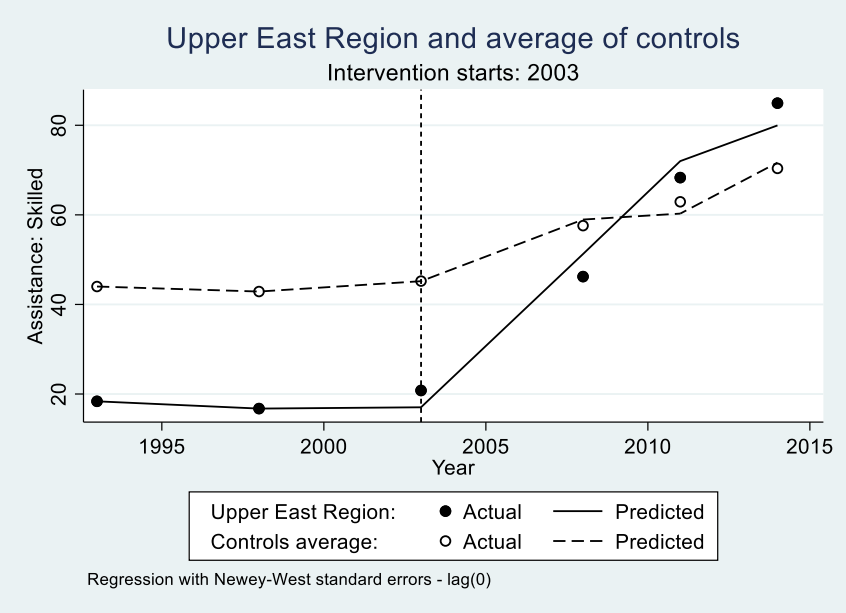

Figure 4.14: Proportion of women in Upper East region (Ghana) assisted by SBA during delivery (with age as a covariate) pre- and post-NHIS

In figure 4.15, the initial mean level difference between Northern region and the other regions was significant **(β= -25.14, CI = [-38.45, -11.83, P<0,05]),** and the difference in the mean baseline slope was not significant **(β= -0.77, CI = [-4.22, 2.66, P>0.05]).** Health insurance coverage pre–NHIS had no statistically significant association **(β= 0.18, CI = [-0.21, 0.58, P>0.05])** with supervised delivery by skilled birth assistants.

During the first year of the commencement of the NHIS there was a non-statistically significant **(β= 6.15, CI = [-22.42, 34.74, P>0.05])** percentage increase of skilled health personnel who offered delivery assistance to pregnant women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 1.86, CI = [1.52, 2.20, P<0.05])** of skilled health care providers who assisted expectant mothers insured under the NHIS. Thus, NHIS-insured women were more likely to seek assistance from SBA during delivery compared to NHIS non-insured.

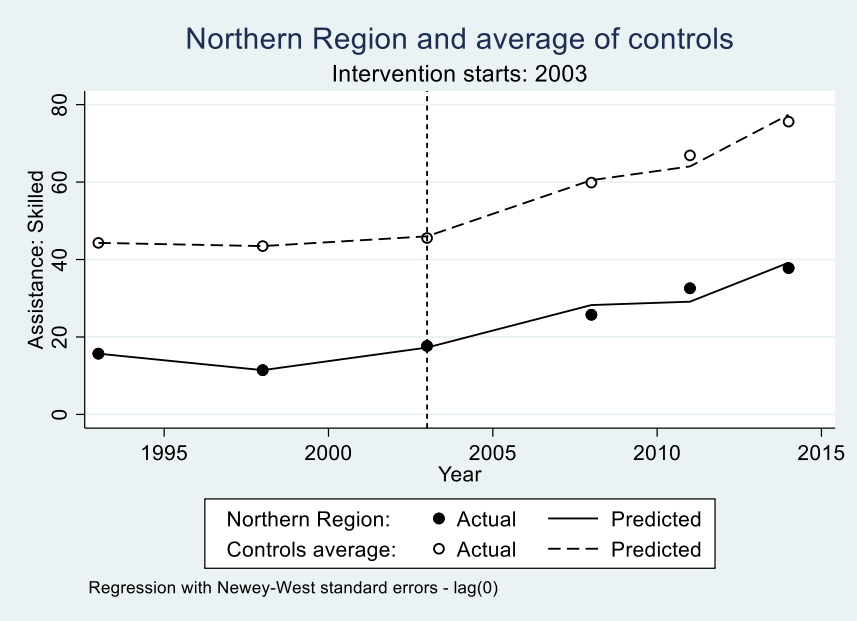

Figure 4.15: Proportion of women in Northern region (Ghana) assisted by SBA during delivery pre- and post-NHIS

In figure 4.16, women who had delivery assistance from SBA (with age as a covariate) pre- and post-NHIS is displayed. The initial mean level difference between Northern region and the other regions was not significant **(β= -20.22, CI = [-41.74, 1.33, P>0,05]),** and the difference in the mean baseline slope was also not significant **(β= -0.89, CI = [-4.24, 2.44, P>0.05]).** Health insurance coverage pre-NHIS had no statistically significant association **(β= 0.43, CI = [-0.63, 1.51, P>0.05])** with supervised delivery by skilled birth assistants. Age as a covariate, had no statistically significant **(β= -0.47, 95% CI = [-1.86, 0.91, P>0.05)** association with supervised delivery by SBA pre-NHIS, which means a woman's age seems not to influence her decision to utilize postnatal care after delivery.

During the first year of the commencement of the NHIS**,** there was a non-statistically significant **(β= 4.82, CI = [-23.81, 33.45, P>0.05])** percentage increase of skilled health personnel who offered delivery assistance to pregnant women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 1.71, CI = [1.15, 2.27, P<0.05])** of skilled health care providers who assisted expectant mothers insured under the NHIS. This suggests that a woman's age could influence her decision to seek assistance from SBA post-NHIS.

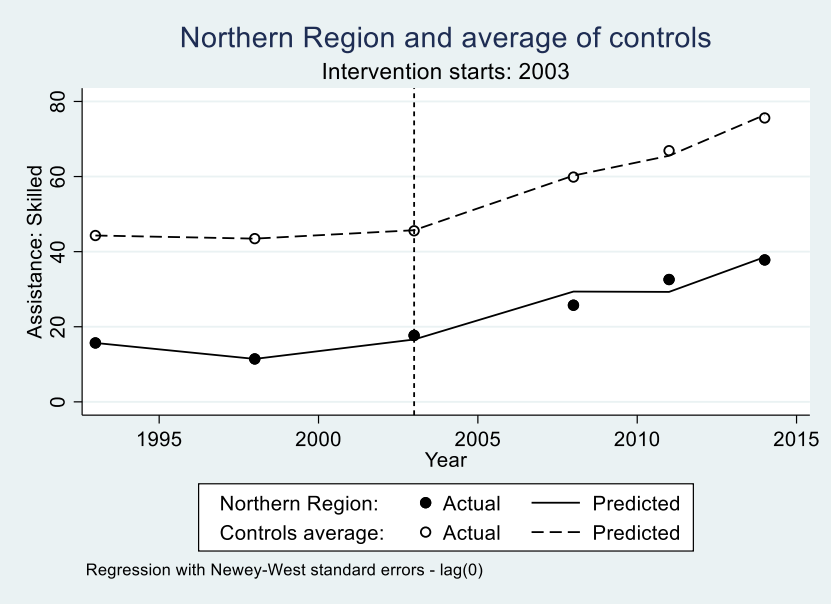

Figure 4.16: Proportion of women in Northern region (Ghana) assisted by SBA during delivery (with age as a covariate) pre- and post-NHIS

In figure 4.17, the initial mean level difference between Greater-Accra region and the other regions was significant **(β= 38.12, CI = [26.64, 49.61, P<0,05]),** and the difference in the mean baseline slope was not significant **(β= -0.75, CI = [-3.74, 2.23, P>0.05]).** Health insurance coverage pre–NHIS had no statistically significant association **(β= 0.30, CI = [-0.02, 0.63, P>0.05])** with supervised delivery by skilled birth assistants.

During the first year of the commencement of the NHIS there was a non-statistically significant **(β= 9.43, CI = [-15.79, 34.66, P>0.05])** percentage increase of skilled health personnel who offered delivery assistance to pregnant women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 1.27, CI = [0.13, 2.41, P<0.05])** of skilled health care providers who assisted expectant mothers insured under the NHIS. Thus, NHIS-insured women were more likely to seek assistance from SBA during delivery compared to NHIS non-insured.

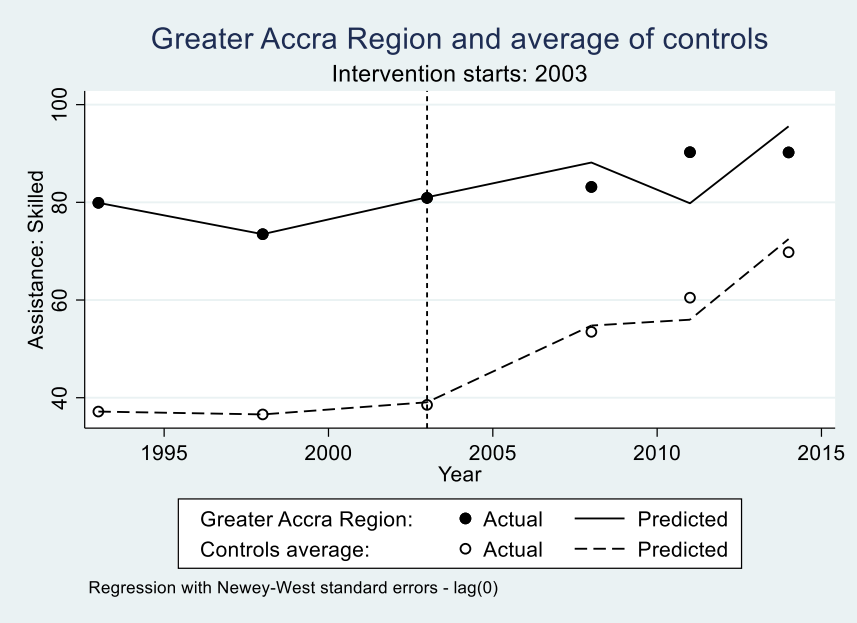

Figure 4.17: Proportion of women in Greater-Accra region (Ghana) assisted by SBA during delivery pre- and post-NHIS

In figure 4.18, the initial mean level difference between Eastern region and the other regions was not significant **(β= 13.26, CI = [-0.22, 26.74, P>0,05]),** and the difference in the mean baseline slope was also not significant **(β= -1.16, CI = [-4.78, 2.45, P>0.05]).** Health insurance coverage pre–NHIS had no statistically significant association **(β= 0.42, CI = [-0.09, 0.94, P>0.05])** with supervised delivery by skilled birth assistants.

During the first year of the commencement of the NHIS there was a non-statistically significant **(β= -0.58, CI = [-32.16, 30.98, P>0.05])** percentage decrease of skilled health personnel who offered delivery assistance to pregnant women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 2.85, CI = [0.61, 5.08, P<0.05])** of skilled health care providers who assisted expectant mothers insured under the NHIS. Thus, NHIS-insured women were more likely to seek assistance from SBA during delivery compared to NHIS non-insured.

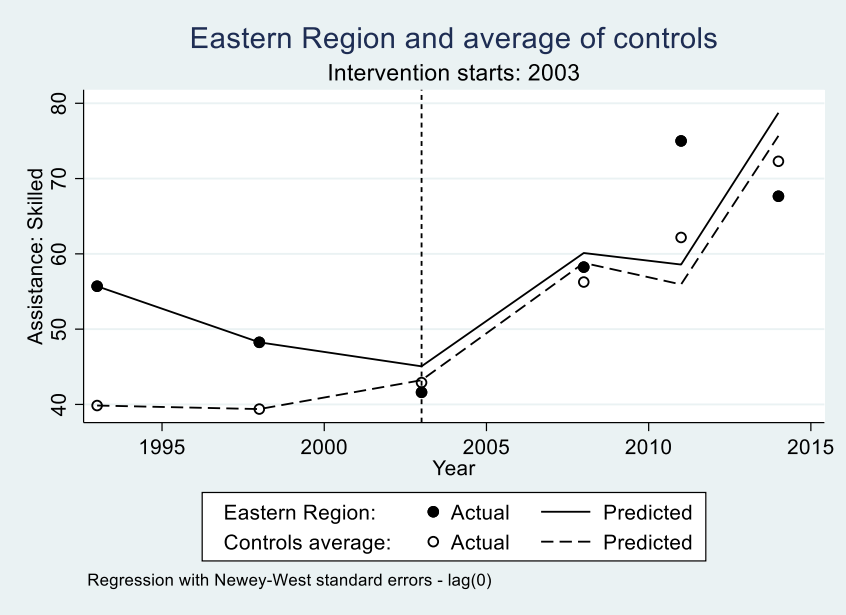

Figure 4.18: Proportion of women in Eastern region (Ghana) assisted by SBA during delivery pre- and post-NHIS

In figure 4.19, women who had delivery assistance from SBA (with age as a covariate) pre- and post-NHIS is displayed. The initial mean level difference between Eastern region and the other regions was not significant **(β= 8.53, CI = [-5.06, 22.12, P>0,05]),** and the difference in the mean baseline slope was also not significant **(β= -0.80, CI = [-3.98, 2.38, P>0.05]).** Health insurance coverage pre-NHIS had a statistically significant association **(β= 1.06, CI = [0.03, 2.09, P<0.05])** with supervised delivery by skilled birth assistants. Age as a covariate, had no statistically significant **(β= -1.35, CI = [-2.73, 0.03, P<0.05)** association with supervised delivery by SBA pre-NHIS, which means a woman's age seems not to influence her decision to utilize postnatal care after delivery.

During the first year of the commencement of the NHIS**,** there was a non-statistically significant **(β= 0.35, CI = [-27.79, 0.50, P>0.05])** percentage increase of skilled health personnel who offered delivery assistance to pregnant women insured under the NHIS, whiles the post - intervention trend shows a statistically significant increase **(β= 2.28, CI = [0.46, 4.09, P<0.05])** of skilled health care providers who assisted expectant mothers insured under the NHIS. This suggests that a woman's age could influence her decision to seek assistance from SBA post-NHIS.

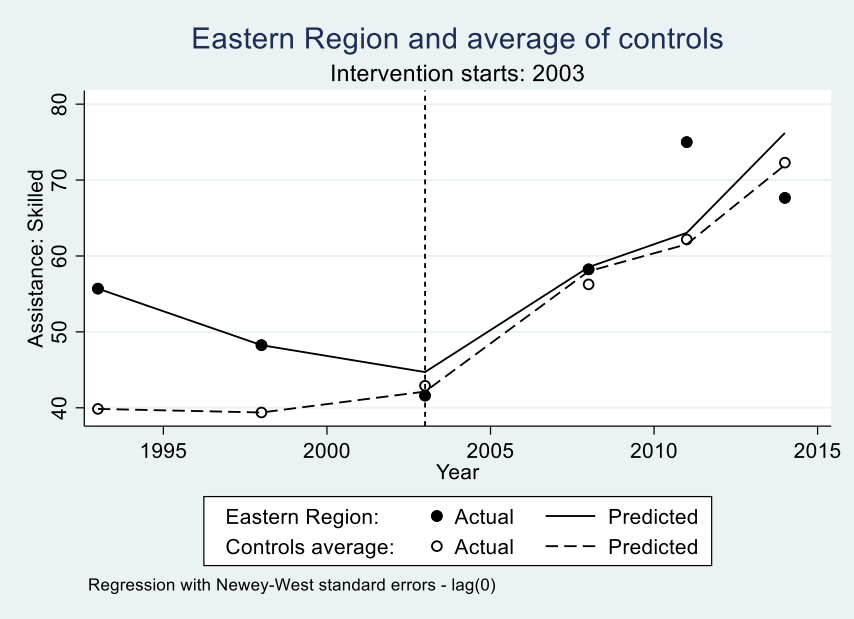

Figure 4.19: Proportion of women in Eastern region (Ghana) assisted by SBA during delivery (with age as a covariate) pre- and post-NHIS

In figure 4.20, the initial mean level difference between Central region and the other regions was not significant **(β= -1.77, CI = [-14.60, 11.05, P>0,05]),** and the difference in the mean baseline slope was also not significant **(β= 0.17, CI = [-3.48, 3.84, P>0.05]).** Health insurance coverage pre–NHIS had no statistically significant association **(β= 0.43, CI = [-0.08, 0.96, P>0.05])** with supervised delivery by skilled birth assistants.

During the first year of the commencement of the NHIS there was a non-statistically significant **(β= -2.60, CI = [-34.17, 28.96, P>0.05])** percentage decrease of skilled health personnel who offered delivery assistance to pregnant women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 3.10, CI = [1.81, 4.40, P<0.05])** of skilled health care providers who assisted expectant mothers insured under the NHIS. Thus, NHIS-insured women were more likely to seek assistance from SBA during delivery compared to NHIS non-insured.

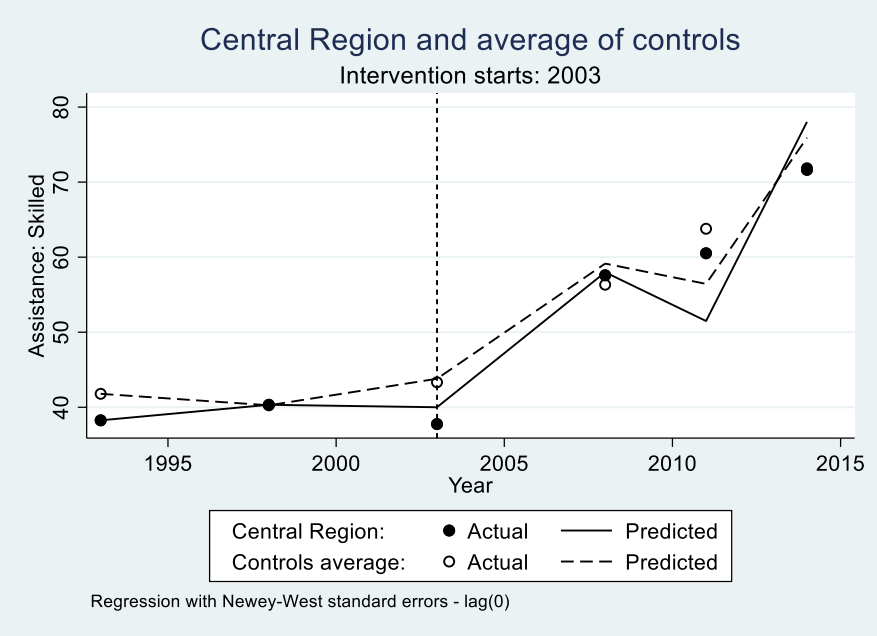

Figure 4.20: Proportion of women in Central region (Ghana) assisted by SBA during delivery pre- and post-NHIS

In figure 4.21, women who had delivery assistance from SBA (with age as a covariate) pre- and post-NHIS is displayed. The initial mean level difference between Central region and the other regions was not significant **(β= 0.09, CI = [-10.46, 10.65, P>0,05]),** and the difference in the mean baseline slope was also not significant **(β= -0.63, CI = [-3.98, 2.72, P>0.05]).** Health insurance coverage pre-NHIS had a statistically significant association **(β= 1.10, CI = [0.06, 2.13, P<0.05])** with supervised delivery by skilled birth assistants. Age as a covariate, had a statistically significant **(β= -1.40, CI = [-2.78, -0.01, P<0.05)** association with supervised delivery by SBA pre-NHIS, which means a woman's age seems to influence her decision to utilize postnatal care after delivery.

During the first year of the commencement of the NHIS**,** there was a non-statistically significant **(β= 4.67, CI = [-25.51, 34.85, P>0.05])** percentage increase of skilled health personnel who offered delivery assistance to pregnant women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 2.58, CI = [1.55, 3.60, P<0.05])** of skilled health care providers who assisted expectant mothers insured under the NHIS. This suggests that a woman's age could influence her decision to seek assistance from SBA post-NHIS.

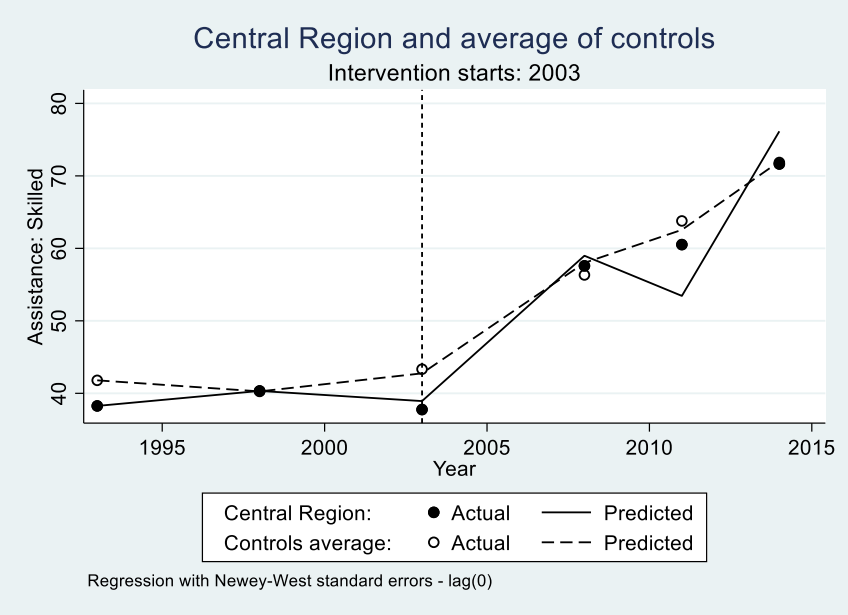

Figure 4.21: Proportion of women in Central region (Ghana) assisted by SBA during delivery (with age as a covariate) pre- and post-NHIS

In figure 4.22, the initial mean level difference between Brong-Ahafo region and the other regions was significant **(β= 15.32, CI = [2.94, 27.70, P<0,05]),** and the difference in the mean baseline slope was not significant **(β= -0.70, CI = [-4.22, 2.82, P>0.05]).** Health insurance coverage pre–NHIS had no statistically significant association **(β= 0.43, CI = [-0.08, 0.95, P>0.05])** with supervised delivery by skilled birth assistants.

During the first year of the commencement of the NHIS there was a non-statistically significant **(β= 3.59, CI = [-26.51, 33.70, P>0.05])** percentage increase of skilled health personnel who offered delivery assistance to pregnant women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 1.66, CI = [1.02, 2.29, P<0.05])** of skilled health care providers who assisted expectant mothers insured under the NHIS. Thus, NHIS-insured women were more likely to seek assistance from SBA during delivery compared to NHIS non-insured.

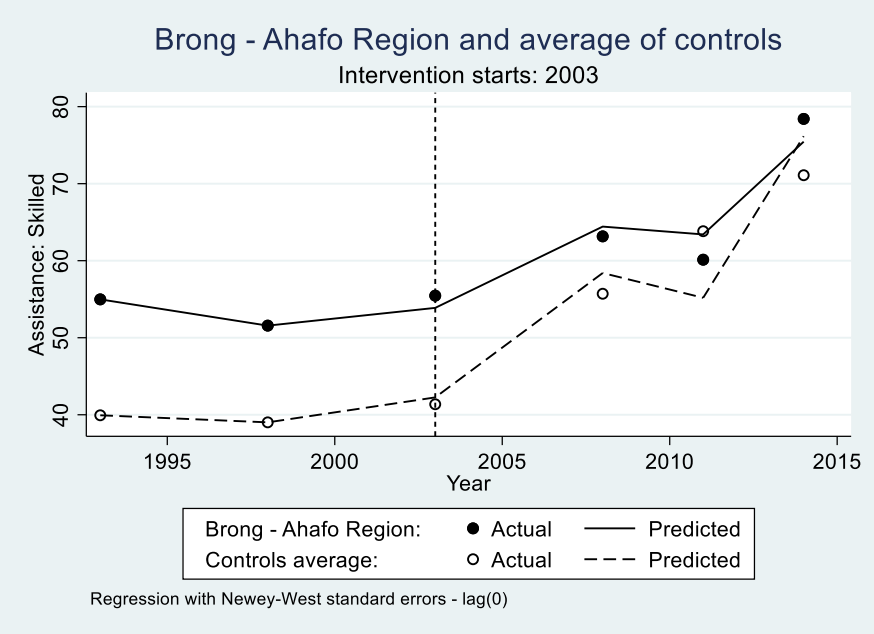

Figure 4.22: Proportion of women in Brong-Ahafo region (Ghana) assisted by SBA during delivery pre- and post-NHIS

In figure 4.23, the initial mean level difference between Ashanti region and the other regions was significant **(β= 13.53, CI = [0.03, 27.02, P<0,05]),** and the difference in the mean baseline slope was not significant **(β= 1.07, CI = [-2.51, 4.67, P>0.05]).** Health insurance coverage pre–NHIS had no statistically significant association **(β= 0.39, CI = [-0.11, 0.91, P>0.05])** with supervised delivery by skilled birth assistants.

During the first year of the commencement of the NHIS there was a non-statistically significant **(β= -8.94, CI = [-38.90, 21.00, P>0.05])** percentage decrease of skilled health personnel who offered delivery assistance to pregnant women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 2.48, CI = [2.14, 2.82, P<0.05])** of skilled health care providers who assisted expectant mothers insured under the NHIS. Thus, NHIS-insured women were more likely to seek assistance from SBA during delivery compared to NHIS non-insured.

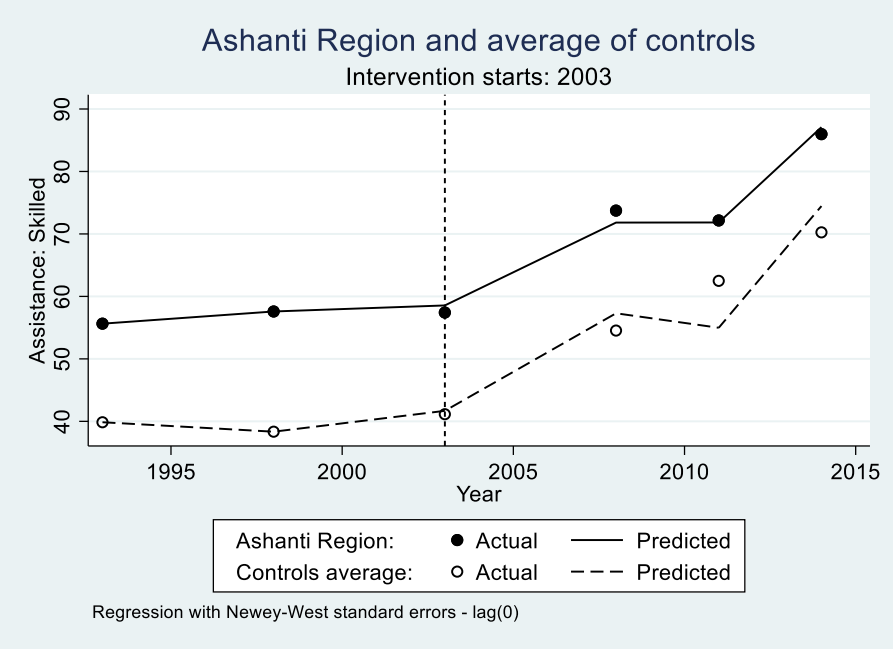

Figure 4.23: Proportion of women in Ashanti region (Ghana) assisted by SBA during delivery pre- and post-NHIS

In figure 4.24, women who had delivery assistance from SBA (with age as a covariate) pre- and post-NHIS is displayed. The initial mean level difference between Ashanti Region and the other regions was not significant **(β= 10.16, CI = [-2.70, 23.02, P>0,05]),** and the difference in the mean baseline slope was also not significant **(β= 1.53, CI = [-1.66, 4.73, P>0.05]).** Health insurance coverage pre-NHIS had no statistically significant association **(β= 1.00, CI = [-0.009, 2.02, P>0.05])** with supervised delivery by skilled birth assistants. Age as a covariate, had no statistically significant **(β= -1.28, CI = [-2.62, 0.05, P>0.05)** association with supervised delivery by SBA pre-NHIS, which means a woman's age seems not to influence her decision to utilize postnatal care after delivery.

During the first year of the commencement of the NHIS**,** there was a non-statistically significant **(β= -12.19, CI = [-39.42, 15.04, P>0.05])** percentage decrease of skilled health personnel who offered delivery assistance to pregnant women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 1.94, CI = [0.97, 2.91, P<0.05])** of skilled health care providers who assisted expectant mothers insured under the NHIS. This suggests that a woman's age could influence her decision to seek assistance from SBA post-NHIS.

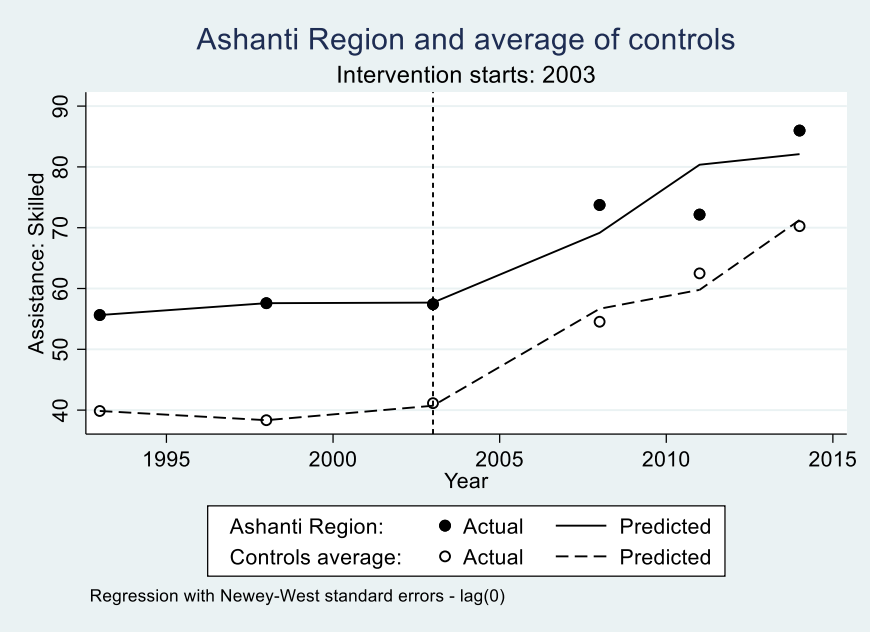

Figure 4.24: Proportion of women in Ashanti region (Ghana) assisted by SBA during delivery (with age as a covariate) pre- and post-NHIS

4.2.4 Postnatal care (Regional Analysis)

The following charts show the regional analysis of associations between NHIS and postnatal care with age as a covariate. Regions with significant associations with NHIS, age and postnatal care are reported and those with no significant associations (with age) are posted in the appendix.

In figure 4.25, the initial mean level difference between Western region and the other regions was significant **(β= -2.22, CI = [-4.21, -0.23, P<0,05])**, and the difference in the mean baseline slope was not significant **(β= 0.89, CI = [-0.13, 1.92, P>0.05])**. Health insurance coverage pre – NHIS had no statistically significant association **(β= 0.053, CI = [-0.33, 0.43, P>0.05])** with postnatal care.

However, during the first year of the NHIS there was a statistically significant **(β= -24.08, CI = [-40.21, -7.96, P<0.05])** percentage decrease of postnatal care to women insured under the NHIS, whiles the post -trend output table shows a statistically significant increase **(β= 6.69, CI = [6.11, 7.28, P<0.05])** of postnatal care to women insured under the NHIS. Thus, NHIS-insured women were more likely to seek postnatal care compared to NHIS non-insured women.

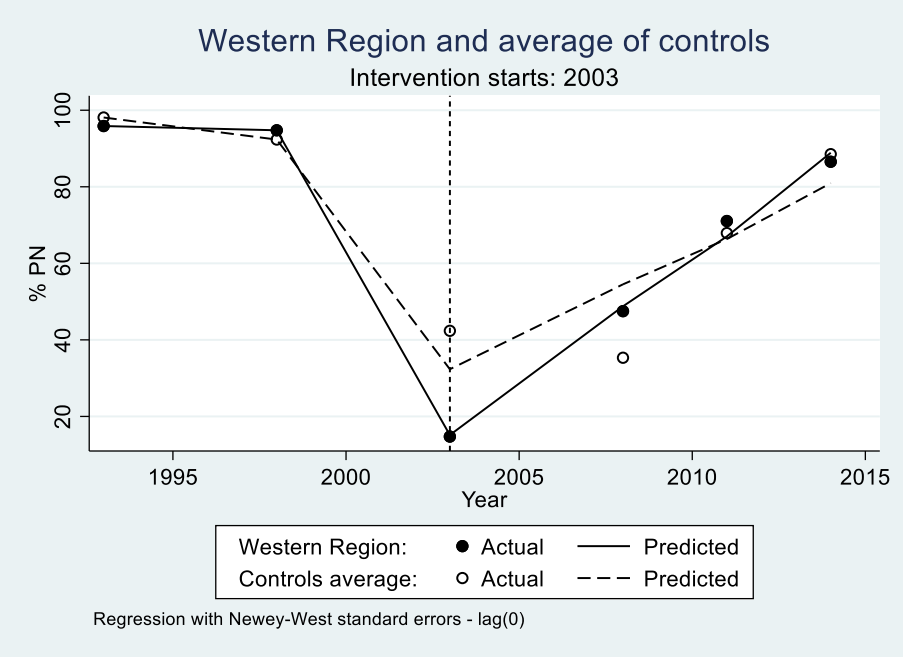

Figure 4.25: Proportion of women in Western region (Ghana) who received postnatal care pre- and post-NHIS

In figure 4.26, women who received postnatal care (with age as a covariate) pre- and post-NHIS is displayed. The initial mean level difference between Western region and the other regions was significant **(β= -2.52, CI = [-4.83, -0.22, P<0,05]),** and the difference in the mean baseline slope was not significant **(β= 0.83, CI = [-0.19, 1.86, P>0.05]).** Health insurance coverage pre-NHIS had no statistically significant association **(β= 0.23, CI = [-0.34, 0.82, P>0.05])** with postnatal care. Age as a covariate, had no statistically significant **(β= -0.39, CI = [-1.12, 0.34, P>0.05)** association with postnatal care pre-NHIS, which means a woman's age seems not to influence her decision to utilize postnatal care after delivery.

During the first year of the commencement of the NHIS**,** there was a statistically significant **(β= -23.66, CI = [-39.78, -7.53, P<0.05])** percentage decrease of postnatal care services to women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 6.65, CI = [6.12, 7.18, P<0.05])** of postnatal care services to women insured under the NHIS. This suggests that a woman's age could influence her decision to seek postnatal care post-NHIS.

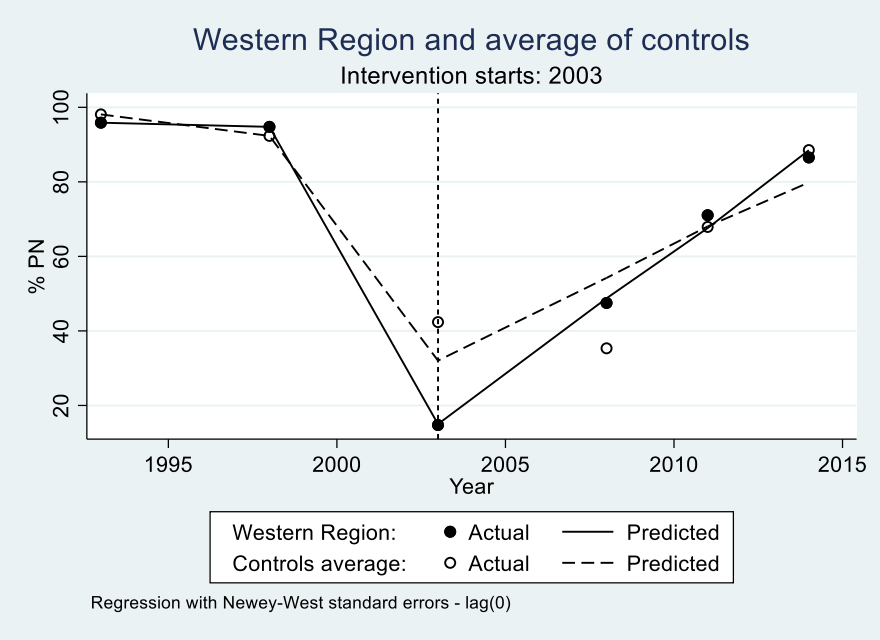

Figure 4.26: Proportion of women in Western region (Ghana) who received postnatal care (with age as a covariate) pre- and post-NHIS

In figure 4.27, the initial mean level difference between Volta region and the other regions was not significant **(β= 2.59, CI = [-0.26, 5.45, P>0,05])**, and the difference in the mean baseline slope was not significant **(β= -0.25, CI = [-1.28, 0.76, P>0.05])**. Health insurance coverage pre – NHIS had no statistically significant association **(β= 0.04, CI = [-0.34, 0.43, P>0.05])** with postnatal care.

However, during the first year of the NHIS there was a non-statistically significant **(β= 12.53, CI = [-24.82, 49.89, P>0.05])** percentage increase of postnatal care to women insured under the NHIS, whiles the post -trend output table also shows a non-statistically significant increase **(β= 2.77, CI = [-1.16, 6.70, P>0.05])** of postnatal care to women insured under the NHIS. Thus, NHIS-insured women are more likely to seek postnatal care compared to NHIS non-insured women.

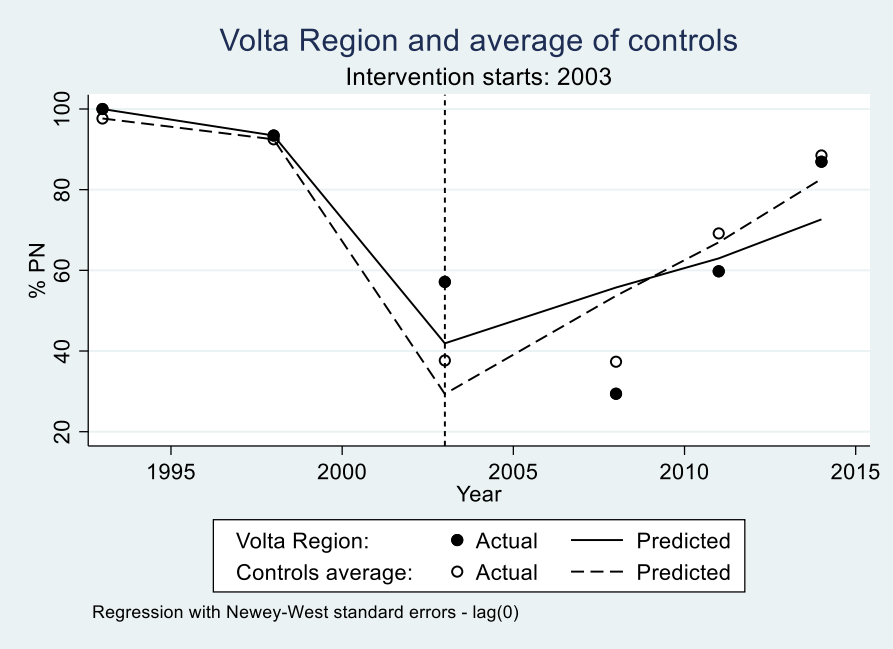

Figure 4.27: Proportion of women in Volta region (Ghana) who received postnatal care pre- and post-NHIS

In figure 4.28, the initial mean level difference between Upper West region and the other regions was significant **(β= 2.34, CI = [0.33, 4.35, P<0,05])**, and the difference in the mean baseline slope was not significant **(β= -0.01, CI = [-1.02, 1.00, P>0.05])**. Health insurance coverage pre – NHIS had no statistically significant association **(β= 0.02, CI = [-0.34, 0.40, P>0.05])** with postnatal care.

However, during the first year of the NHIS there was a non-statistically significant **(β=22.59, CI = [-23.23, 68.42, P>0.05])** percentage increase of postnatal care to women insured under the NHIS, whiles the post-trend output table shows a non-statistically significant increase **(β= 1.99, CI = [-2.75, 6.74, P>0.05])** of postnatal care to women insured under the NHIS. Thus, NHIS-insured women are more likely not to seek postnatal care compared to NHIS non-insured women.

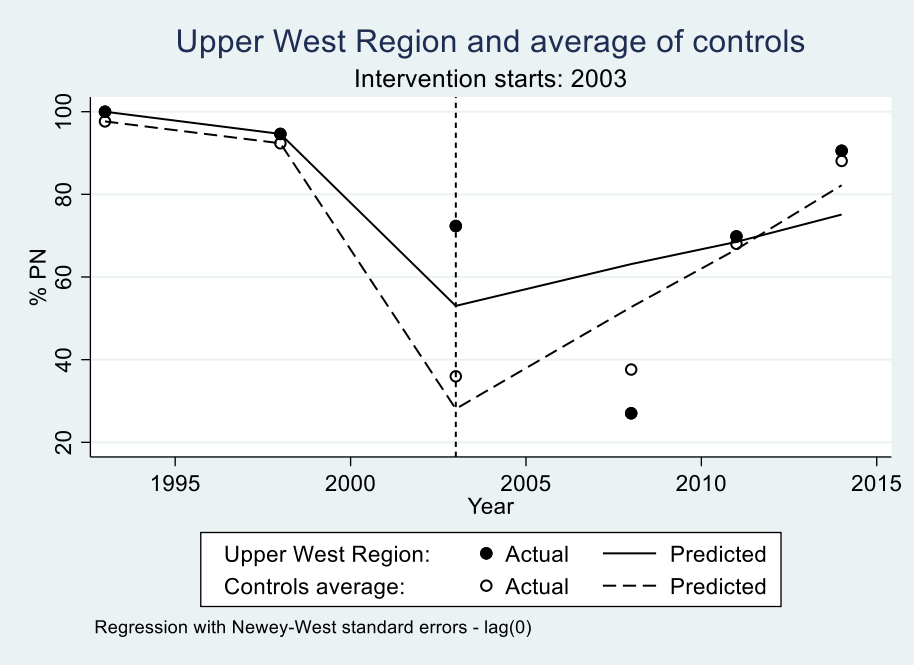

Figure 4.28: Proportion of women in Upper West region (Ghana) who received postnatal care pre- and post-NHIS

In figure 4.29, the initial mean level difference between Upper East region and the other regions was significant **(β= 2.27, CI = [0.14, 4.41, P<0,05])**, and the difference in the mean baseline slope was also significant **(β= -2.91, CI = [-3.77, -2.05, P<0.05])**. Health insurance coverage pre – NHIS had no statistically significant association **(β= 0.03, CI = [-0.33, 0.41, P>0.05])** with postnatal care.

However, during the first year of the NHIS there was a statistically significant **(β=28.52, CI = [10.84, 46.19, P<0.05])** percentage increase of postnatal care to women insured under the NHIS, whiles the post -trend output table shows a statistically significant increase **(β= 6.07, CI = [5.03, 7.10, P<0.05])** of postnatal care to women insured under the NHIS. This suggests that NHIS-insured women were more likely to seek postnatal care compared to NHIS non-insured

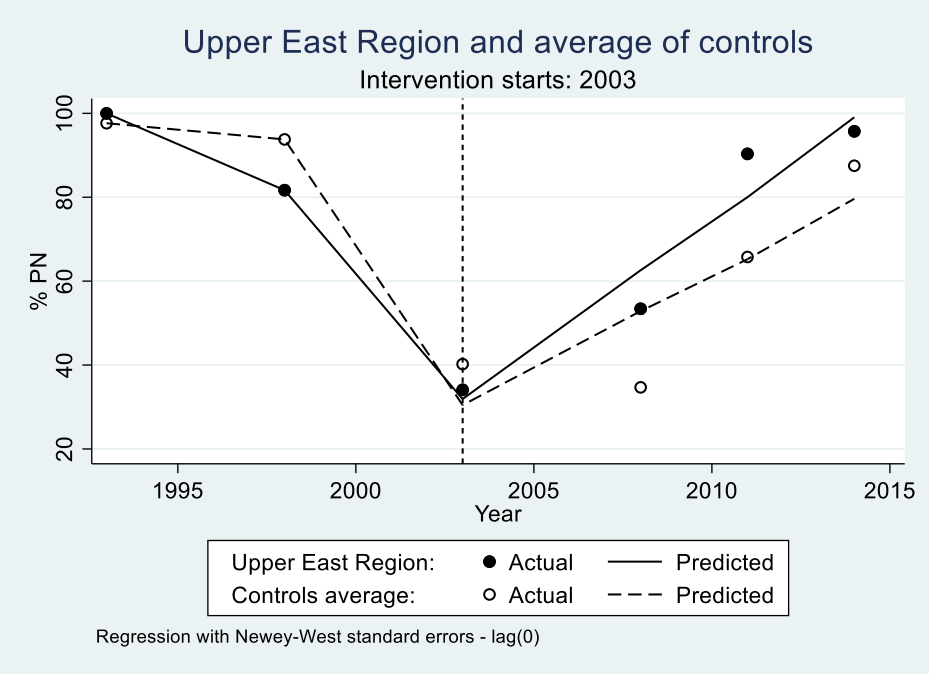

Figure 4.29: Proportion of women in Upper East region (Ghana) who received postnatal care pre- and post-NHIS

In figure 4.30, women who received postnatal care (with age as a covariate) pre- and post-NHIS is displayed. The initial mean level difference between Upper East region and the other regions was not significant **(β= 2.21, CI = [-0.05, 4.48, P>0,05]),** and the difference in the mean baseline slope was significant **(β= -3.02, CI = [-3.86, -2.17, P<0.05]).** Health insurance coverage pre-NHIS had no statistically significant association **(β= 0.17, CI = [-0.39, 0.74, P>0.05])** with postnatal care. Age as a covariate, had no statistically significant **(β= -0.28, CI = [-0.88, 0.31, P>0.05)** association with postnatal care pre-NHIS, which means a woman's age seems not to influence her decision to utilize postnatal care after delivery.

During the first year of the commencement of the NHIS**,** there was a statistically significant **(β= 29.92, CI = [11.44, 48.39, P<0.05])** percentage increase of postnatal care services to women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 5.85, CI = [4.91, 6.79, P<0.05])** of postnatal care services to women insured under the NHIS. This suggests that a woman's age could influence her decision to seek postnatal care post-NHIS.

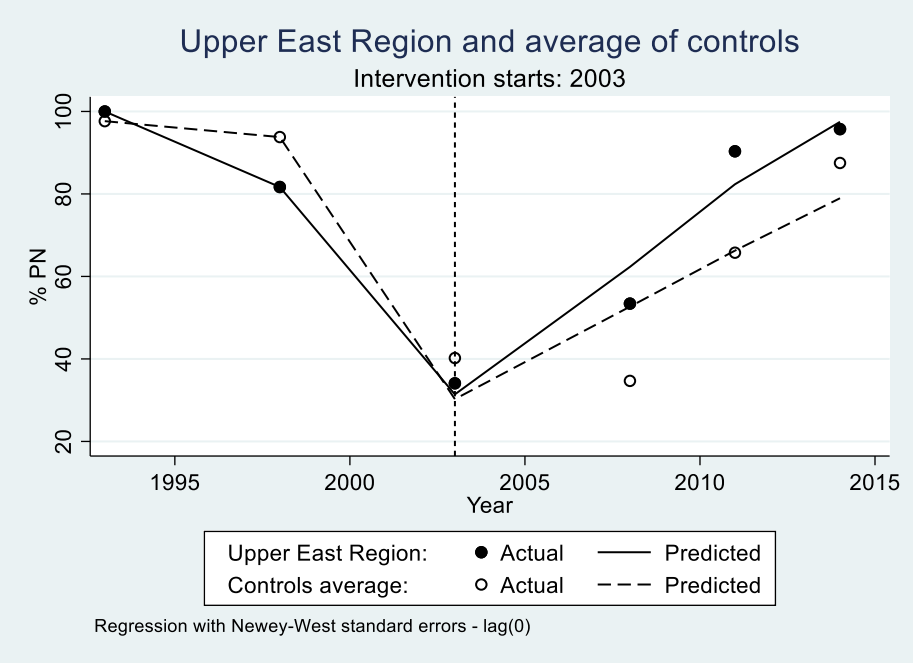

Figure 4.30: Proportion of women in Upper East region (Ghana) who received postnatal care (with age as a covariate) pre- and post-NHIS

In figure 4.31, the initial mean level difference between Northern region and the other regions was not significant **(β= -5.40, CI = [-12.67, 1.87, P>0,05])**, and the difference in the mean baseline slope was significant **(β= -1.34, CI = [-2.22, -0.46, P<0.05])**. Health insurance coverage pre – NHIS had no statistically significant association **(β= -0.02, CI = [-0.40, 0.34, P>0.05])** with postnatal care.

However, during the first year of the NHIS there was a statistically significant **(β=24.09, CI = [2.09, 46.10, P<0.05])** percentage increase of postnatal care to women insured under the NHIS, whiles the post -trend output table shows a non-statistically significant increase **(β= 2.52, CI = [-0.13, 5.18, P>0.05])** of postnatal care to women insured under the NHIS. This suggests that NHIS-insured women were more likely not to seek postnatal care compared to NHIS non-insured women.

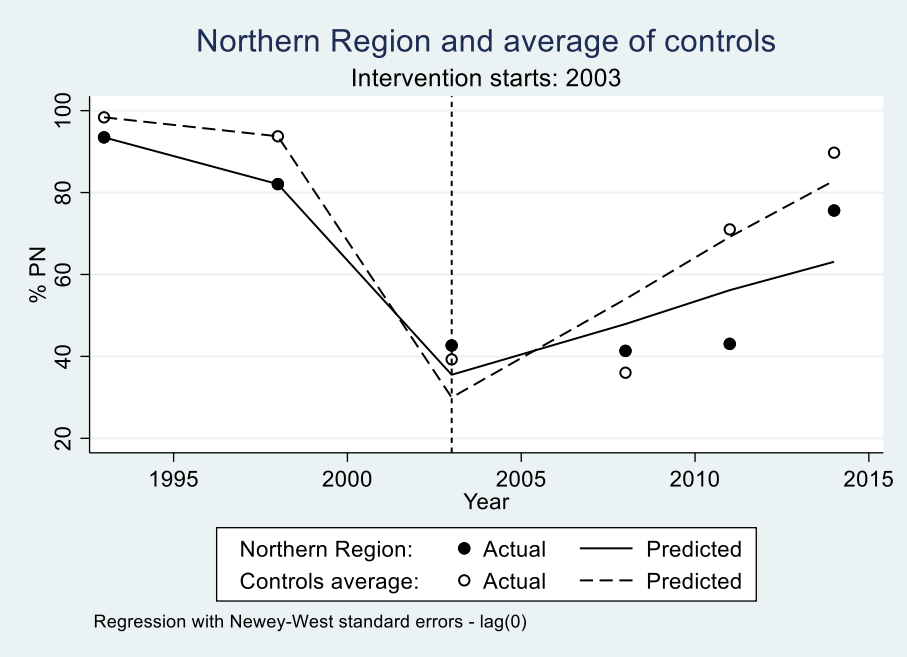

Figure 4.31: Proportion of women in Northern region (Ghana) who received postnatal care pre- and post-NHIS

In figure 4.32, the initial mean level difference between Greater-Accra region and the other regions was not significant **(β= 1.23, CI = [-4.57, 7.04, P>0,05])**, and the difference in the mean baseline slope was significant **(β= 1.35, CI = [0.27, 2.42, P<0.05])**. Health insurance coverage pre – NHIS had no statistically significant association **(β= 0.03, CI = [-0.32, 0.39, P>0.05])** with postnatal care.

However, during the first year of the NHIS there was a non-statistically significant **(β= -7.36, CI = [-42.34, 27.62, P>0.05])** percentage decrease of postnatal care to women insured under the NHIS, whiles the post -trend output table shows a statistically significant increase **(β= 4.77, CI = [1.94, 7.61, P<0.05])** of postnatal care to women insured under the NHIS. This suggests that NHIS-insured women were more likely to seek postnatal care compared to NHIS non-insured women.

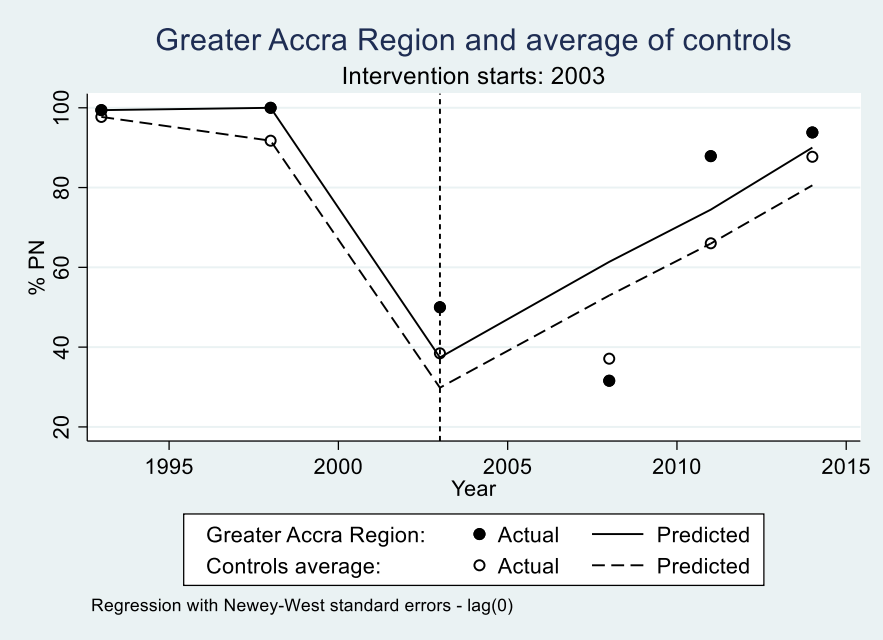

Figure 4.32: Proportion of women in Greater-Accra region (Ghana) who received postnatal care pre- and post-NHIS

In figure 4.33, women who received postnatal care (with age as a covariate) pre- and post-NHIS is displayed. The initial mean level difference between Greater-Accra region and the other regions was not significant **(β= -1.89, CI = [-10.43, 6.65, P>0,05]),** and the difference in the mean baseline slope was significant **(β= 1.68, CI = [0.44, 2.91, P<0.05]).** Health insurance coverage pre-NHIS had no statistically significant association **(β= 0.23, CI = [-0.29, 0.76, P>0.05])** with postnatal care. Age as a covariate, had no statistically significant **(β= -0.41, CI = [-1.13, 0.30, P>0.05)** association with postnatal care pre-NHIS, which means a woman's age seems not to influence her decision to utilize postnatal care after delivery.

During the first year of the commencement of the NHIS**,** there was a non-statistically significant **(β= -8.51, CI = [-43.84, 26.82, P>0.05])** percentage decrease of postnatal care services to women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 4.85, CI = [2.01, 7.69, P<0.05])** of postnatal care services to women insured under the NHIS. This suggests that a woman's age could influence her decision to seek postnatal care post-NHIS.

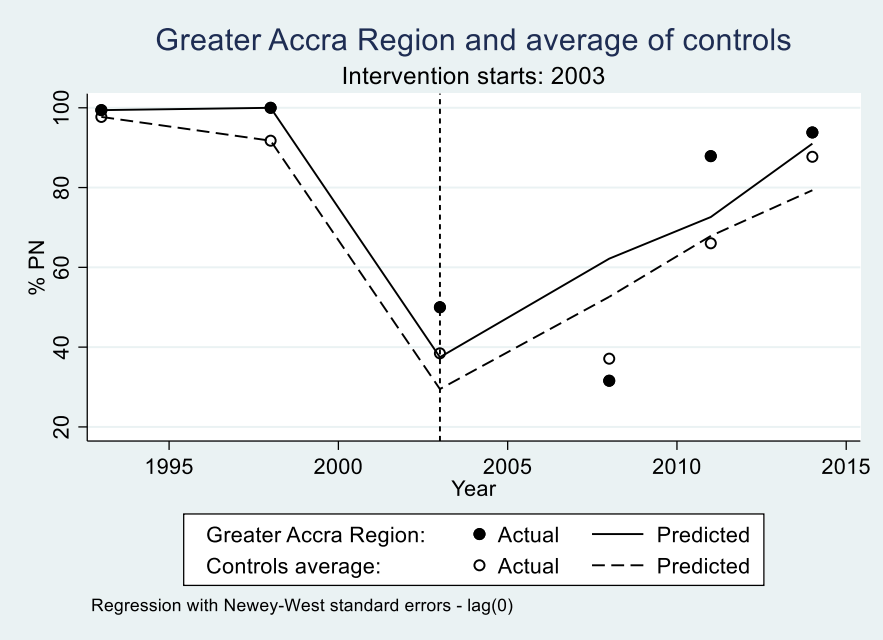

Figure 4.33: Proportion of women in Greater-Accra region (Ghana) who received postnatal care (with age as a covariate) pre- and post-NHIS

In figure 4.34, the initial mean level difference between Eastern region and the other regions was significant **(β= -6.58, CI = [-9.23, -3.93, P<0,05])**, and the difference in the mean baseline slope was not significant **(β= 0.65, CI = [-0.32, 1.62, P>0.05])**. Health insurance coverage pre – NHIS had no statistically significant association **(β= 0.05, CI = [-0.32, 0.43, P>0.05])** with postnatal care.

However, during the first year of the NHIS there was a non-statistically significant **(β= -7.90, CI = [-27.90, 12.09, P>0.05])** percentage decrease of postnatal care to women insured under the NHIS, whiles the post -trend output table shows a statistically significant increase **(β= 4.94, CI = [3.37, 6.52, P<0.05])** of postnatal care to women insured under the NHIS. This suggests that NHIS-insured women were more likely to seek postnatal care compared to NHIS non-insured women.

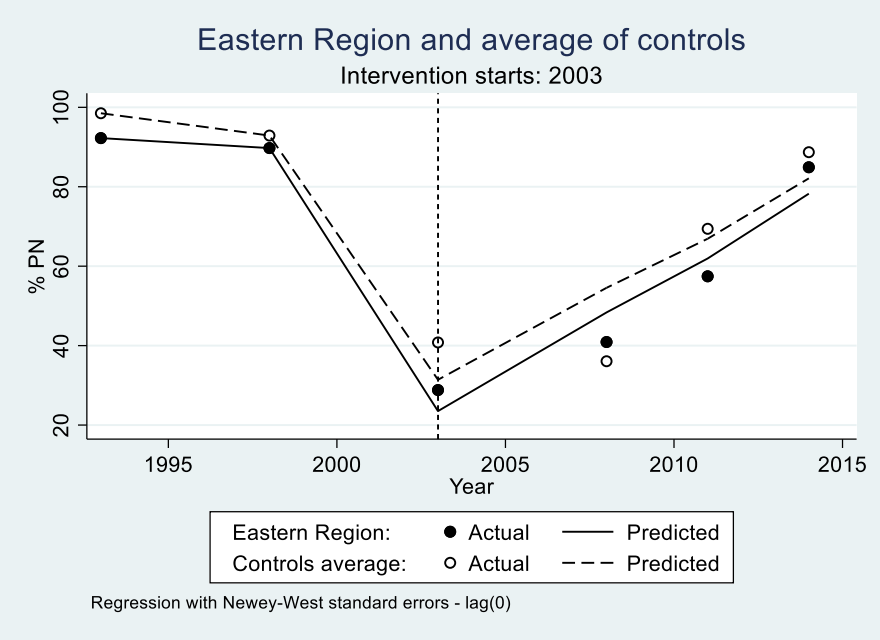

Figure 4.34: Proportion of women in Eastern region (Ghana) who received postnatal care pre- and post-NHIS

In figure 4.35, women who received postnatal care (with age as a covariate) pre- and post-NHIS is displayed. The initial mean level difference between Eastern region and the other regions was significant **(β= -7.93, CI = [-12.06, -3.80, P<0,05]),** and the difference in the mean baseline slope was not significant **(β= 0.75, CI = [-0.19, 1.70, P>0.05]).** Health insurance coverage pre-NHIS had no statistically significant association **(β= 0.23, CI = [-0.34, 0.81, P>0.05])** with postnatal care. Age as a covariate, had no statistically significant **(β= -0.38, CI = [-1.10, 0.33, P>0.05)** association with postnatal care pre-NHIS, which means a woman's age seems not to influence her decision to utilize postnatal care after delivery.

During the first year of the commencement of the NHIS**,** there was a non-statistically significant **(β= -7.63, CI = [-27.66, 12.39, P>0.05])** percentage decrease of postnatal care services to women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 4.78, CI = [3.05, 6.51, P<0.05])** of postnatal care services to women insured under the NHIS. This suggests that a woman's age could influence her decision to seek postnatal care post-NHIS.

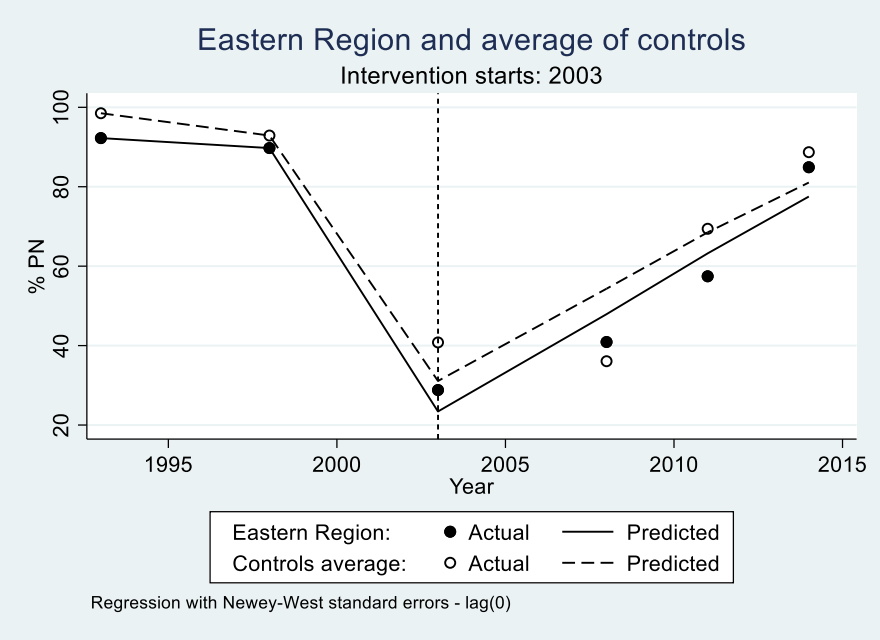

Figure 4.35: Proportion of women in Eastern region (Ghana) who received postnatal care (with age as a covariate) pre- and post-NHIS

In figure 4.36, the initial mean level difference between Central region and the other regions was not significant **(β= 1.45, CI = [-1.10, 4.01, P>0,05])**, and the difference in the mean baseline slope was also not significant **(β= -0.40, CI = [-1.52, 0.71, P>0.05])**. Health insurance coverage pre – NHIS had no statistically significant association **(β= 0.006, CI = [-0.35, 0.37, P>0.05])** with postnatal care.

However, during the first year of the NHIS there was a statistically significant **(β= -33.97, CI = [-56.08, -11.85, P<0.05])** percentage decrease of postnatal care to women insured under the NHIS, whiles the post -trend output table shows a statistically significant increase **(β= 7.30, CI = [5.39, 9.22, P<0.05])** of postnatal care to women insured under the NHIS. This suggests that NHIS-insured women were more likely to seek postnatal care compared to NHIS non-insured women.

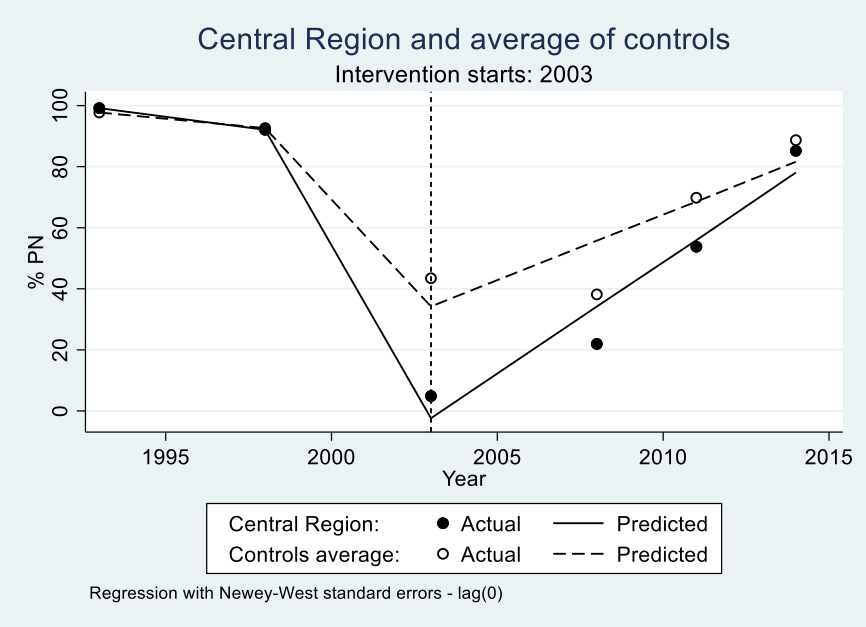

Figure 4.36: Proportion of women in Central region (Ghana) who received postnatal care pre- and post-NHIS

In figure 4.37, women who received postnatal care (with age as a covariate) pre- and post-NHIS is displayed. The initial mean level difference between Central region and the other regions was not significant **(β= 1.84, CI = [-0.95, 4.64, P>0,05]),** and the difference in the mean baseline slope was also not significant **(β= -0.57, CI = [-1.76, 0.61, P>0.05]).** Health insurance coverage pre-NHIS had no statistically significant association **(β= 0.14, CI = [-0.40, 0.69, P>0.05])** with postnatal care. Age as a covariate, had no statistically significant **(β= -1.28, CI = [-2.62, 0.05, P>0.05)** association with postnatal care pre-NHIS, which means a woman's age seems not to influence her decision to utilize postnatal care after delivery.

During the first year of the commencement of the NHIS**,** there was a statistically significant **(β= -32.45, CI = [-55.53, -9.37, P>0.05])** percentage decrease of postnatal care services to women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 7.20, CI = [5.17, 9.22, P<0.05])** of postnatal care services to women insured under the NHIS. This suggests that a woman's age could influence her decision to seek postnatal care post-NHIS.

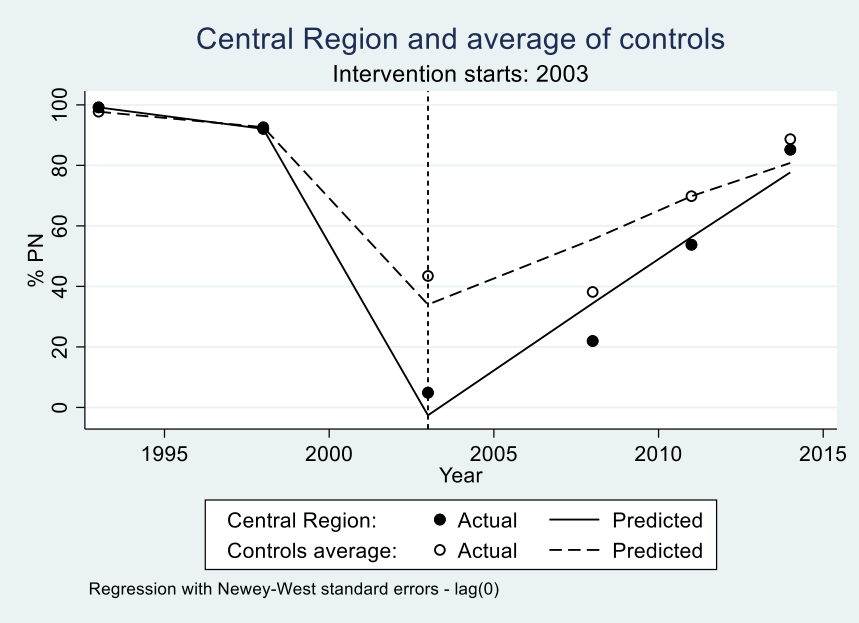

Figure 4.37: Proportion of women in Central region (Ghana) who received postnatal care (with age as a covariate) pre- and post-NHIS

In figure 4.38, the initial mean level difference between Brong-Ahafo region and the other regions was not significant **(β= 1.38, CI = [-0.68, 3.44, P>0,05])**, and the difference in the mean baseline slope was significant **(β= 1.36, CI = [0.40, 2.32, P<0.05])**. Health insurance coverage pre – NHIS had no statistically significant association **(β= 0.03, CI = [-0.35, 0.41, P>0.05])** with postnatal care.

However, during the first year of the NHIS there was a non-statistically significant **(β= 0.84, CI = [-25.72, 27.40, P<0.05])** percentage increase of postnatal care to women insured under the NHIS, whiles the post -trend output table shows a statistically significant increase **(β= 3.49, CI = [1.17, 5.82, P<0.05])** of postnatal care to women insured under the NHIS. This suggests that NHIS-insured women were more likely to seek postnatal care compared to NHIS non-insured women.

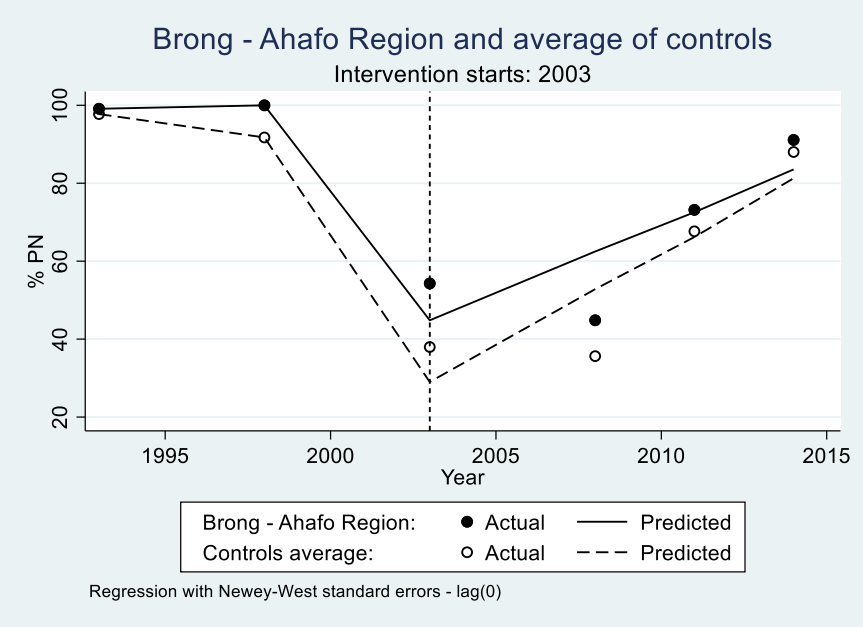

Figure 4.38: Proportion of women in Brong-Ahafo region (Ghana) who received postnatal care pre- and post-NHIS

In figure 4.39, women who received postnatal care (with age as a covariate) pre- and post-NHIS is displayed. The initial mean level difference between Brong-Ahafo region and the other regions was not significant **(β= 1.27, CI = [-0.88, 3.43, P>0,05]),** and the difference in the mean baseline slope was significant **(β= 1.32, CI = [0.37, 2.27, P<0.05]).** Health insurance coverage pre-NHIS had no statistically significant association **(β= 0.16, CI = [-0.43, 0.77, P>0.05])** with postnatal care. Age as a covariate, had no statistically significant **(β= -0.28, CI = [-1.10, 0.52, P>0.05)** association with postnatal care pre-NHIS, which means a woman's age seems not to influence her decision to utilize postnatal care after delivery.

During the first year of the commencement of the NHIS**,** there was a non-statistically significant **(β= -1.21, CI = [-25.78, 28.20, P>0.05])** percentage decrease of postnatal care services to women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 3.24, CI = [0.50, 5.98, P<0.05])** of postnatal care services to women insured under the NHIS. This suggests that a woman's age could influence her decision to seek postnatal care post-NHIS.

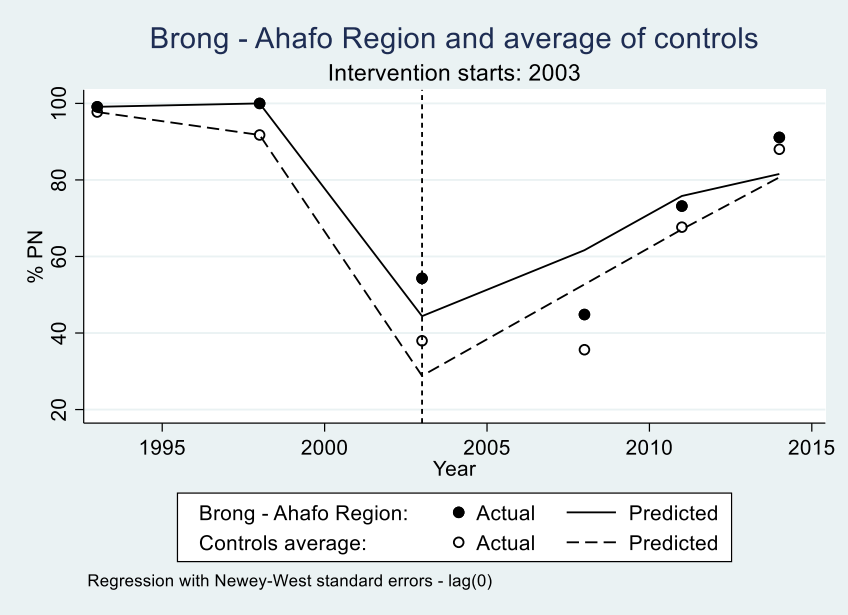

Figure 4.39: Proportion of women in Brong-Ahafo region (Ghana) who received postnatal care (with age as a covariate) pre- and post-NHIS

In figure 4.40, the initial mean level difference between Ashanti region and the other regions was significant **(β= 1.59, CI = [-1.35, 4.54, P<0,05])**, and the difference in the mean baseline slope was not significant **(β= 0.74, CI = [-0.30, 1.79, P>0.05])**. Health insurance coverage pre – NHIS had no statistically significant association **(β= 0.04, CI = [-0.33, 0.42, P>0.05])** with postnatal care.

However, during the first year of the NHIS there was a statistically significant **(β= -15.31, CI = [-48.19, 17.57, P<0.05])** percentage decrease of postnatal care to women insured under the NHIS, whiles the post-trend output table shows a statistically significant increase **(β= 5.55, CI = [2.78, 8.32, P<0.05])** of postnatal care to women insured under the NHIS. This suggests that NHIS-insured women were more likely to seek postnatal care compared to NHIS non-insured women.

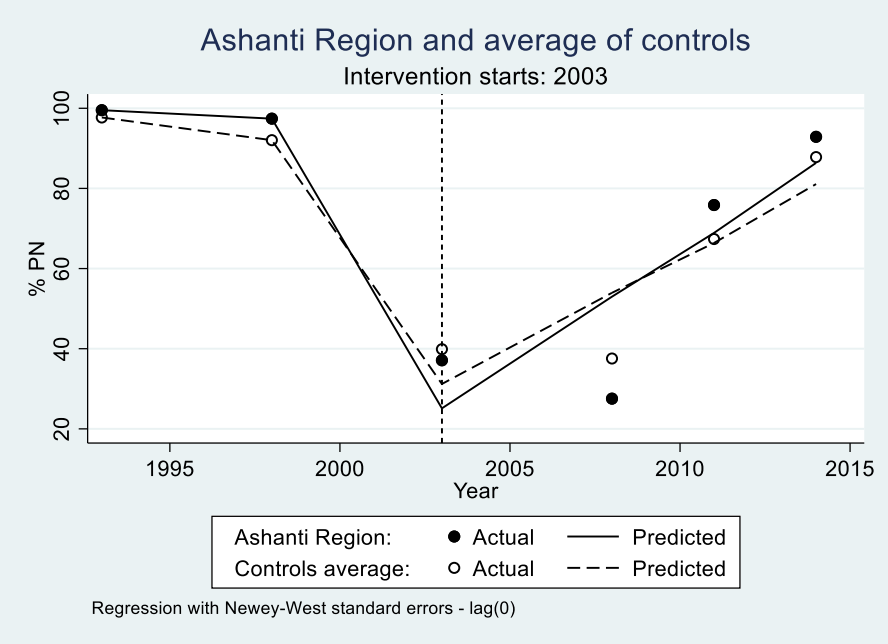

Figure 4.40: Proportion of women in Ashanti region (Ghana) who received postnatal care pre- and post-NHIS

In figure 4.41, women who received postnatal care (with age as a covariate) pre- and post-NHIS is displayed. The initial mean level difference between Ashanti region and the other regions was not significant **(β= 0.68, CI = [-3.31, 4.69, P>0,05]),** and the difference in the mean baseline slope was also not significant **(β= 0.87, CI = [-0.21, 1.95, P>0.05]).** Health insurance coverage pre-NHIS had no statistically significant association **(β= 0.20, CI = [-0.37, 0.78, P>0.05])** with postnatal care. Age as a covariate, had no statistically significant **(β= -0.34, CI = [-1.08, 0.39, P>0.05)** association with postnatal care pre-NHIS, which means a woman's age seems not to influence her decision to utilize postnatal care after delivery.

During the first year of the commencement of the NHIS**,** there was a non-statistically significant **(β= -16.18, CI = [-49.52, 17.15, P>0.05])** percentage decrease of postnatal care services to women insured under the NHIS, whiles the post -intervention trend shows a statistically significant increase **(β= 5.41, CI = [2.49, 8.32, P<0.05])** of postnatal care services to women insured under the NHIS. This suggests that a woman's age could influence her decision to seek postnatal care post-NHIS.

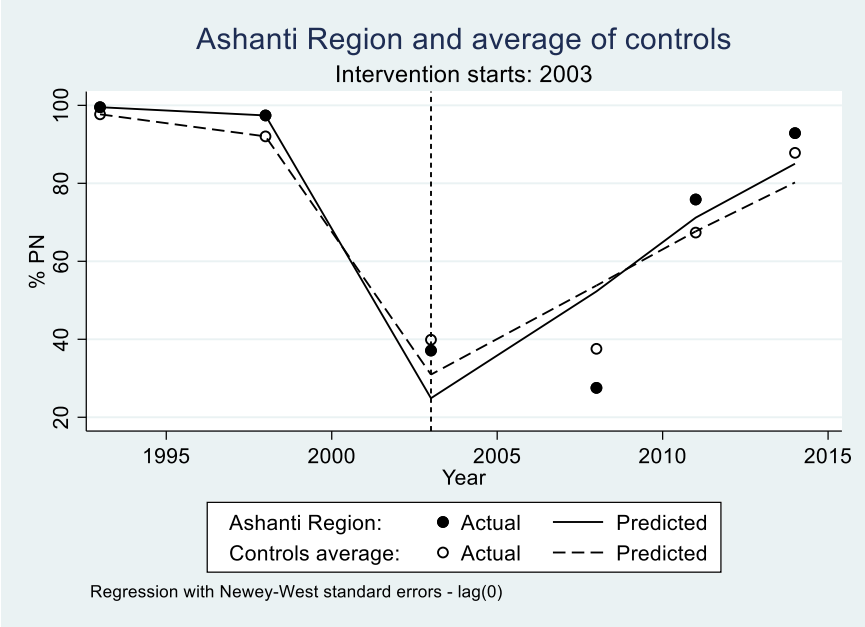

Figure 4.41: Proportion of women in Ashanti region (Ghana) who received postnatal care (with age as a covariate) pre- and post-NHIS

CHAPTER 5: DISCUSSION

This study has observed trends in supervised delivery and postnatal care, before and after the implementation of the free maternal health policy under the NHIS. In addition, it was to find out regional differences in maternal care pre- and post-NHIS. In short, the underlying objectives of the study was to investigate the impact of the NHIS on supervised delivery and postnatal care. This chapter provides summary and discussion of the results presented in Chapter 4. It specifically discussed NHIS impact on skilled assistance during delivery and postnatal care in the 10 regions of Ghana, including results from age as a covariate.

5.1 Skilled assistance during delivery

From the overall national and regional analyses of utilization of services from skilled birth attendants, pre- and post-NHIS, results indicate a statistically significant association between NHIS and supervised delivery from skilled birth assistants post-NHIS. These results, therefore, seem to suggest that women insured under the NHIS are more likely to seek assistance from skilled birth personnel during delivery, unlike those without health insurance. This finding reaffirms similar conclusions from other studies that health insurance increases access to maternal health care services such as delivery assistance by skilled health personnel (Zere et al, 2011).

In addition, nationwide, age as a covariate was statistically significant with supervised delivery by SBA in all 10 regions post-NHIS. This suggests age of NHIS-insured women did not affect postnatal care use post-NHIS compared to pre-NHIS.

A myriad of factors could explain why NHIS was statistically significant with delivery by skilled birth attendants post-NHIS. With NHIS as an enabling factor to address a critical need of seeking delivery assistance from skilled birth attendants as elaborated in this study's theoretical framework, the perception of NHIS-insured women regarding the benefits of the health insurance scheme may have played a role. NHIS-insured women would likely perceive that skilled birth attendants, with their expertise, would ensure the safe deliveries of their babies unlike traditional birth attendants will limited professional skills in delivery.

Also, the free maternal policy under the NHIS could also have encouraged NHIS-insured women to seek the services of delivery assistance by skilled birth attendants. The abolition of

user-fees from government health centers would not only have reduced the financial burden from pregnant women insured with the NHIS but would likely have persuaded them to depend on skilled birth attendants during delivery due to positive birth outcomes.

Nonetheless, pregnant women in rural Ghana are at a higher risk of delivery complications and less likely to receive the needed care from SBA unlike those in the urban areas (Ghana Statistical Service, 2018). Similarly, among the 90% of pregnant women who took part in the 2017 Ghana Maternal Health Survey, attending four antenatal visits, 68% of respondents in rural communities received delivery assistance from SBA.

Expecting mothers in some Ghanaian communities and countries within SSA have little or no autonomy in their reproductive health such as deciding their preferred health center for delivery (Sumankuuro et al, 2018). Notwithstanding, mothers, husbands, in-laws, and other family members, especially in rural communities wield significant power in the decision-making process regarding the choice of health care provider for mothers, cost of transportation to and from the health center and other miscellaneous expenses. This could negatively affect health care utilization such as delivery assistance by SBA (Ganle et al, 2015).

However, study shows increasing women's autonomy in decisions affecting their reproductive health tends to improve utilization in maternal health care in SSA (Stephenson et al, 2006).

5.1.1 Postnatal care

Nationally, for postnatal care coverage pre- and post-NHIS, results show a non – significant percentage increase in postnatal care services post-NHIS. This seems to demonstrate that although the patronage of postnatal care services increased among women, the NHIS had no statistically significant positive association with such an occurrence. Hence, other contributing factors could explain this trend such as perception towards postnatal care and health care personnel, cost of transportation to health facilities, deplorable roads to health centers, long waiting hours at health centers and the like. This finding contradicts the conclusions from other studies that show a positive correlation between NHIS and PN care (Yaya et al, 2019; Sanogo et al, 2020).

Similarly, 3 (Volta, Upper West, and Northern Regions) out of the 10 regions reported a non-significant association between NHIS and postnatal care, which suggests that other variables, other than NHIS, might explain a woman's decision to seek postnatal care. Also, age

as a covariate was not statistically significant with postnatal care across the 10 regions in Ghana post-NHIS. Thus, age of mothers did not affect postnatal care usage post-NHIS compared to pre-NHIS.

As already mentioned, several reasons could explain why NHIS had no statistically significant association with postnatal care, nationally and in 3 regions, despite an increase post-NHIS. NHIS-insured women would probably have prioritized delivery assistance by skilled birth attendants over postnatal care especially when there are no post-partum complications. With only 1 postnatal visit and childcare for three months under the NHIS (Escobar et al, 2010), mothers insured with NHIS would likely choose to stay home and cater for their newborns unless the need arises to seek postnatal care. First-time mothers are also more likely to receive postnatal care compared to women who already have children.

Also, transportation costs for postnatal care, distance to the nearest health centers, coupled with longer waiting times at health centers would likely deter mothers from seeking postnatal care. Although the WHO encourages women to receive postnatal care within 24 hours after delivery, low utilization in postnatal care services in some Ghanaian communities could be as a result of inadequate education on the importance of postnatal care within 24 hours to mothers by health care providers (Ameyaw et al, 2021 & WHO, 2014).

To reduce maternal and infant mortality rates, the Ghana Health Service introduced the Community-based Health Planning and Services (CHPS) program in 1999 but was restructured in 2017 to meet its goal of providing community-based health services to rural communities in Ghana (Kweku et al, 2020). This initiative, among other things, assists mothers who reside in remote areas farther away from health facilities to receive postnatal care (Sakeah et al, 2018). Community Health Officers under the CHPS program travel to rural areas to educate mothers on breastfeeding, immunization, healthy practices to avoid diarrhea and water-borne diseases and the like (Kweku et al, 2020). Hence, further research is necessary to understand the impact of the CHPS initiative and the NHIS intervention in improving maternal health care utilization in Ghana.

5.2 Study Limitations

This study offers important information regarding maternal care pre- and post-NHIS. Analyses presented indicate national and regional differences in delivery assistance by skilled persons and postnatal care pre- and post-NHIS.

Results from this study underscores the pivotal role of health interventions in improving access to health care and enhancing the wellbeing of vulnerable groups like women and children. However, more information is needed to throw more lights on the national and regional variations in postnatal care and delivery assistance by skilled birth attendants post-NHIS.

Also, more research is needed to explore other reasons jeopardizing efforts in higher enrollment in the NHIS and patronage of essential health services under the scheme.

5.2.1 Data Limitations

Given the data available from the GDHS and MICS, only 2 outcome variables were used namely supervised delivery from skilled birth assistants and postnatal care. In addition, only 6 data time points were utilized with varying gaps from the GDHS and MICS. Although these 6 data points met the minimum requirements for the interrupted time series in analyzing the data, more data points would have sufficed in drawing a better conclusion on the impact of Ghana's NHIS on maternal care. Also, due to availability of data and multicollinearity between some potential confounders like age, education and place of residence, *age* was selected as the only covariate. Multicollinearity arises when covariates within a model are not independent from each other which could lead to biased estimation (Yoo et al, 2014).

5.3 Policy Implication

This study is of much relevance to policy makers in Ghana as it discusses the impact of the NHIS on maternal care. With health care disparities at the national and regional levels, it is not unusual to realize a non – significant increase in postnatal care nationwide after the roll out of the NHIS. These findings are against the backdrop that only about 40% of Ghanaians were insured under the NHIS as at 2014 (Wang et al, 2019). This suggests perhaps, higher enrollment in the NHIS is more likely to increase access to maternal care and reduce regional inequalities in utilization of maternal care services. The Ghanaian government and other stakeholders in the

health sector must identify and address challenges of high enrollment in the NHIS and other reasons that impede accessibility to basic health care including maternal services.

5.4 Conclusion

Ghana's NHIS is a timely and necessary health intervention in enhancing accessibility to affordable and quality health care. This research has explored the trajectory of maternal health care to find out any improvements before and after the inception of the NHIS. Whereas nationally and in all 10 regions, there were statistically significant increases in delivery assistance by skilled birth attendants after the commencement of NHIS, nationwide, the health insurance scheme had no significant association with postnatal care.

It tends to reason that although NHIS is crucial in improving maternal care, it is not enough in tackling bottlenecks within the health system that hinders access to basic health care. Some of these hurdles include inadequate medical facilities, long waiting times at health facilities, fewer skilled workers in remote areas, poor road networks to health facilities and the like. Government's failure to address these challenges means SDGs targets of improving maternal health care will be farfetched.

It is therefore expedient on the part of the Ghanaian government to intensify the campaign on educating the populace about the immerse benefits in enrolling in the NHIS. This will not only increase the number of enrollees to the insurance scheme but will likely improve access to better and affordable health care services including maternal care.

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APPENDIX A: Itsa (Regional) displaying skilled birth attendants during delivery pre-and post-NHIS

	Coefficient	**95%CI**	**P-value**
Region: Greater Accra			
Initial mean level difference between Greater Accra region and other regions (_z)	38.1	(26.6, 49.6)	<0.001
Difference in the mean baseline slope (_z_t)	-.75	(-3.74, 2.23)	0.61
% change in the first period of intervention (_z_x2003)	9.43	(-15.7, 34.6)	0.75
Health insurance coverage pre NHIS	0.30	(-.02, 0.63)	0.06
Changes in post-intervention trend (_z_x_t2003)	1.27	(0.13, 2.41)	0.02
Maternal age	1.50	(-0.24, 3.24)	**0.08**
Region: Brong Ahafo Region			
Initial mean level difference between Brong Ahafo region and other regions (_z)	15.3	(2.94, 27.7)	0.016
Difference in the mean baseline slope (_z_t)	-.70	(-4.22, 2.82)	0.69
% change in the first period of intervention (_z_x2003)	3.59	(-26.5, 33.7)	0.81
Health insurance coverage pre NHIS	0.43	(-.08, 0.95)	0.09
Changes in post-intervention trend (_z_x_t2003)	1.66	(1.02, 2.29)	0.001
Maternal age	0.40	(-2.41, 3.22)	**0.77**

***adjusted for maternal age (age in bold not statistically significant)**
***significance set as p-value <0.05**

APPENDIX B: Itsa (Regional) displaying postnatal care pre- and post-NHIS

	Coefficient	**95%CI**	**P-value**
Region: Volta			
Initial mean level difference between Volta region and other regions (_z)	2.59	(-.26, 5.45)	0.07
Difference in the mean baseline slope (_z_t)	-.25	(-1.28, 0.76)	0.61
% change in the first period of intervention (_z_x2003)	12.53	(-24.82, 49.89)	0.50
Health Insurance coverage pre NHIS	.046	(-.34, 0.43)	0.81
Changes in post-intervention trend (_z_x_t2003)	2.77	(-1.16, 6.70)	0.16
Maternal age	2.60	(-1.43, 6.64)	**0.20**
Region: Upper West			
Initial mean level difference between Upper West region and other regions (_z)	2.34	(0.33, 4.35)	0.02
Difference in the mean baseline slope (_z_t)	-.01	(-1.02, 1.00)	0.98
% change in the first period of intervention (_z_x2003)	22.5	(-23.2, 68.42)	0.32
Health Insurance coverage pre NHIS	.028	(-.34, 0.40)	0.87
Changes in post-intervention trend (_z_x_t2003)	1.99	(-2.75, 6.74)	0.40
Maternal age	1.80	(-3.22, 6.83)	**0.47**
Region: Northern			
Initial mean level difference between Northern region and other regions (_z)	-5.40	(-12.67, 1.87)	0.14
Difference in the mean baseline slope (_z_t)	-1.34	(-2.22, -.46)	0.004
% change in the first period of intervention (_z_x2003)	24.09	(2.09, 46.1)	0.032
Health Insurance coverage pre NHIS	-.02	(-.40, 0.34)	0.88
Changes in post-intervention trend (_z_x_t2003)	2.52	(-0.13, 5.18)	0.06
Maternal age	2.50	(-0.21, 5.26)	**0.07**

***adjusted for maternal age (age in bold not statistically significant)**
***significance set as p-value <0.05**