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THREE ESSAYS ON SOCIAL HEALTH INSURANCE IN DEVELOPING COUNTRIES: THE CASE OF GHANA

by

Stephen Ofori Abrokwah

A dissertation submitted to the Graduate College
in partial fulfillment of the requirements
for the degree of Doctor of Philosophy
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THREE ESSAYS ON SOCIAL HEALTH INSURANCE IN DEVELOPING COUNTRIES: THE CASE OF GHANA

Stephen Ofori Abrokwah, Ph.D.

Western Michigan University, 2013

More than 2 billion people live in developing countries with health systems constrained by inequitable access and inadequate funding. The World Health Organization estimates that more than 150 million of these people suffer financial breakdown every year having to make unexpected out-of-pocket expenditures for emergency care.

To improve health and reduce the financial burden on households, a number of developing countries, including Ghana, Colombia, and Peru, have recently introduced social health insurance programs which are heavily subsidized. The dissertation is a collection of three essays looking at how individual health care choices changed as a result of the availability of insurance coverage in Ghana.

The first essay evaluates health care choices and out-of-pocket expenditures after the introduction of social health insurance covering modern health care services. When ill, an individual decides between a set of alternatives; no care, alternative (traditional) medicine, modern care and both alternative and modern care. My results show that when health insurance becomes available, individuals either switch to modern medical care or complement alternative care with modern care. I also find that out-of-

pocket expenditures decrease significantly across all the different types of care as a result of health insurance.

The second essay studies the effect of health insurance on household fertility decisions and examines whether the effect is due to women likely to become pregnant seeking out insurance (adverse selection effect) or women with insurance changing fertility decisions (moral hazard effect). To disentangle the effects of adverse selection from moral hazard, I exploit district-level variation in the dates of implementation of the national health insurance to instrument for insurance enrollment. My results suggest that both adverse selection and moral hazard effects were present and fertility increased with insurance.

The third essay examines the role of social health insurance on prenatal care and expenditure using a two-part model. Results show that health insurance increases the propensity of pregnant women to seek prenatal care relative to the uninsured. Insured pregnant women are more likely to seek prenatal care, but conditional on any spending, they spend less out-of-pocket compared to the uninsured.

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CHAPTER 1

INTRODUCTION

Illness is a major risk for households in developing countries and can have significant financial impact on affected households. It potentially reduces a household's stream of income and results in additional medical expenditures. The World Health Organization (WHO) estimates that more than 150 million of people in developing countries suffer financial breakdown every year, having to make unexpected out-of-pocket expenditures for hospital care (Aguilar-Rivera et al. 2007). Without access to insurance, households use alternative cost-reducing strategies to care for themselves in times of illness.

A number of developing countries including Ghana, Peru, Namibia, and Colombia have recently introduced health care reforms, primarily through social health insurance programs aimed at improving health care access at affordable prices and to reduce the financial burden to households. Social health insurance was designed to provide health coverage and to help balance financial risk between the healthy and the sick (Eggleston 2000). This model of coverage is known as social insurance because those more likely to use health care (such as the old and sick) do not pay substantially more for coverage than the healthy and young. Through pooling financial contributions from enterprises, households, and governments, social health insurance mechanisms finance and manage health care (Nyman 2004). The social health insurance model ensures that all people who make contributions receive a pre-defined right to health care, regardless of their income or social status.

Social health insurance generally takes two forms, particularly in developing countries. In one form, there is universal and mandatory membership for all people. This ensures the inclusion of underserved groups who are often left out from the voluntary private health insurance schemes. A typical example of this system is Taiwan's National health insurance program. In the other form, people in the formal sector are mandated to join, whereas the informal sector is allowed to enroll at will. The second form is more common in developing countries where it is difficult to track people in the informal sector, for example Ghana's social health insurance program.

Unlike market (private) insurance schemes, social insurance programs are typically highly subsidized. The concept of market insurance follows an actuarial model, where how much policyholders pay is in large part a function of their individual situation and history. Also the providers of market insurance are driven by profit; whereas social insurance has the goal of optimizing social welfare.

From independence in 1957 through 1970, the government of Ghana provided free public health services to all citizens. In the 1970's, the government introduced a nominal fee to improve financing of the public health services (Frempong 2009). In the 1980s, the country faced dire economic conditions. This led to the government introducing user fees, a cost recovery scheme, also known as the 'cash and carry' system which severely constrained access to health care. Under this system, an individual was required to have money in order to access any health service. This was part of the IMF and World Bank's structural adjustment program (Mensah et al., 2010).

During this period, many people resorted to alternative means of attending to their health. Most people would postpone doctor visits due to inability to pay for health care costs (Oppong, 2001; Shaw and Griffin, 1995). In the 1990s, private Community health insurance schemes were introduced in some districts. These community schemes however covered less than 3 percent of the population by 2002 (Schmidt, 2009; Sabi, 2005). It was not until year 2003, that the government of Ghana instituted the National Health Insurance Scheme (NHIS). The goal of this scheme was to ensure equitable and universal access to health care services for all Ghanaians and to reduce mortality especially maternal and infant mortality. The program was financed through several means: First, the National Health Insurance levy (2.5 percent of V.A.T.); payroll deductions (2.5 percent of income) for formal sector employees, including people who work in government institutions and the private (formal) and industrial sector, and premiums for informal sector members. Other funds come from donations or loans.

Annual premiums are between 72,000 cedis and 480,000 cedis based on income of the insured. To obtain a complete coverage of the population, the premium paid by adults covers children and dependents under 18. Several other groups are exempted from premium payments and these include pensioners, the elderly, and indigents; pregnant women were exempted (as of 2008). (Mensah et al., 2010).

The introduction of social health insurance in Ghana in 2003 provides a unique opportunity to study how health care choices change in developing countries once people are given affordable access to care. This dissertation is a collection of three essays that examines how individual health care choices change as a result of the availability of social health insurance coverage in Ghana.

The first essay evaluates health care choices and out-of-pocket expenditures after the introduction of Ghana's social health insurance program covering only modern health care services. When ill, an individual decides between a set of alternatives; no care, alternative medical care, modern care and both alternative and modern care. My results show that when health insurance becomes available, individuals take advantage of the insurance by either switching to modern medicine or complementing the use of alternative care with modern care. Finally, I find that out-of-pocket health expenditures decrease significantly across all the different types of care sought as a result of health insurance. Overall, my results show mixed evidence of both substitution and complementarity across the different health care choices. Even though theory predicts the substitution result, the complementarity result is rather interesting and suggest that alternative[1] (i.e., traditional) medicine still plays a crucial role in the health care in Ghana. This result can be partly attributed to the problems of access in regards to longer distance to modern health facilities as well as perception of the efficacy of alternative medicine over the years.

The introduction of social health insurance programs in a number of developing countries is in part a response to two of the millennium development goals, namely reducing infant mortality and improving maternal health outcomes. By making modern health care more accessible and affordable, policy makers hope that more women will seek prenatal care and thereby improve health outcomes. The second and third essays look at how the insurance program affected fertility and prenatal care decisions,

[1] Alternative medicine here broadly refers to non-western medicine and comprises of traditional healers, herbalists, chemical sellers and pharmacists.

respectively. The second essay studies whether the availability of social health insurance affects the fertility decisions of women and examines whether the effect is due to women likely to become pregnant seeking out insurance (adverse selection effect) or women changing fertility decisions once they have insurance (moral hazard effect).

To disentangle the effects of adverse selection from moral hazard, I exploit an exogenous event, the district-level variation in the dates of implementation of the national health insurance, to instrument for insurance enrollment. I first run a standard probit regression of insurance status on fertility decisions of women, controlling for demographic, household, and community characteristics without controlling for endogeneity. The result from this estimation shows that the relationship between insurance and fertility could be either the result of adverse selection or moral hazard or both. I then run an iv-probit estimation to account for the endogeneity problem. Comparing the two sets of regression estimations helps us distinguish between adverse selection and moral hazard.

My results suggest that women who expect to become pregnant may be more likely to enroll in the insurance program but that insurance also seems to encourage women to have more children.

The third essay addresses three issues related to prenatal care. I examine the role of social health insurance on prenatal care utilization and expenditure using a two-part model. Finally I evaluate the impact of social health insurance on the number of prenatal care visits. Sub-Saharan Africa accounts for approximately half of global maternal deaths (WHO, 2007). As a result of this alarming statistic, a prenatal care

model was developed by the World Health Organization (WHO) and recommends a minimum of four medical care visits with detailed instructions on the basic components of care for the four visits (WHO, 2001). Most developing countries have often failed in the past to meet these standards due to lack of human resources, equipment and supplies (Zanconato, Msolomba, Guarentil, and Franchi, 2006).

The social health insurance programs recently introduced in a number of developing countries are designed to improve primary health care and help to reduce thereby reduce infant and maternal mortality. My estimation results show that health insurance increases the propensity of pregnant women to seek prenatal care relative to the uninsured. I use a proxy variable for insurance status, called 'intent to treat', which is defined as whether a respondent was in a district which had the national health insurance scheme already in operation at the time when she was surveyed. Using this variable enables me to avoid the problem of endogeneity, since district-level availability of the program is exogenous event similar to a natural experiment.

The results regarding prenatal care spending show that insured pregnant women are more likely to seek and hence to spend at least 1 cedi on prenatal care, but conditional on any spending they actually spend less out of pocket compared to the uninsured pregnant women. As a robustness check to the second research question, I added an interaction term between insurance status and urban residency status. People in the urban insured group are more likely to have insurance compared to others, but, even with the interaction term, insurance still has an independent and significant effect on prenatal care choices.

Furthermore, the interaction term, insured pregnant women living in urban areas, were more likely to seek and hence spend at least 1 cedi on prenatal care. However conditional on spending any amount, they did not differ significantly from other pregnant women on the magnitude of out-of-pocket spending. Finally, I find that insurance increases the odds of having more prenatal care visits compared to not having insurance, which implies that the insurance program is helping Ghana reach the WHO target of four prenatal care visits per woman.

CHAPTER 2

THE EFFECT OF SOCIAL HEALTH INSURANCE ON CHOICE OF CARE

2.1 Introduction

In most developing countries, traditional healers and remedies made from indigenous plants (alternative medicine) play a crucial role in the health of millions. According to the WHO (2008), in some Asian and African countries, up to 80 percent of the population relies on traditional medicine for their primary health care needs The relative ratios of traditional practitioners and university trained doctors to the population in some African countries may partly explain the use of traditional care. For example, in Kwahu district of Ghana, for every traditional practitioner there are 224 people, compared with one university trained doctor for nearly 21,000. The same study finds that there is one healer for every 200 people in the Southern Africa region which is a much greater doctor-to-patient ratio than is found in North America.

As a result of the challenges faced by households in developing countries with regards to access to and out-of-pocket cost of modern health care, a number of developing countries, including Ghana, Namibia, Colombia, and Peru, have recently introduced social health insurance programs. These programs aim at improving health care access at affordable prices and thus reducing the financial burden to households. The government of Ghana instituted the National Health Insurance Scheme (NHIS) in 2003. The primary goal of this scheme was to ensure equitable and universal access to

health care services for all Ghanaians and to replace the "cash and carry"[2] system which required prompt payment for health services.

The primary purpose of insurance is to spread risk, which in this case, is the risk of incurring substantial medical expenses. With risk-spreading, the insured is then protected against variable financial loss due to medical expenses in the event of illness. Social health insurance differs from market insurance in that social health insurance programs are heavily subsidized and place emphasis on the social welfare of the entire population. Market insurance places greater emphasis on actuarial fairness, with high risk individuals being made to pay more compared to low risk individuals. Market insurance model also includes risk reducing strategies like, co-payments, co-insurance, deductibles, and policy limits. Social Health Insurance programs have been shown to increase health-seeking behavior and reduce out-of-pocket expenditures for medical care in developed countries (Waters, Anderson and Mays 2004).

The goal of this paper is to investigate individual decisions over choice of health care as well as the magnitude of their out-of-pocket health care expenditures after the introduction of the social health insurance system in Ghana. Specifically, I study whether individuals or households substitute modern medical care for alternative medical care, or if they make use of both types of care, suggesting complementarity in the types of care.

When ill, individuals and households decide whether or not to seek health care and where to get treatment. These household decisions are influenced by factors such as

[2] Cash and carry is a sales policy or a method of purchase in which the customer must remit payment at the point of service and must take the item with you. In the context of this paper, it can be seen as paying for health care before you receive the necessary treatment.

the nature of the medical problem, the expected cost of treatment, individual's perception about the type of care, accessibility of health care as well as other socio-economic characteristics of the household in question. Based on these factors, individuals, after deciding whether to seek care, must choose between seeking alternative medicine, which includes traditional healers, spiritualists or visiting a chemical seller[3]; and modern medical care.

The proportion of the population seeking some form of alternative medicine cuts across all income groups, (Barnes et al., 2008; Eisenberg et al., 1998). This is because alternative medicine has developed over generations within these societies before the era of modern medicine. Another advantage that alternative medicine has over modern medicine is that it is generally less expensive and often closer to home, which implies that individuals without health insurance are more likely to use some form of alternative medicine (i.e. herbalists, spiritualists) in these societies.

I apply models used in the health literature for informal care versus formal care to analyze the relationship between alternative medicine and modern medicine. There are two main competing models in the health literature on the trade-off between informal and formal care, namely, the substitution model and the complementary model. According to the *substitution model,* (Greene 1983), as the patient receives formal care, the household decreases the amount of informal care received. The

[3] In Ghana, a chemical seller is one who is licensed and legally authorized to sell only products that do not require a medical prescription, thus mostly traditional medicine. Typically, the attendants have minimal or no training on appropriate dispensing of medicines. Chemical sellers' shops are the principal source of medicinal products for the Ghanaian rural population. Chemical sellers are also recognized as the first-line or only source of consultation for 60 percent of people seeking health care in general. There are over 8,000 licensed chemical sellers in Ghana and perhaps 2,000 more that are unlicensed, Ghana Health Service (2009).

complementary model, (Blandford and Chappell 1991), on the other hand, hypothesizes that households jointly use both informal care and formal care in their quest to receive treatment. When the medical needs of the individual seeking care exceed informal care resources, formal care provides the necessary support, (Bass and Noelker 1989; Edelman and Hughes 1990; Denton 1997). There is little evidence in the literature regarding whether the substitution model or the complementary model dominates (Jiménez-Martín and Prieto 2008). Both types of care may happen simultaneously or sequentially.

There are a number of papers which have discussed the issue of access to health care and financial protection in developing countries (for example, Yip, et al. 2008; and Trujillo et al. 2005), but there has been none to the best of my knowledge that has focused on the role of a social health insurance scheme on health care decisions. This is also the first paper to use an extension of the four part equation model by Duan et al. (1982 and 1983), an extension of the two-part models, to model health care expenditures and health care choices in developing countries. In the present application, a seven-part equation model is needed due to the number of categories of care.

2.2 Health Care Financing and Health Insurance in Ghana

The health insurance program introduced in Ghana in 2003 is the most recent of several major reforms of Ghana's health system since independence in 1957. After independence, the government embarked on a welfare system which provided free health care for all its citizens at public health facilities. Health care was primarily financed by taxes and external donor support, user fees were removed and attention was

directed to developing a wide range of primary health care facilities across the country. By the early 1970s, the country was facing stagnating economic growth and could therefore not support its health financing with tax revenues alone.

In 1985, the government introduced health care reforms as part of the ongoing structural adjustment programs aimed mainly at reducing government spending to address budgetary deficits. The reforms included introducing cost recovery mechanisms through user fees (known in Ghana as "cash and carry") in order to discourage unnecessary use of services and liberalize health services to allow private sector involvement (The World Bank 2007). This system led to dramatic declines in health care utilization, with outpatient visits to hospitals dropping from 4.6 million to 1.6 million in 1985 (Ghana health service 2009). Beginning in 1989, community-based health insurance (CBHI) schemes, also known as mutual health organizations (MHOs), were introduced in certain districts throughout the country in response to this plight. However coverage rates were very low covering less than 5 percent of the population, leaving many Ghanaians vulnerable in the event of a catastrophic illness (Ghana Health Service 2009).

In response, the government of Ghana passed the National Health Insurance Act (650) in 2003, whose primary goal was to reduce out-of-pocket expenditures and improve access to, as well as the quality of, basic health care services through the establishment of district-wide insurance schemes coordinated by the National Insurance Authority. The funding sources come mainly from the National Health Insurance Levy (2.5 percent of V.A.T.); secondary sources are payroll deductions (2.5 percent of income) for formal sector employees, including people who work in government

institutions and the private (formal) and industrial sectors, and premiums for informal sector members. Other funds come from donations or loans.

Membership in the National Health Insurance Scheme (NHIS) is mandatory for formal sector workers, unless alternative private health insurance can be demonstrated. Membership is optional for informal sector workers and those not in the labor force who make up the majority of the population. For formal sector workers, a payroll deduction of 2.5 percent is transferred to the NHI fund as part of their contribution to the Social Security and National Insurance Trust fund. Premiums by those outside the formal sector are supposed to be defined according to income such that the lowest-income group pays an annual premium of 72,000 cedis, or roughly US$ 8, while those in the highest income group pay a premium of 480,000 or US$53 per annum for each enrolled individual. In practice, a flat premium payment of 72,000 per annum is charged in some regions due to the difficulty of assessing and verifying income in the informal sector. Once the premium is paid, there are no additional costs, such as co-payments or deductibles, to members, provided the ailment falls within the defined benefits package.

The National Health Insurance Act (NHIA) mandates a pre-defined benefits package that covers about 95 percent of the disease burden in Ghana. Services covered include outpatient consultations, essential drugs, inpatient care and shared accommodation, maternity care (normal and caesarean delivery), eye care, dental care and emergency care. Excluded benefits include echocardiography, renal dialysis, heart and brain surgery, organ transplantation as well as other drugs not listed in the approved drugs list. Several groups are exempted from premium payments, and these include pensioners, the elderly, children under age 18, indigents and pregnant women (pregnant

women were added as of 2008). However, those exempted from premiums still need to be registered to receive the benefits. There is a six-month waiting period between joining and being eligible for benefits (Government of Ghana 2004). By the end of 2008, Ghana's national insurance program covered 61 percent of the population, with District Municipal Health Insurance Schemes (DMHIS) operating in all districts (Asenso-Boadi 2009).

2.3 Theoretical Framework

Grossman's (1972) influential paper on demand for health has formed the foundation in the field of health economics in understanding and formulating demand functions for health In Grossman's human capital model, individuals demand health care or "good health." Good health is a consumption good that provides both utility and production benefits (healthy individuals have greater earning potential). Individuals inherit an initial stock of health that declines over time and can be increased by investment according to Grossman's model. They then maximize the life-cycle discounted sum of utilities defined over consumption of health services and consumption of other commodities subject to an inter-temporal budget constraint.

To achieve the desired level of health capital, individuals invest time and utilize health care to generate health capital. The Grossman reduced form demand for health care equation implied by the model takes the following form:

$$\ln M(t) = \beta_1 + \beta_2 \ln w(t) + \beta_3 \ln P^m + \beta_4 E + \beta_5 X + \beta_6 t + \beta_7 \ln\{1 + H(t)/\delta(t)\mu\} \quad (1)$$

where $M(t)$ is the demand for health care, $w(t)$ is the wage rate, P^m is the price of health care, E is education, X is a vector of variables capturing environmental conditions, and t is a time index . H is the relative change in stock of health over time, δ is the rate of depreciation of health and reflects the potential ability of individuals to adjust to the desired health stock instantaneously. For the purpose of simplification, I use a static, one-period version of the Grossman model. I modify the Grossman model to incorporate the choice of type of care, as well as social health insurance, which reduces the cost of modern medical care relative to alternative care.

2.3.1 Model Specification

In this model, an individual's utility is assumed to depend on his own health stock, commodities consumed by the individual, as well as preferences of the individual. The utility function takes the form:

$$U = U(H, Z; P) \tag{2}$$

Where H is health stock, Z denotes a vector of all other commodities consumed by the individual, and P denotes a vector of preference factors. The demand for health care is a derived demand from the optimal health (H) according to Grossman. Health is produced by investments of market purchased good and services.

The two forms of care, Alternative medical care (A) and Modern medical care (M) are used by individuals to improve their health status. E represents individual specific characteristics such as age, education, health status, as well as activities such as

smoking or physical exercise which affects the individual's efficiency in producing health. The production function for health can be expressed as,

$$H = H(A, M; E, \mu) \tag{3}$$

where μ represents unobservable household-specific health endowments known to the household but not controlled by it, including environmental factors or genetic traits of the household members. Substituting the production functions for health and for other commodities into the main utility function results in utility as a function of modern medical care and alternative medical care use:

$$Max\ U = U(\mathrm{H}(\mathrm{A}, \mathrm{M}; \mathrm{E}, \mu), \mathrm{Z}, \mathrm{P}) \tag{4}$$

Individuals thus maximize utility subject to their budget constraint. Due to the presence of social health insurance, I break down the budget constraint into insured and uninsured categories, where persons who enroll in the insurance program pay a flat premium along with other costs associated with seeking care, including transportation costs. For the uninsured however, apart from paying the other related costs, they pay the full cost of modern care. The budget constraint requires that the expenditures on health care for both modern and alternative as well as on all other market goods should be less than or equal to the total income;

With no insurance;

$$(p_M + t_M)M + (p_A + t_A)A + (p_X)X \leq I \tag{5}$$

With insurance;

$$\pi_M + (t_M)M + (p_A + t_A)A + (p_X)X \leq I \qquad (6)$$

where π_M represents the health insurance premium that is paid by those who seek modern medical care. Following the social insurance system in Ghana, the out-of-pocket costs for care, P_M, equal zero when the individual has insurance. I assume that the benefits of the social health insurance program are given and hence do not appear in my model, since the benefit structure is standard across all the population in a social health insurance program, t_M and t_A represents indirect costs related to seeking modern and alternative care respectively, including transportation cost. p_M is the price of modern care, with M being the quantity of modern care received, p_A is the price of alternative medical care, with A being the quantity of alternative medical care, p_X is the price of other market goods and services, X is the quantity of all other market goods and services, and I represents the income available for expenditure.

The individual consumer's optimization problem therefore takes the form:

$$Max\ U = U(\mathrm{H(A, M; E}, \mu), \mathrm{Z, P})$$

subject to

$$(p_M + t_M)M + (p_A + t_A)A + (p_X)X \leq I, \qquad \text{if uninsured} \qquad (7a)$$

and

subject to

$$\pi_M + (t_M)M + (p_A + t_A)A + (p_X)X \leq I, \qquad \text{if insured} \qquad (7b)$$

Setting up the Lagrangian function first for no insurance gives us:

$$\mathcal{L} = Max\ U = U(\mathrm{H}(\mathrm{A}, \mathrm{M}, T_A, T_M; \mathrm{E}, \mu), \mathrm{Z}(\mathrm{X}, \mathrm{T}_X;\ \mathrm{E});\ \mathrm{P}) + \gamma\{I - (p_M + t_M)M - (p_A + t_A)A - (p_X)X\} \quad (8)$$

The first order conditions are as follows:

$$\frac{\partial \mathcal{L}}{\partial A} = \frac{\partial U}{\partial H} * \frac{\partial H}{\partial A} - \gamma(p_A + t_A) = 0 \quad (9a)$$

$$\frac{\partial \mathcal{L}}{\partial M} = \frac{\partial U}{\partial H} * \frac{\partial H}{\partial M} - \gamma(p_M + t_M) = 0 \quad (9b)$$

$$\frac{\partial \mathcal{L}}{\partial X} = \frac{\partial U}{\partial H} * \frac{\partial H}{\partial X} - \gamma(p_X) = 0 \quad (9c)$$

$$\frac{\partial \mathcal{L}}{\partial \gamma} = I - (t_M + p_M)M - (p_A + t_A)A - (p_X)X = 0 \quad (9d)$$

From (9a) and (9b), I have that

$$\frac{\frac{\partial U}{\partial H} * \frac{\partial H}{\partial A}}{\frac{\partial U}{\partial H} * \frac{\partial H}{\partial M}} = \frac{p_A + t_A}{p_M + t_M} \quad (10)$$

Setting up the Lagrangian function first for having insurance gives us:

$$\mathcal{L} = Max\ U = U(\mathrm{H}(\mathrm{A}, \mathrm{M}, T_A, T_M; \mathrm{E}, \mu), \mathrm{Z}(\mathrm{X}, \mathrm{T}_X;\ \mathrm{E});\ \mathrm{P}) + \gamma\{I - \pi_M - (t_M)M - (p_A + t_A)A - (p_X)X\} \quad (11)$$

The first order conditions are as follows:

$$\frac{\partial \mathcal{L}}{\partial A} = \frac{\partial U}{\partial H} * \frac{\partial H}{\partial A} - \gamma(p_A + t_A) = 0 \quad (12a)$$

$$\frac{\partial \mathcal{L}}{\partial M} = \frac{\partial U}{\partial H} * \frac{\partial H}{\partial M} - \gamma(t_M) = 0 \qquad (12b)$$

$$\frac{\partial \mathcal{L}}{\partial X} = \frac{\partial U}{\partial H} * \frac{\partial H}{\partial X} - \gamma(p_X) = 0 \qquad (12c)$$

$$\frac{\partial \mathcal{L}}{\partial \gamma} = I - \pi_M - (t_M)M - (p_A + t_A)A - (p_X)X = 0 \quad (12d)$$

From (12a) and (12b), I have that

$$\frac{\frac{\partial U}{\partial H} * \frac{\partial H}{\partial A}}{\frac{\partial U}{\partial H} * \frac{\partial H}{\partial M}} = \frac{p_A + t_A}{t_M} \qquad (13)$$

Thus, at the optimal solution, the ratio of the marginal products of alternative care and modern care equals the relative ratios of the prices for the type of cares as shown in equations 11 and 14. This means that patients balance the health benefits of the type of care with the cost. So for example, a person may start with alternative care because it is less expensive, but then if the marginal health benefits (i.e., the effectiveness of the treatment for additional spending) decline, then he will switch to modern medicine, which may be more expensive but more effective. It is evident in equation 14 that insurance results in lower costs for modern care relative to alternative care.

When ill or injured, an individual decides whether or not to seek health care and, conditional on seeking any care, which type of care to seek by weighing the potential costs and benefits of health care utilization. A number of factors affect costs and benefits of different treatment options as perceived by the individual. From the traditional Grossman model as postulated above, an individual seeks to maximize his utility, derived from his own health stock and from the consumption of other

commodities. For the purposes of my analysis, I will focus on the following determinants of demand for health; insurance status, access to health care, health status, income, age, education, occupation, type of illness, severity of illness and gender.

Social health insurance, which reduces the cost of modern health care, should induce individuals to seek more modern medical care relative to alternative medicine, thus supporting the substitution idea, assuming that modern medicine is a normal good, thus exhibiting income effects of the price change. On the hand there could be complementary as well as income effects. If the price of modern health care falls, there will be an incentive for households to complement modern care with alternative care as they consume more health care services overall. The cost of access to health care is another important determinant of the demand for health (Carlson 1999). Access can be proxied by distance or access to transportation. It constitutes out-of-pocket payments and time costs, which depends on labor income and the opportunity cost of lost household production due to sick time.

In general, conditional on health status, income should be positively associated with health care utilization. The typical sources of income are either through the labor market or from self-employment, especially agricultural work. According to the Grossman demand for health model, it is assumed that health depreciates with time and hence, one would expect age to affect the marginal utility of health.

This paper tests whether the introduction of social health insurance causes individuals to complement modern care with alternative care, or to substitute modern medical care for alternative medical care. Theory suggests that the results could go either way, thus alternative care and modern care can be substitutes or complements.

2.4 Data and Descriptive Statistics

The data used for this study come from two rounds of a survey conducted in two districts of Ghana, with different samples of households selected in each round. The baseline survey was conducted September - October 2004, while the end-line survey took place September – October 2007. The period of the baseline survey preceded the roll-out of the National Health Insurance (NHIS) program, while the end-line survey took place after the implementation of the NHIS. The survey was funded by the United States Agency for International Development and conducted by the Health Systems 20/20 Project, led by Abt Associates Inc., in collaboration with the Research and Development Division of the Ghana Health Services. The two districts in the study are Nkoranza and Offinso, both predominantly agricultural and relatively poor. Nkoranza is one of the few districts in the country where a municipal health organization operated before the NHIS.

A two-stage cluster sampling design was used, first selecting a sample of municipalities, then selecting a sample of households within the municipalities. The baseline sample covered 1,805 households, and the end-line sample consisted of 2,520 households in the same communities visited at baseline. The number of individuals reporting illness or injury within two weeks prior to the survey was 413 and 411 for baseline and end line surveys respectively. The household survey collected information on socio-demographic characteristics of households, health insurance membership, and health care utilization and payments associated with: (1) injury or illness in the two weeks preceding the survey, (2) hospitalization in the 12 months preceding the survey, and (3) births in the household in the 12 months preceding the survey. The survey also

collected information related to the treatment-seeking behavior for recent illness or injury for the past 15 days, whether the household sought an informal source of care or a formal source of care. Additional information was collected on ownership of land, assets (including television, refrigerator, telephone, bicycle, motorbike, and car), and living conditions (whether there is electricity, floor type, type of water, fuel used for cooking, having farmland, and number of rooms in the house). From this information, a wealth quintile variable was constructed using principal component analysis.

2.4.1 Descriptive Statistics by Type of Care

Figure 2.1 and table 2.1 provide descriptive statistics for the types of care sought by households: no care, alternative care, modern medical care and those who jointly seek alternative care and modern medical care. From figure 2.1, it is seen that the proportion of people who sought both types of care increased in the end-line survey period relative to the baseline survey period, which supports the theory that there is persistence in the use of alternative medicine. Also, the proportion of people who sought only modern medical care increased in the end-line survey relative to the baseline survey period, while, the proportion of people who sought only alternative medical care fell in the end-line survey compared to the baseline period. Since the National health insurance program started between the two survey periods, it is reasonable to assume that at least a portion of the changes in the distribution to the insurance program.

Consistent with expectations, a higher proportion of insured household members seek modern medical care relative to the uninsured (table 2.1). The proportion of insured individuals who sought modern care is greater than the insured who sought each

of the other sources of care. Approximately 70 percent of the people who sought modern medical care had health insurance, while only 32 percent of persons who sought alternative medicine were insured. This is not surprising, since the national health insurance program supports the formal health centers and public hospitals. In my sample, women account for a disproportionate share (74 percent) of people who reported illness over the study period.

Across the different age groups who sought modern medical care, 41 percent of them were children under age 18, while 32 percent of them were between ages 18 and 49. Since the communities surveyed were relatively rural, the predominant occupations in these communities were farmers and fishermen. There were more people who reported severe illness than less serious illness. Not surprisingly, a higher percentage of people who self-medicated or did not seek any form of health care were people who reported less severe illness.

2.4.2 Descriptive Statistics by Survey Period

Table 2.2 shows the demographic characteristics by year. There were a higher proportion of individuals with health insurance during the end-line survey relative to the baseline survey period. Insurance enrollment almost doubled from 34 percent to 57 percent from the baseline to end line. The primary reason is that the national health insurance program had not yet been rolled out in the entire country at the time of the baseline survey. The Nkoranza district, however, did have a working community based health insurance program at the time, whereas Offinso did not have any in place. Total health expenditure decreased from the baseline to the end line and this includes total

health expenditure including transport costs. This was generally expected since the health insurance program helped reduce the out-of-pocket health care expenditures.

2.5 Empirical Methodology

2.5.1 Modeling Household Health Care Expenditures Using a Seven-Part Model

In this paper, I present estimates based on an augmented form of the four-equation model developed by Duan et al. (1982 and 1987); Duan (1983). This particular model is well-suited to the characteristics of the distribution of health expenditure. First, in health expenditures data, it is common to observe a high percentage of zeros. This often results from the fact that a large proportion of respondents use no medical services during the year. Second, the distribution of expenditures among users is highly skewed to the right (visits, hospitalization, costs). Third, the distribution of medical expenses may be different across types of care. There also exists nonlinearity in response to covariates.

According to Deb et al. (2011), ordinary least squares may yield badly biased and/or less precise estimates of means and marginal effects if these characteristics of the data are ignored. Also the results will not be robust to tail problems and estimates from one subsample may even forecast poorly to another subsample from same population. As Duan et al. (1982 and 1983) and Manning et al. (1987) show, a four-equation model that exploits the characteristics of the medical expense distribution yields consistent estimates with lower mean square error than other methods.

2.5.2 The Seven-Equation Model

I partition the respondents into four groups: nonusers (those who were ill but sought no care), users of only alternative medical care, users of only modern medical care, and users of both alternative medical care and modern medical care. Thus the choice of care variable is a categorical variable *j* which denotes the choice of the type of care among the set of alternatives {1= nonusers, 2= Alternative medical care (A), 3 = Modern medical care (M), 4 = Both Alternative medical care and Modern medical care (B)}.

Outlined below are the seven equations of the model. The first equation (equation 15) is a probit equation for the probability that an individual will receive any form of health care during the past two weeks prior to the survey, from either alternative medical care, modern medical care, or both types of care. This equation therefore separates users from nonusers of care because a high proportion of the population does not use any form of care during the two weeks prior to the survey. It is a probit equation for the binary variable that is equal to one when there are some positive medical expenses and takes the form:

$$C_{1i} = X_i\alpha_1 + \epsilon_{1i} \qquad (14)$$

$$(\epsilon_{1i}|X_i) \sim N(0,1) \qquad (15)$$

where $C_{1i} > 0$, when there is some positive expenditure on some type of care, and 0 otherwise. The variable X represents a vector of covariates which affects the likelihood of seeking health care, which includes health insurance, the main policy variable being the primary independent variable. The vector of control variables accounts for individual, household and community characteristics and include gender, age, income

quintile of household, relationship to household head, occupation, education, marital status, and regional dummies.

The second equation (equation 16) is a probit equation for the conditional probability that a user will have at least one alternative medical care usage, given that he uses some care. The third and fourth equations, all also represented in equation 16 below are probit equations for the conditional probability that a user will have at least one modern medical care usage and both types of care use respectively, given that he uses some care. They can be restated as a probit equation for having a zero versus some positive alternative care expenses, positive modern care expenses, and positive joint care expenses respectively, given that the person used some form of health care services:

$$C_{ji} = X_i\alpha_j + \epsilon_{ji} \quad (16)$$

$$j = 2,3,4; \qquad i = 1,2,\dots,N$$

$$\left(\epsilon_{ji} \middle| C_{1i} > 0, X_i\right) \sim N(0,1) \quad (17)$$

The remaining equations; fifth, sixth and seventh equations of the seven part model, represented by equations 18, 20, and 21 are linear regressions for the logarithm of the total annual expenditure for alternative medical care users, modern medical care users, and users of both types of care respectively. Equation 18 is a linear model on the log scale for positive health expenditure if only alternative medical care services are used:

$$\ln(HEALTH\ EXP_i | C_{1i} > 0\ and\ C_{2i} > 0) = X_i\alpha_5 + \epsilon_{5i} \quad (18)$$

where

$$E(\epsilon_{5i} | C_{1i} > 0\ and\ C_{2i} > 0) = 0 \qquad (19)$$

The remaining equations 20 and 21 are linear models on the log scale for positive health expenditures if only modern medical care services are used, and if only both types of health care services are used respectively:

$$\ln(HEALTH\ EXP_i | C_{1i} > 0\ and\ C_{3i} > 0) = X_i\alpha_6 + \epsilon_{6i} \quad (20)$$

$$\ln(HEALTH\ EXP_i | C_{1i} > 0\ and\ C_{4i} > 0) = X_i\alpha_7 + \epsilon_{7i} \quad (21)$$

where

$$E(\epsilon_{6i} | C_{1i} > 0\ and\ C_{3i} > 0) = 0 \quad (22)$$

and

$$E(\epsilon_{7i} | C_{1i} > 0\ and\ C_{4i} > 0) = 0 \quad (23)$$

The error terms in these equations are assumed to be identically distributed even though not necessarily normally distributed. The likelihood function for this model is multiplicatively separable due to the approach taken to compute the conditional densities. According to Duan et al. (1982), and Duan (1983), separability implies that estimating the seven equations by maximum-likelihood separately provides the global full-information maximum-likelihood estimates. I therefore proceed to estimate the equations separately following the two-part model methodology.

Given the skewed nature of the expenditure variable in the second part of the model and hence the non-normality of the log scale error term, I perform the regressions on a log transformation of the expenditure. The logarithmic transformation actually results in nearly symmetric and roughly normal error distributions, which makes ordinary least squares estimates efficient, (Duan et al. 1982, and Duan 1983).

However, in calculating expenditure predictions from the model, one runs into the problem of retransformation back to raw-scale expenditures. A commonly used retransformation technique is Duan's smearing transformation from the OLS model for ln(expenditure).

In a typical cross-sectional survey data, insurance is endogenous when enrollment is voluntary; those who expect to demand more services have a clear incentive to obtain more insurance coverage. I acknowledge in this paper the presence of a self-selection problem with respect to the insurance variable. Because people are able to self-select into the insurance program, an appropriate endogeneity correction may be needed. However, since my data set is from a small survey in only two districts in Ghana, it makes it very difficult to be able to obtain a good instrument.

2.6 Empirical Results

2.6.1 First Stage Results: Probability of spending on care types

The first part of the analysis looks at who is seeking some form of care. Following from the seven-part equation model, the first equation whose results are shown in table 2.3 is a probit regression along with its associated marginal effects for the probability that an individual will receive some form of care within two weeks prior to the survey. It is clear that having insurance does increase the predicted probability of seeking at least some form of care and statistically significant at 5 percent level.

The results in table 2.4 show the probability of seeking the different types of care, namely alternative medical care, modern medical care and the joint care category.

Table 2.5 shows the magnitude of out-of-pocket spending conditional on any spending on the respective types of care.

Table 2.4 estimations show evidence of a trade-off between modern medical care and alternative medical care as a result of the social health insurance. Having insurance has a strong positive effect on the probability of seeking and hence spending on modern medical care (see table 2.4). On the other hand, insurance has a strong negative effect on the likelihood of seeking alternative medicine. Furthermore, having insurance has a strong positive effect on the probability of spending on seeking both types of care. This result supports the idea that there seems to be a trade-off between alternative medical care and modern medical care or alternative medical care and joint care when social health insurance becomes available. This therefore provides some evidence for the *substitution model* put forward by Greene (1983). The tradeoff could also be between alternative medicine and the joint care, where, as a result of insurance being made available, people who exit the exclusive use of alternative medicine might enter the category who seeks both types of care. Thus they might only add on modern medicine which has become relatively cheaper instead of switching to seeking only modern medical care.

Even though the substitution result is not very surprising, there is evidence for complementarity in that there is an increase in the predicted probability of people seeking both types of care. This result tends to support the evidence that alternative medicine is still widely used across the globe especially in developing countries, even in the presence of insurance in the modern health sector. Thus, people who use both types of care may continue using both after obtaining insurance, as much as those who use

only modern medicine may seek modern medical care after insurance enrollment. Consistent with the theoretical model, social insurance reduces the exclusive use of alternative medicine. The above results supports the complementary model by Blandford and Chappell (1991) in that people who use alternative medicine do not use it exclusively and often complement it with modern medicine.

With regards to access to health care, I use three different proxies for access to health care, namely whether a household own a bicycle, whether a household owns a motor cycle or a car or whether the individual owns a mobile phone. Households who own a car or a motor cycle are more likely to choose modern medicine care (hospital care) compared to the other types of care. I recognize that these are imperfect measures of access, as they do not reflect distance to a health facility and are also correlated with income. With regards to health status, both individuals reporting good or average health relative to a poor health reduced their likelihood of seeking alternative medicine, while individuals with good health status were more likely to seek more of both types of care.

I also find different care choices across age groups. The base category for the age grouping was age 50-69. For alternative medical care, children (under 18 years), the working class (age 18-49) and the very old (age 70+) relative to the omitted category showed significant decreases in their probability of spending on alternative care. There is however an associated increase in the likelihood of spending on modern care for the elderly (age 70+).

2.6.2 Second Stage Results: Out-of-pocket expenditures on care types

The table 2.5 results represent the magnitude of out-of-pocket expenditures on the respective types of care, conditional on some spending. I use the log of total health expenditures which helps eliminate the undesirable skewness in the distribution of expenses among users. The results show that conditional on any spending on the respective types of care, having health insurance reduces the actual magnitude of out-of-pocket expenditure across all the different sources of care.

In terms of interpretation, the insured who seek modern care are more likely than the uninsured to spend at least 0.66 cedis, but conditional on spending any amount, they do actually spend less out-of-pocket. For people who seek alternative care however, insured individuals are less likely to spend at least 0.70 cedis, and conditional on any spending, they spend less compared to the uninsured in that category. This is because, once insured, modern care is free and thus they are less likely to both seek and spend on alternative care.

In table 2.6, I report the predicted total spending on the different types of care for the insured and uninsured. Clearly, the uninsured spend much more compared to the insured. The predicted total spending on modern medical care for the uninsured is about ₵ 17,000 ($2.00[4]) per person for the two week recall period. The national average monthly income in Ghana between the two survey periods was approximately 1,000,000 cedis. Hence a typical uninsured household is likely to spend on average close to 2 percent of its income per person on modern health care for a particular doctor

[4] I used the average Ghana cedi to USD rate between the survey periods at a rate of ₵9,000 = $1, which is valued in the old Ghana cedi.

visit. This figure drops significantly for the insured to about ₵ 9,700 ($1.1). A similar result was seen among alternative care users and for users who used both types of care. Consistently, the insured paid less out-of-pocket compared to the uninsured.

In general, the expenditure across income groups relative to the lowest income group did not differ significantly across the types of care. The only exception was for modern care, where people within the fourth income quintile experienced a lower out of pocket expenditures relative to the lowest income quintile, holding all the other groups constant.

2.7 Conclusion and Policy Implications

Two of the main challenges of health care across the globe are affordability and access, particularly for the poor. As a result of these challenges, a number of developing countries are introducing social health insurance programs aimed at making health care more accessible and affordable to all. This study uses data from the Ghana National Health Insurance program to evaluate the impact of social health insurance on the households' health care decisions. I test whether households substitute modern medical care (for example, hospital services) for alternative medical care (for example, traditional healer), or use both types of care when the national health insurance program was made available.

This paper uses a modified form of the four-part equation model by Duan (1982, 1983), which is an extension of the two-part models for modeling expenditures. This paper contributes to the literature by looking particularly at how the introduction of social health insurance affects health care choices and the magnitude of out-of-pocket

health care expenditures. It uses a model that has been applied to only developed countries to highlight the dynamics regarding the substitutability and complementarity of household health care choices when health insurance is available. Other papers that have analyzed health care choices have not looked at the effect of health insurance on these choices.

In general, I find evidence of both substitutability and complementarity between modern medical care and alternative medical care. I see a significant decrease in the likelihood of households seeking alternative medical care after insurance, while there is an increase in the likelihood of households seeking modern medical care as well as for households who sought both types of care. Thus I find support for both the substitution model by (Greene 1983), and the complementary model by (Blandford and Chappell 1991). The interesting result here is that people are still likely to use some form of alternative medicine (traditional medicine) even after the introduction of insurance. Out-of-pocket health care expenditures generally decreased significantly across all the different types of care sought as a result of health insurance.

Despite the positive impact of western medicine in Africa, it has not been able to integrate fully into the culture and society of these countries and traditional practitioners continue to be a vital part of the health care system. The complementarity result is likely due to the fact that most of the alternative sources of care (for example traditional healer, spiritualists) are more easily accessible and more affordable. Most of the modern care facilities (for example hospitals) are located in the larger towns and require some traveling time to access them. Also, hospitals may have longer waiting time compared to visiting a traditional healer.

One of the main challenges of social health insurance schemes is financing these highly subsidized programs. The program in Ghana, with no co-payments and very low premiums makes it a primarily tax-funded social health insurance system. According to Ghana Health Service (2007), approximately 76 percent of the National Health Insurance Fund revenue came from value added tax (V.A.T), 24 percent came from Social Security and National Insurance Trust (SNNIT) contributions of formal sector workers, and only 0.01 percent came from premiums received from people in the informal sector in the year 2006. With the informal sector forming a higher proportion of the population and with some individuals being in the premium exempt category, it makes the financial sustainability of the program in the near future questionable.

As my result shows, insured households benefit from the significant drop in out-of-pocket spending for care and are more likely to seek modern care once insured. With the increasing pressure on the existing health facilities, the supply of modern health care may not be able to keep pace with expanding demand resulting from health insurance coverage. This is likely to lead to the continued reliance on traditional medicine.

Table 2.1: Descriptive statistics by type of care received.

Variable	No Care Means	Alternative medical care Means	Modern medical care Means	Alternative & Modern care Means
Insurance status: Insured = 1	0.333	0.316	0.699	0.645
Own a Bicycle	0.190	0.368	0.418	0.385
Own a Car/Motor cycle	0.143	0.049	0.098	0.053
Own a Phone	0.048	0.085	0.263	0.219
Demographics				
Sex: Male = 1	0.476	0.420	0.380	0.373
Age Groups				
age0-17	0.524	0.359	0.413	0.343
age18-49	0.238	0.398	0.317	0.420
age50-69	0.190	0.188	0.133	0.130
age70+	0.048	0.056	0.137	0.107
Occupation				
Unemployed	0.333	0.059	0.139	0.112
Farmer/Fisherman	0.571	0.629	0.547	0.491
Trader	0.048	0.130	0.127	0.154
Artisan	0.048	0.075	0.066	0.107
Government worker	0.000	0.049	0.082	0.065
Education (Head's highest education)				
No Education	0.476	0.293	0.377	0.296
Primary Education	0.476	0.606	0.427	0.556
Secondary Education	0.048	0.098	0.190	0.148
Severity of Illness				
Not serious	0.571	0.316	0.165	0.166
Serious	0.143	0.498	0.560	0.527
Income Quintiles				
Q1: If first quintile	0.095	0.150	0.098	0.101
Q2: If second quintile	0.286	0.176	0.089	0.136
Q3: If third quintile	0.000	0.156	0.165	0.124
Q4: If fourth quintile	0.286	0.241	0.234	0.278
Q5: If fifth quintile	0.333	0.274	0.415	0.361
Health Status				
Good	0.395	0.394	0.291	0.254
Average	0.248	0.236	0.282	0.383
Poor	0.348	0.207	0.309	0.218
Type of Illness				
Malaria	0.333	0.257	0.244	0.320
Body Pains	0.286	0.358	0.184	0.231
Respiratory disease	0.000	0.078	0.070	0.053
Fever	0.048	0.091	0.108	0.089
Regional Dummy				
Urban	0.476	0.534	0.551	0.615
Log(Total Expenditure)	0.000	8.798	9.839	10.032
Observations	**29**	**307**	**318**	**170**

NB: All figures are in proportions with the exception of the expenditure figures which are the average expendiutre values

Table 2.2: Descriptive statistics by survey period.

Variable	Baseline Means	Endline Means	Diff in mean Significance
Insurance status: Insured = 1	0.348	0.572	***
Own a Bicycle	0.386	0.361	
Own a Car/Motor	0.075	0.068	
Own a Phone	0.023	0.334	***
Demographics			
Sick person's gender			
Male	0.250	0.266	
Female	0.750	0.734	
Age Groups			
age0-17	0.241	0.276	*
age18-49	0.588	0.548	*
age70 +	0.055	0.081	**
Occupation			
Farmer/Fisherman	0.600	0.525	***
Trader	0.143	0.142	
Government	0.036	0.081	
Artisan	0.082	0.089	
Education (Head's highest education)			
No Education	0.361	0.293	*
Primary Education	0.518	0.564	*
Seconddary Education	0.121	0.143	
Severity of Illness			
Serious	0.447	0.583	***
Not Serious	0.252	0.222	
Income Quintiles			
Q1: If first quintile	0.194	0.091	*
Q2: If second quintile	0.166	0.131	**
Q3: If third quintile	0.162	0.159	***
Q4: If fourth quintile	0.179	0.249	***
Q5: If fifth quintile	0.299	0.370	***
Health Status			
Good	0.000	0.349	***
Average	0.000	0.087	***
Type of Illness			
Malaria	0.177	0.077	***
Fever	0.000	0.090	***
Respiratory problem	0.034	0.031	
Body pains	0.167	0.087	
Regional Dummy			
Offinso	0.336	0.471	
Nkoranza	0.664	0.529	
Urban	0.533	0.525	*
Total Expenditure	9.500	9.377	
Observations	**413**	**411**	

NB: *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively

Table 2.3: Probit regression and marginal effects for the probability that an individual will receive any form of care.

	Regular Probit			Marginal Effects		
Variables	**Coeff**		**P>|z|**	**dy/dx**		**P>|z|**
Insurance status: Insured =1	**0.472**	**	0.029	**0.019**	**	0.050
Own a Bicycle	0.299		0.162	0.011		0.146
Own a Car/Motor	-0.341		0.370	-0.018		0.494
Own a Mobile phone	0.285		0.424	0.009		0.334
Demographics						
Sex: Male = 1	0.063		0.754	0.002		0.752
Age Categories						
age 0-17	0.069		0.805	0.003		0.802
age 18-49	0.238		0.382	0.009		0.361
age70+	**0.375**	**	0.038	0.011		0.229
Occupation						
Farmer/Fisherman	0.082		0.743	0.003		0.748
Trader	0.195		0.592	0.007		0.531
Artisan	0.491		0.381	0.013		0.154
Education (Head's highest education)						
Primary Education	0.219		0.288	0.009		0.315
Secondary Education	0.433		0.252	0.012		0.130
Severity of Illness						
Fairly serious	**0.675**	***	0.010	**0.029**	**	0.020
Not serious	-0.313		0.166	-0.015		0.257
Income Quintiles						
Q2: If second quintile	-0.205		0.582	-0.010		0.640
Q3: If third quintile	-0.534		0.111	-0.032		0.271
Q4: If fourth quintile	-0.185		0.588	-0.008		0.626
Q5: If fifth quintile	-0.289		0.409	-0.013		0.461
Health Status						
Good	0.211		0.539	0.007		0.480
Average	-0.320		0.384	-0.017		0.505
Type of Illness						
Malaria	0.035		0.892	0.001		0.891
Fever	0.488		0.321	0.013		0.130
Body Pains	-0.073		0.764	-0.003		0.773
Regional Dummy						
Urban	0.255		0.225	0.010		0.258
Constant	**1.080**	**	0.023			

NB: *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively
(*) dy/dx is for discrete change of dummy variable from 0 to 1

Table 2.4: Probability of seeking alternative care only, modern care only, and both types of care.

	Alternative Medical care			Modern Medical care			Both types of care		
First Stage: Probit									
	Coef.		P>|z|	Coef.		P>|z|	Coef.		P>|z|
Insurance status: Insured =1	**-0.700**	***	0.000	**0.660**	***	0.000	**0.339**	***	0.002
Own a Bicycle	0.045		0.673	-0.072		0.512	-0.066		0.545
Own a Car/Motor	-0.307		0.168	0.225	*	0.058	-0.305		0.187
Own a Mobile phone	**-0.374**	**	0.024	0.010		0.945	0.040		0.798
Demographics									
Sex: Male = 1	0.109		0.305	0.048		0.662	0.006		0.954
Age Categories									
age 0-17	**-0.269**	*	0.083	0.244		0.135	0.073		0.667
age 18-49	**-0.256**	*	0.089	0.062		0.704	0.227		0.162
age70+	**-0.564**	**	0.011	**0.392**	*	0.063	0.164		0.457
Occupation									
Farmer/Fisherman	0.041		0.766	0.103		0.451	-0.089		0.520
Trader	-0.091		0.607	0.035		0.847	0.125		0.488
Artisan	-0.068		0.757	-0.086		0.701	0.206		0.335
Education (Head's highest education)									
Primary Education	**0.249**	**	0.032	-0.143		0.244	0.133		0.282
Secondary Education	-0.018		0.917	0.258		0.129	0.047		0.791
Severity of Illness									
Fairly serious	**0.360**	***	0.005	-0.158		0.188	**-0.233**	*	0.059
Not serious	**0.633**	***	0.000	**-0.621**	***	0.000	**-0.382**	**	0.013
Income Quintiles									
Q2: If second quintile	0.055		0.770	-0.334		0.124	-0.047		0.824
Q3: If third quintile	-0.061		0.750	-0.022		0.913	-0.179		0.402
Q4: If fourth quintile	-0.028		0.878	-0.127		0.514	-0.012		0.950
Q5: If fifth quintile	-0.027		0.889	-0.025		0.900	-0.177		0.398
Health Status									
Good	**-0.662**	***	0.000	0.063		0.631	**0.256**	*	0.060
Average	**-0.409**	*	0.059	-0.188		0.363	0.211		0.306
Type of Illness									
Malaria	0.015		0.916	-0.167		0.225	**0.273**	*	0.053
Fever	0.294		0.126	-0.162		0.403	-0.052		0.795
Body Pains	**0.402**	***	0.004	**-0.392**	***	0.008	-0.018		0.903
Regional Dummy									
Urban	0.067		0.540	-0.081		0.468	0.189		0.100
Constant	-0.328		0.209	**-0.835**	***	0.003	**-1.127**	***	0.000

NB: *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively

Omitted variables: uninsured, female, age 50-69, No Education, first income quintile, rural, very serious illness

Table 2.5: Ordinary least squares on the out-of-pocket expenditures on alternative care, modern care and both types of care.

Second Stage: OLS (LN EXP)	**Alternative Medical care**			**Modern Medical care**			**Both types of care**		
	Coef.		P>|z|	Coef.		P>|z|	Coef.		P>|z|
Insurance status : Insured =1	**-0.052**	***	0.009	**-0.099**	***	0.000	**-0.056**	**	0.037
Own a Bicycle	-0.010		0.601	0.008		0.723	-0.034		0.178
Own a Car/Motor	0.036		0.432	0.012		0.753	0.041		0.479
Own a Mobile phone	0.014		0.709	-0.002		0.945	0.013		0.702
Demographics									
Sex: Male = 1	0.011		0.553	0.007		0.777	-0.012		0.643
Age Categories									
age 0-17	0.025		0.356	**0.077**	**	0.033	-0.056		0.158
age 18-49	0.003		0.893	**0.094**	***	0.009	-0.020		0.611
age70+	-0.019		0.672	**0.121**	***	0.005	**-0.097**	*	0.060
Occupation									
Farmer/Fisherman	-0.010		0.694	0.041		0.130	0.002		0.943
Trader	-0.023		0.493	0.028		0.452	0.037		0.398
Artisan	0.040		0.320	**0.112**	**	0.017	0.015		0.740
Education (Head's highest education)									
Primary Education	-0.022		0.310	**0.047**	*	0.085	-0.045		0.116
Secondary Education	-0.010		0.763	**0.072**	**	0.046	-0.004		0.926
Severity of Illness									
Fairly serious	-0.032		0.208	**-0.062**	**	0.011	-0.026		0.355
Not serious	**-0.070**	**	0.011	0.004		0.909	**-0.079**	**	0.033
Income Quintiles									
Q1: If second quintile	-0.015		0.632	-0.065		0.181	0.049		0.334
Q2: If third quintile	0.014		0.687	-0.050		0.236	-0.067		0.191
Q4: If fourth quintile	0.003		0.931	**-0.091**	**	0.030	-0.061		0.186
Q5: If fifth quintile	-0.004		0.903	-0.052		0.212	0.005		0.918
Health Status									
Good	0.035		0.279	-0.011		0.692	**-0.057**	*	0.060
Average	-0.005		0.917	-0.023		0.606	0.006		0.895
Type of Illness									
Malaria	-0.027		0.317	-0.010		0.720	-0.023		0.493
Fever	-0.030		0.397	-0.022		0.593	-0.003		0.948
Body Pains	**-0.048**	*	0.058	-0.031		0.342	0.020		0.566
Regional Dummy									
Urban	-0.005		0.818	0.013		0.585	-0.014		0.624
Constant	**2.256**	***	0.000	**2.302**	***	0.000	**2.469**	***	0.000

NB: *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively

Omitted variables: uninsured, female, age 50-69, No Education, first income quintile, rural, very serious illness

Table 2.6: Predictive margins: Delta method.

		ALTERNATIVE CARE			MODERN CARE			ALTERNATIVE & MODERN CARE		
UNINSURED		Margin	Std. Err.	P>|z|	Margin	Std. Err.	P>|z|	Margin	Std. Err.	P>|z|
	Constant	7,967.96	903.65	0.000	17,093.64	5,146.78	0.001	16,257.93	6,159.96	0.008
INSURED		Margin	Std. Err.	P>|z|	Margin	Std. Err.	P>|z|	Margin	Std. Err.	P>|z|
	Constant	2,249.62	515.87	0.000	9,706.32	1,638.39	0.000	11,809.62	2,596.74	0.000

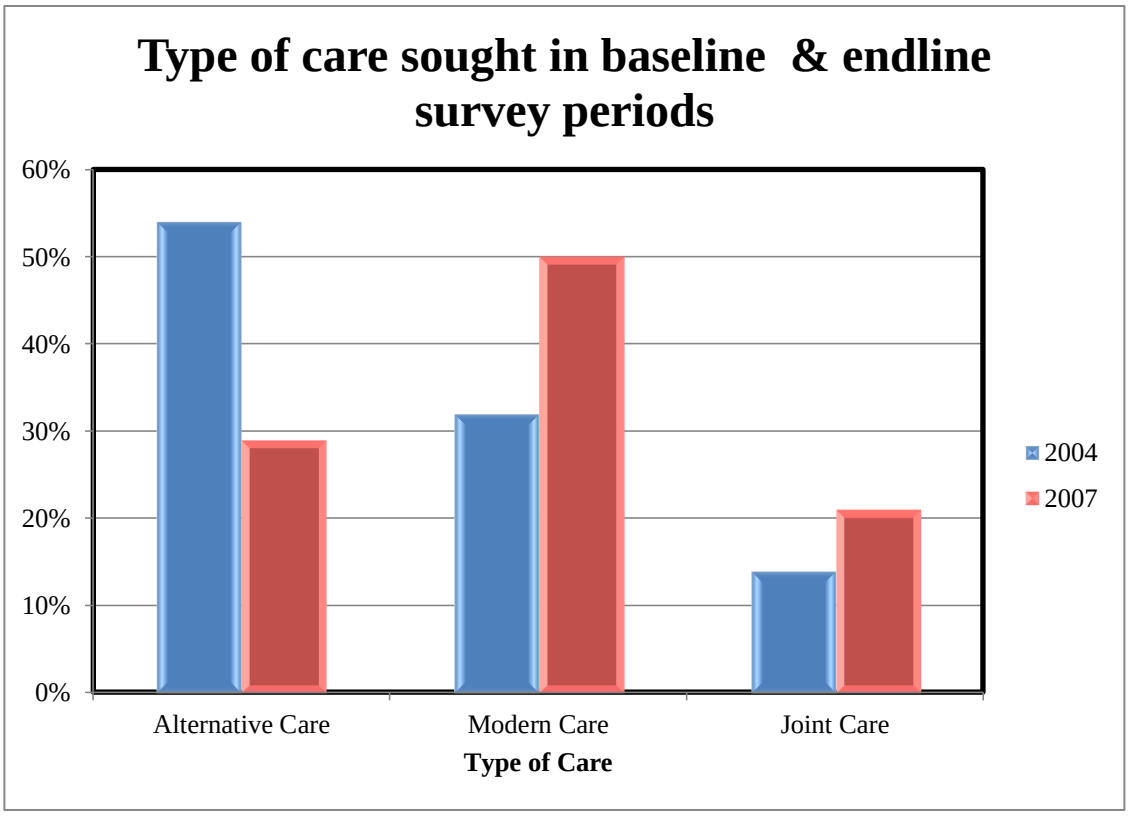

Figure 2.1: Distribution of people who sought health care in both survey periods

CHAPTER 3

THE IMPACT OF SOCIAL HEALTH INSURANCE ON HOUSEHOLD FERTILITY DECISIONS

3.1 Introduction

According to the demographic transition model, as a country develops from a pre-industrial to an industrialized economic system it tends to move from a state of high birth and death rates to low birth and death rates (Thompson, 2003). Reasons for this transition include increasing urbanization, better access to education, and less need for large families as improved health care lowers death rates. With development therefore, we expect fertility rates to fall, and, in fact this has been the general trend in Africa over the last decade. However, fertility rates may not fall monotonically, as in the case of Ghana, where there was an increase in fertility rates peaking around 2006 (see table 3.1). This essay provides evidence that the introduction of social health insurance in Ghana may be, at least in part, responsible for this increase. In particular, I examine how fertility patterns differ between insured and uninsured women, and whether this difference is due to women likely to become pregnant seeking out insurance or women with insurance changing fertility decisions.

Ghana is one of the few African countries that have successfully implemented a social health insurance program. The government of Ghana instituted the National Health Insurance Scheme (NHIS) in 2003. The primary goal of this scheme was to ensure equitable and universal access to health care services for all Ghanaians and to

replace the "cash and carry"[5] system which required prompt payment for health services. The NHIS program allows voluntary enrollment from persons in the informal sector, who form a large proportion of the population. As a result of the voluntary enrollment, there is the potential problem in empirical analyses of self-selection, since individuals have the choice to either enroll or not without any sanctions.

In this paper, I evaluate the relationship between the social health insurance program and fertility decisions in Ghana. There are two main possible effects corresponding to adverse selection and moral hazard[6]. First, women who plan to become pregnant might enroll in greater numbers. This is the adverse selection effect, although unlike the standard notion of adverse selection, this is arguably a positive outcome by increasing prenatal care visits and having access to hospital care for delivery. Second, the moral hazard effect occurs when having insurance encourages higher fertility by reducing the cost and risk associated with pregnancy. To disentangle the effects of adverse selection (which in this case is the unobserved heterogeneity in insurance enrollment) from moral hazard, I exploit the district-level variation in the dates of implementation of the national health insurance program to instrument for insurance enrollment.

The paper is organized as follows; section 3.2 discusses health care financing and health insurance in Ghana, while section 3.3 summarizes factors that affect

[5] Cash and carry is a sales policy or a method of purchase in which the customer must remit payment at the point of service and you must take it with you.

[6] A third possibility is if contraception is covered under the insurance program, then fertility could go down and vice versa. As at the time of the survey, contraception was not covered under the insurance program.

insurance enrollment in Ghana. The literature review is discussed in section 3.4, followed by data and descriptive statistics, empirical methodology and empirical results in sections 3.5, 3.6 and 3.7 respectively. Conclusions follow in section 3.8.

3.2 Health Care Financing and Health Insurance in Ghana

The health insurance program introduced in Ghana in 2003 is the most recent of several major reforms of Ghana's health system since the nation achieved independence in 1957. After independence, the government established a social welfare system which provided free health care for all its citizens at public health facilities. Health care was primarily financed by taxes and external donor support, user fees were removed and attention was directed to developing a wide range of primary health care facilities across the country. However, by the early 1970s, the country was facing stagnating economic growth and could therefore not support its health financing with tax revenues alone.

In 1985, the government introduced health care reforms as part of the ongoing structural adjustment programs aimed mainly at reducing government spending to address budgetary deficits. The reforms included introducing cost recovery mechanisms through user fees (known in Ghana as "cash and carry") in order to discourage unnecessary use of services and liberalize health services to allow private sector involvement (The World Bank 2007). This system led to dramatic declines in health care utilization, with outpatient visits to hospitals dropping from 4.6 million to 1.6 million in 1985 (Ghana health service 2009). Beginning in 1989, community-based health insurance schemes, also known as mutual health organizations, were introduced

in certain districts throughout the country in response to this plight. However coverage rates were very low, covering less than 5 percent of the population, leaving many Ghanaians vulnerable in the event of a catastrophic illness (Ghana health service 2009).

In response, the government of Ghana established the National Health Insurance Act (650, 2003), whose primary goal was to reduce out-of-pocket expenditures and improve access to, as well as the quality of, basic health care services through the establishment of district-wide insurance schemes coordinated by the National Insurance Authority. The primary funding source is the National Health Insurance Levy (2.5 percent of V.A.T.); secondary sources are payroll deductions (2.5 percent of income) for formal sector employees and premia for informal sector members. Other funds come from donations or loans.

Membership in the NHIS is mandatory for formal sector workers, unless alternative private health insurance can be demonstrated. Membership is optional for non-formal sector workers who make up the majority of the population. For formal sector workers, a payroll deduction of 2.5 percent is transferred to the NHI fund as part of their contribution to the Social Security and National Insurance Trust fund. Premiums by those outside the formal sector was intended to vary by income such that those in the lowest-income group pay an annual premium of 7.20 Ghanaian cedi (GH¢), roughly US$ 8, while those in the highest income group pay a premium of GH¢ 48.00 (US$53) per annum for each enrolled individual. In practice, in some districts, a flat premium payment of GH¢ 7.20 per annum is charged due to the difficulty of assessing and verifying income in the informal sector. Once the premium is paid, the only additional costs are the annual registration fee which serves as renewal costs to the

members. There are no co-payments or deductibles, provided the ailment falls within the defined benefits package. The National Health Insurance Act (NHIA) mandates a pre-defined benefits package that covers about 95 percent of the disease burden in Ghana.

Services covered include outpatient consultations, essential drugs, inpatient care and shared accommodation, maternity care (vaginal and caesarean delivery), eye care, dental care and emergency care. Excluded benefits include echocardiography, renal dialysis, heart and brain surgery, organ transplantation as well as other drugs not listed in the approved drugs list. Several groups are exempted from premium payments, and these include pensioners, the elderly, children under age 18, indigents and pregnant women (as of 2008). There is a six-month gap between joining and being eligible for benefits (Government of Ghana 2004). By the end of 2008, Ghana's national insurance program covered 61 percent of the population, with District Mutual Health Insurance Schemes operating in all districts (Asenso-Boadi 2009).

3.3 Enrollment into the Ghana National Health Insurance Program

In this section, I discuss sign-up or enrollment into the health insurance program. Part of the information in this section is obtained from the Health Systems 20/20 project (2009), which undertook an evaluation of the national health insurance scheme in Ghana. As mentioned in section 2 above, the program is administered at the district level, which is called the District Mutual Health Insurance Schemes (DMHIS). Registration fees for the insurance program, premium payments, waiting time among others are outlined under different sub-sections below. In general it is observed that,

regardless of the national guidelines, premiums paid, amounts paid for registration fees as well as waiting time vary greatly between the different districts in Ghana.

3.3.1 Registration Fees

Registration in the DMHIS across the country is done both at the scheme offices as well in the field through the assistance of the community premium collectors (or DMHIS agents). For example, the Offinso district scheme has 70 agents operating throughout the district. Most people in the district, however, tend to register at the DMHIS office in order to avoid the delays that can accompany processing membership cards when community members register with field agents. The delays are a result of agents waiting until they collect a sizable number of registrants before they take the payments to the DMHIS office. Annual registration fees (paid by all enrollees, including those exempt from premiums) range between 7,000 and 50,000 cedis per annum depending on the individual's income.

The registration process varies across the districts. There are generally two types of registration: open registration or bi-annual registration. The open registration operates throughout the year, whiles the bi-annual has only two registration periods in a year. Examples of districts that use the open registration is the Ahanta West and the Offinso districts, whiles the Kwahu West, and the Nkoranza districts operate the two period registration type called the "minor" and "major" seasons. The major season usually runs between October and January and the minor season between May and July to coincide with agricultural cycles. The major season is usually during the harvesting period, when farmers are in a better position to pay insurance premiums. Thus the bi-

annual registration type is normally used in rural and farming communities. There is however minor registrations that take place outside the two seasons. All who choose to enroll in the insurance scheme, regardless of whether they are exempt from premium payments, must pay annual registration fees to receive insurance identification cards in order to benefit from the insurance program.

3.3.2 Premium Payments

Premium payments from those employed in the formal sector are deducted at source from their income. For individuals outside of the formal sector, their premiums are defined according to their income such that the lowest-income group pays an annual premium of 72,000 Ghanaian cedi (₵), roughly (US$ 8)[7], while those in the highest income group pay a premium of ₵480,000 (US$53) per annum for each enrolled individual. At the time of the survey, birth control was not part of the benefit packages given to insured members. For the purposes of this study, this implies that differences in access to birth control between the insured and uninsured cannot explain changes in fertility rates. At the end of the year 2008, pregnant women were added to the premium exempt category.

While the premium is supposed to vary by income, in some districts, a flat premium payment is charged due to the difficulty of assessing and verifying income in the informal sector. For example, in the Nkoranza district, all non-exempt community

[7] I used the average Ghana cedi to USD rate within the survey period at a rate of ₵9,500 = $1, which is valued in the old Ghana cedi. Ghana's cedi currency was redenominated in July 2007 at a rate of ₵10,000 = GH₵ 1.

members pay a flat premium rate of 80,000 cedis. The absence of differentiation in premium payment in this particular district was based on the argument that the wealthier community members do not accept that they should pay higher rates, since they end up paying the premiums of their poorer relations who are not able to afford it.

In some districts, the poor and are not able to pay the premium at the time of registration or make upfront payment. For such reasons, some district mutual schemes introduced installment plans, a manner of payment termed the "susu" system. Under this system, records of the installment payments are kept until the full premium is paid, at which point the enrollee is eligible for benefits. Those who can afford to make upfront payments are encouraged to do so.

3.3.3 Waiting Period for NHIS Benefits

The waiting period for benefit eligibility is the official period between when an individual signs up for insurance and when he finally obtains the insurance card and can access health care benefits. The waiting period is designed to discourage only sick people from enrolling in the insurance program. However it has posed potentially more problems than it was intended due to longer delays than stated on paper. As a result of this, in late 2007, there was a change in some districts to a three-month waiting period before an enrollee could access health services from the initial waiting period of six months, which existed at the inception of the NHIS. Managers mentioned that this reduction in wait time has encouraged new members to join the scheme. The data set

used for this study is from a 2005/06 survey and hence the six-month waiting period still applied.

Despite the official waiting period, observed waiting periods have been far longer for many enrollees, due to various operational problems. One of the main problems has been the inadequacy of staff and equipment (computers, printers, and cameras) and the volumes of cards to be issued. The waiting period sometimes exceeds six months. This waiting period also holds for pregnant women even though a case has been put forward suggesting the reduction in the waiting period for pregnant women to one month.

3.3.4 Other Factors

Other factors that determine enrollment into the insurance program include the availability of some private insurance products, and transportation costs to designated health centers that run the program. If the cost of traveling to the hospital is high, individuals may not sign up since the additional cost is a barrier to using from health insurance program. Another factor is that the lack of understanding of the need for health insurance by some community members, mostly in the rural and poor communities. Some residents feel the scheme is just a way to exploit them since, even though they pay premiums, they still have to pay for certain drugs when they utilize the health facilities. Other residents question why they should pay for health insurance in advance when they might not fall sick.

Overall, there have been general concerns about the problem of adverse selection in the program, due to the fact that, a social insurance program does not screen

between healthy and sick people. The recommended solution being an increase in the enrollment in order to have a more balanced risk pool.

3.4 Related Literature

Adverse selection and moral hazard represent two key fundamental information problems in insurance. The theoretical literature on health insurance predicts inefficient outcomes as result of these asymmetric information problems (Arrow 1963; Akerlof 1970; Rothschild and Stiglitz 1976). The moral hazard problem in health insurance results from the unintended behavioral changes due to the problem of perverse incentives toward over usage of services, (Ma and Riodan 2001; Pauly 1968). One of the earlier papers on moral hazard is by Zweifel and Manning (2000), who present a comprehensive overview of this topic, making a distinction between ex-ante and ex-post moral hazard in insurance outcomes.

While the former relates to a change in behavior prior to the outcome of a health event, the latter deals with behaviors that happen after the outcome of a health event. Similarly, a number of papers have identified the effect of adverse selection in health insurance. Rothschild and Stiglitz (1976), in their seminal paper, develop a model in which adverse selection is present because individuals have private information about their risk status. They show in their paper that those with high risk and thus higher expected expenditures self-select into insurance in order to cover their costs. Most of the studies on the asymmetric information problems have focused on developed countries relative to developing countries. In the context of developing countries, studies on adverse selection and moral hazard in health insurance are scant.

The majority of the papers in the health insurance literature, especially in developing countries, find evidence for adverse selection but not for moral hazard (Lammers and Warmerdam 2010, Jowett, Deolalikar, and Martinsson 2004). The main factor contributing to this result is the nature of most health insurance programs in developing countries. Most of these programs are social insurance programs which have the aim of achieving universal coverage at very subsidized prices. Since the membership in the majority of the social health insurance programs in developing countries is voluntary, it is easier for the high risk individuals to self-select into the insurance program, resulting in adverse selection. For example Cutler and Zeckhauser (2000) shows that voluntary schemes without medical screenings enable a relatively unhealthy share of the population to enroll and endanger the sustainability of such programs if unanticipated.

Moral hazard is more difficult to substantiate, especially in developing countries where under-utilization of medical services is widespread, since it is not easy to distinguish between over-usage of health services and the optimal use of these services. Furthermore, one of the primary reasons for social health insurance programs is to improve health outcomes through encouraging the use of health services.

3.5 Data and Descriptive Statistics

This study uses data from the current round of the Ghana Living Standards Survey (GLSS), the GLSSV conducted by the Ghana Statistical Service (GSS) in 2005/06. The GLSS is a nationally representative multi-purpose survey of households in Ghana. A two-stage stratified random sampling design was adopted in the survey. Initially, a total

sample of 550 enumeration areas was considered at the first stage of sampling, followed by a fixed take of 15 households per enumeration area. The distribution of the selected enumeration areas into the ten regions or strata was based on proportionate allocation using the population.

The GLSSV survey sampled 37,128 individuals from 8,867 households. I limited the study to only the round five of the national survey because it included information on the National Health Insurance program. For example, at the time of the round four survey (1998/99), the National Health Insurance program in Ghana had not yet been implemented. The sample used for this study includes only women of child bearing age, ages 15 through 49 who did or did not get pregnant during the recall period, which is within a year to the survey date. This reduces the sample to 5,641 observations.

The household survey collected information on socio-demographic characteristics of the population, education, health, employment and time use, migration, housing conditions and household agriculture. The third section of the survey provides information on health including condition of illness, usage, expenditure, insurance status among others.

Table 3.2 presents the descriptive statistics. The majority of the differences between the insured and their uninsured are statistically significant. The average age of women within the sample was approximately 19 years for the insured population and 18 years for the uninsured population, with the average household size of 4 and 5 persons per household for the insured and uninsured samples respectively. Wealth is positively correlated with insurance enrollment. About half of the individuals in the wealthiest

quintile were insured, compared to less than one-fifth of individuals in the poorest quintile, and these differences are statistically significant.

Approximately 40 percent of the insured women were married, while about 43 percent of the uninsured were married. This was followed by single women who represented 47 percent for the insured sample, and 41 percent for the uninsured group. As typical of a developing country, agriculture dominated as the occupation of majority of women in my sample, followed by trading, with the professional and clerical occupations being the least common occupations in the sample.

3.6 Empirical Methodology (Probit and IV Probit)

The fertility rate between insured and uninsured women could differ for two principal reasons. The difference in fertility could be due to women planning to become pregnant seeking out insurance or to women with insurance changing fertility decisions. The former depicts the situation of adverse selection while the latter captures the problem of moral hazard. In this case, adverse selection can be thought of primarily as a problem of endogeneity because we do not observe women's ex-ante fertility preferences and those planning to become pregnant self-select into insurance.

To address endogeneity in this paper, I exploit the district-level variation in the dates of implementation of the national health insurance relative to when the national survey took place as an instrument for insurance enrollment. Put in different terms, I define my instrument as the number of months a woman had access to insurance at the time the woman was surveyed (month-year woman was surveyed minus month-year of

district access to insurance). This implies that people in districts that did not yet have insurance in operation had a score of zero for the instrumental variable. There were approximately 28 districts out of 110 that did not have the health insurance program in operation at the time of the survey. The national survey spanned a period of 12 months; September 2005 – September 2006, which means different respondents were surveyed at different times within the survey period.

When the health insurance program was made available within the respective districts is an exogenous event in that household members had no knowledge of or control over when the scheme was implemented in their districts. A similar instrument was used by Hanratty (1996) on the Canadian national health insurance and infant health.

I model fertility decisions, a binary choice model as a function of my main policy variable, insurance status, a vector of individual characteristics as well as a vector of household and community characteristics using a probit methodology which takes the form:

$$F_i = \alpha + \beta INS_i + \sum_{j=1}^{J} \gamma_j P_{ij} + \sum_{j=1}^{J} \gamma_j H_{ij} + \varepsilon \quad ; i = 1, 2.\ldots.N,\ j = 1,2,\ldots., J \qquad (1)$$

where F, the dependent variable is a dummy variable representing whether a woman got pregnant within a year of the survey date. The variable INS_i represents the *i*th observation on the endogenous explanatory variable, a dummy variable representing the insurance status of household members, and δ is the vector of regression parameters. P is a vector of individual respondent's characteristics: age, marital status, income,

education. H represents a vector of household and community characteristics such as relationship to household head, household size, occupation of household head, a dummy variable for urban or rural area, and, a regional dummy for the ten regions in Ghana.

I assume that the disturbance terms in equation 1 are normally distributed, which therefore leads us to the probit model. Yatchew and Grilliches (1985) show in their work that applying the usual probit maximum likelihood estimator in the presence of an endogenous regressor renders the estimators inconsistent.

Following the methodology in Greene (2008), let the probability of F_i equal one be of the form

$$pr(F_i = 1) = \Phi\left(F_i, INS_i + \sum_{j=1}^{J} \gamma_j P_{ij} + \sum_{j=1}^{J} \gamma_j H_{ij}\right) = \Phi(F, \mathrm{W}_i\ \delta\ )$$

where Φ represents the normal cumulative density. In applying the ordinary probit model, the maximized log likelihood function results in inconsistent estimates, since it ignores the endogeneity of the insurance variable. As a result of the above, an instrumental variable probit procedure is needed to produce consistent estimates.

The iv-probit procedure follows the two-stage residual inclusion (2SRI) approach, a specific kind of control function. As has been put forward by Blundell and Smith (1989) and Terza, Basu, and Rathouz (2008), in non-linear models, a different approach from the usual 2SLS is needed. They show that in non-linear models, 2SRI remains consistent whereas 2SLS is not consistent and leads to biased estimates. The main difference here is that under the control function approach, then instead of putting

the predicted value of the endogenous variable in the main equation, the predicted error term is added to a model that still includes the original endogenous variable. Maximizing the conditional likelihood function results in the iv-probit procedure results in consistent estimates.

3.7 Empirical Results

3.7.1 Distinguishing between Adverse Selection from Moral Hazard in Fertility Decisions

There are three possible sources of endogeneity in empirical studies, namely, unobserved heterogeneity, measurement error and reverse causality. Among the three sources of endogeneity in this study however, the most likely type to be present in this study is that of unobserved heterogeneity/self-selection in the insurance program due to the nature of the insurance program. The other sources of endogeneity are however also mitigated with the use of instrumental variable regression in accounting for endogeneity.

Without randomization of enrollment into insurance, it is difficult to establish the causal effects of insurance because there can be heterogeneous self-selection into insurance. Unobserved heterogeneity is one major source of endogeneity and describes a situation where some unobserved characteristic (such as unobserved health status or unobserved preference for children) is related to both the dependent variable (fertility decisions) and one or more independent variables (insurance). The unobserved preference for children could be correlated with both fertility decisions of households and insurance choice. Hence, a simple regression of the fertility decision on insurance

status will not be a causal estimate of the effect of that fertility choice because it is endogenously chosen.

Reverse causality is another possible source of endogeneity. In the present case, a pregnant woman might enroll in the program as soon as she knows she is pregnant. Thus the pregnancy is "causing" the insurance and the insurance had no effect on the pregnancy. The third source of endogeneity occurs through measurement error of a covariate. An observed variable with classical measurement error may be correlated with the error term, causing bias in estimated coefficients. However for the measurement error to be problematic, it has to be systematic rather than random.

Under the assumption that self-selection into the insurance program by women more likely to become pregnant or already pregnant is the main source of endogeneity, controlling for endogeneity is the equivalent of stripping away the adverse selection effect. I first run a regular probit regression of insurance status on fertility decisions of women, controlling for demographic, household, and community characteristics without controlling for endogeneity as shown in the first panel (column) of table 3.3. Without controlling for endogeneity, the relationship between insurance and fertility could be either the result of adverse selection or moral hazard or both. On the right panel of table 3.3, I present an iv-probit estimation to account for the endogeneity problem.

In the second stage estimations, instrumenting for insurance helps us to wipe out the effect of the unobserved characteristics and reverse causality, and thus the adverse selection problem. Hence, if we find that insurance is statistically significant in the instrumental variable regression, then there is an evidence of a moral hazard effect. This is because instrumenting for insurance strips out the adverse selection effect. A moral

hazard effect in this case will imply that having health insurance encourages women to become pregnant and hence have more children.

Results from the first stage regressions are shown in tables A1 through A3 in the appendix. The instrument comes out strongly significant in all cases and hence provides some support for its validity. Results from the left panel of table 3.3 show that the impact of insurance on fertility is positive and significant. After instrumenting for insurance status, the insurance variable remains significant, implying that moral hazard was present. The moral hazard effect suggests that having health insurance encouraged women to have more children. The effect of insurance on fertility may be short-run, however. First, table 3.1 suggests that after a brief uptick in 2006 and 2007, the rates began to decline. Second, the cost and/or risk of pregnancy may have led to pent up demand for children. Finally, the demographic transition model suggest that fertility rates will continue to decline as Ghana develops and many developed countries with free or subsidized health care do not have higher fertility rates.

3.7.2 Robustness Checks

In tables 3.4 and 3.5, I run two additional estimations as augmented versions of the baseline model. In my baseline regression model, I only include the key household variables to start with. In table 3.4, the first version of the robustness checks, I include village characteristics as an additional control variable. Table 3.5 shows the second robustness check results where I add on regional dummies to account for the differences in effect within the various regions in Ghana as additional control variables. Again, I show the first stage iv-probit results in tables A2 and A3 of the appendix. The results

are consistent with the earlier findings that insurance access led to higher rates of pregnancy.

3.8 Conclusion

Governments and policy makers in a number of developing countries have introduced social health insurance programs, with the aim of increasing access to health care at affordable prices, particularly for women and children. There is the expectation that such generous insurance programs should help increase access to health care and hence improve health outcomes. There is however a possibility that insurance will increase fertility by lowering the cost and risk of pregnancy and delivery. My findings suggests that women who expect to become pregnant may have been more likely to enroll in the social health insurance program (adverse selection effect), which can be seen as a positive outcome in terms of improving maternal and infant health. This will however result in an increase in the cost to the system because young, healthy women more likely to become pregnant are more likely to wait to seek insurance. The results also suggest that having insurance encourages women to have more children (moral hazard effect). Overall my results confirm the trend in Ghana, in that health insurance caused a spike in the fertility rate around year 2006, which is also when the survey was conducted.

Table 3.1: Total Fertility rate in Ghana per year (children born/woman)

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Ghana	3.95	3.82	3.69	3.32	3.17	3.02	3.99	3.89	3.78	3.68	3.57	3.48	4.15

Source: CIA World Fact book.

Table 3.2: Descriptive statistics by insurance status (bivariate comparison)

	INSURED		UNINSURED		
Variable	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**	**Significance**
Age	18.600	14.030	17.700	13.820	***
Household size	4.420	2.100	4.850	2.930	
Relation to Household Head					
Head	0.088	0.284	0.073	0.260	***
Spouse	0.233	0.423	0.248	0.432	***
Child	0.500	0.500	0.525	0.499	***
Grandchild	0.080	0.271	0.071	0.257	
Househelp	0.007	0.082	0.002	0.048	
Marital Status					
Married	0.392	0.488	0.425	0.494	
Divorced	0.046	0.210	0.059	0.235	***
Single	0.474	0.499	0.409	0.492	
Regional Dummy					
Western	0.088	0.283	0.090	0.286	***
Central	0.054	0.226	0.067	0.250	***
Greater-Accra	0.107	0.309	0.116	0.320	
Volta	0.034	0.182	0.085	0.278	***
Eastern	0.111	0.315	0.088	0.284	*
Ashanti	0.249	0.432	0.161	0.368	***
Brong-Ahafo	0.198	0.399	0.071	0.257	***
Northern	0.073	0.259	0.136	0.342	***
Upper East	0.058	0.233	0.085	0.279	***
Upper West	0.029	0.167	0.101	0.301	*
Occupation					
Professional	0.084	0.278	0.063	0.243	***
Clerical	0.024	0.153	0.013	0.115	
Trading	0.267	0.443	0.186	0.389	***
Agriculture	0.517	0.500	0.637	0.481	***
Construction	0.036	0.187	0.041	0.199	
Education					
No Education	0.236	0.425	0.309	0.462	***
Primary Education	0.479	0.159	0.426	0.158	
Secondary Education	0.235	0.424	0.165	0.371	***
Tertiary Education	0.049	0.216	0.027	0.163	***
Income Quintile					
1st Income quintile	0.181	0.275	0.819	0.290	***
2nd Income quintile	0.215	0.291	0.785	0.276	***
3rd Income quintile	0.219	0.229	0.781	0.209	**
4th Income quintile	0.410	0.220	0.690	0.166	**
5th Income quintile	0.502	0.181	0.498	0.139	*

NB: *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively

The categorical variables have their means as proportions

Table 3.3: Baseline regression - Effect of social health insurance on fertility choice: Probit and IV probit regressions

	Regular Probit			IV-Probit		
Fertility	**Coef.**		**P>z**	**Coef.**		**P>z**
Insurance status: insured =1	**0.582**	***	0.000	**6.063**	**	0.014
Demographics (Age)						
Age	**0.214**	***	0.000	**0.228**	***	0.000
Age^2	**-0.004**	***	0.000	**-0.004**	***	0.000
Household size	0.008		0.305	0.023		0.148
Urban	**-0.150**	***	0.000	0.274		0.177
Income Quartiles						
2nd Income quartile	-0.012		0.854	-0.261		0.116
3rd Income quartile	-0.066		0.422	**-0.469**	**	0.049
4th Income quartile	-0.007		0.939	**-0.453**	*	0.091
Relation to Head						
Spouse	**0.608**	***	0.000	**0.749**	***	0.000
Child	**-0.239**	***	0.006	-0.029		0.868
Grandchild	**-0.239**	*	0.087	-0.124		0.589
Marital Status						
Married	**0.194**	***	0.001	0.107		0.374
Divorced	-0.154		0.204	0.203		0.421
Occupation						
Trading	0.003		0.972	0.098		0.508
Agric	**0.224**	***	0.003	**0.688**	***	0.006
Construction	0.052		0.718	0.388		0.195
Education						
No Education	-0.006		0.937	**0.765**	**	0.041
Primary Education	0.166		0.209	0.255		0.296
Secondary Education	0.084		0.275	-0.229		0.248
Constant	**-3.935**	***	0.000	**-6.594**	***	0.000

Number of obs= 5641, Prob > χ^2= 0.000, Pseudo R2= 0.177, Wald test of exogeneity:chi2(1)=17.42

* p = 0.1, ** p=0.05, *** p = 0.01

Table 3.4: Effect of social health insurance on household fertility choice: Probit and IV probit regressions adding on village characteristics to baseline specification.

	Regular Probit			IV-Probit		
Fertility	**Coef.**		**P>z**	**Coef.**		**P>z**
Insurance status: insured =1	**0.648**	**	0.000	**3.408**	**	0.000
Demographics (Age)						
Age	**0.275**	***	0.000	**0.304**	***	0.000
Age^2	**-0.005**	***	0.000	**-0.006**	***	0.000
Income Quartiles						
2nd Income quartile	0.006		0.949	0.175		0.191
3rd Income quartile	**-0.269**	**	0.029	-0.248		0.131
4th Income quartile	0.090		0.562	0.211		0.314
Relation to Head						
Spouse	**0.632**	**	0.000	**0.713**	***	0.000
Child	-0.114		0.364	-0.085		0.605
Grandchild	-0.338		0.118	-0.350		0.185
Marital Status						
Married	0.126		0.158	-0.222		0.112
Divorced	-0.180		0.290	0.046		0.832
Occupation						
Trading	-0.042		0.692	0.068		0.630
Agric	**0.235**	**	0.023	**0.337**	**	0.016
Construction	-0.129		0.506	-0.011		0.965
Education						
No Education	**0.285**	***	0.009	**0.478**	**	0.001
Primary Education	0.220		0.225	**0.414**	*	0.087
Secondary Education	0.115		0.252	-0.020		0.885
Village Characteristics						
Distance to Health center	**-0.005**	**	0.042	**-0.009**	***	0.002
Household size	0.020		0.138	0.028		0.127
Urban	**-0.237**	***	0.001	0.183		0.129
Constant	**-4.700**	***	0.000	**-6.360**	***	0.000

Number of obs= 5641, Prob > χ^2= 0.000, Pseudo R2= 0.1192, Wald test of exogeneity:chi2(1)=54.18

* p = 0.1, ** p=0.05, *** p = 0.01

Table 3.5: Effect of social health insurance on household fertility choice: Probit and IV probit regressions adding on village characteristics and regional dummies.

	Regular Probit			IV-Probit		
Fertility	Coef.		P>z	Coef.		P>z
Insurance status: insured =1	**0.553**	***	0.000	**1.937**	***	0.008
Demographics (Age)						
Age	**0.210**	***	0.000	**0.215**	***	0.000
Age^2	**-0.004**	***	0.000	**-0.004**	***	0.000
Income Quartiles						
2nd Income quartile	0.022		0.741	-0.080		0.371
3rd Income quartile	-0.024		0.779	-0.170		0.152
4th Income quartile	0.069		0.475	-0.059		0.630
Relation to Head						
Spouse	**0.663**	***	0.000	**0.685**	***	0.000
Child	**-0.205**	**	0.021	-0.141		0.155
Grandchild	**-0.249**	*	0.079	-0.240		0.105
Marital Status						
Married	**0.159**	***	0.009	0.107		0.131
Divorced	-0.080		0.512	-0.002		0.989
Regional Dummy						
Western	**-0.601**	***	0.000	-0.296		0.103
Central	**-0.492**	***	0.000	-0.120		0.584
Ashanti	**-0.642**	***	0.000	**-0.884**	***	0.000
Brong-Ahafo	**-0.699**	***	0.000	**-0.705**	***	0.000
Northern	**-0.567**	***	0.000	-0.257		0.153
Upper East	**-0.704**	***	0.000	**-0.448**	***	0.005
Greater Accra	**-0.396**	***	0.000	-0.028		0.897
Occupation						
Trading	0.010		0.897	0.012		0.889
Agric	**0.212**	***	0.005	**0.327**	***	0.001
Construction	0.018		0.899	0.040		0.796
Education						
No Education	0.004		0.962	0.122		0.254
Primary Education	0.181		0.180	0.172		0.231
Secondary Education	0.116		0.139	0.041		0.653
Village Characteristics						
Distance to Health center	0.002		0.218	-0.001		0.620
Household size	-0.003		0.731	0.004		0.628
Urban	**-0.108**	**	0.014	0.039		0.666
Constant	**-3.381**	***	0.000	**-4.147**	***	0.000

Number of obs= 5641, Prob > χ^2= 0.000, Pseudo R2= 0.1992, Wald test of exogeneity:chi2(1)=4.08

* p = 0.1, ** p=0.05, *** p = 0.01

CHAPTER 4

THE EFFECT OF SOCIAL HEALTH INSURANCE ON PRENATAL CARE: THE CASE OF GHANA

4.1 Introduction

Slightly more than half of all maternal deaths occur in Sub-Saharan Africa. For example, in Ghana, the maternal mortality ratio in 2005 was estimated at 560 maternal deaths per 100,000 live births, compared to 12.7 maternal deaths per 100,000 live births in the U.S. (WHO, 2007). A Ghanaian woman's risk of dying from treatable or preventable complications of pregnancy and childbirth over the course of her lifetime is about 1 in 45, compared to 1 in 7,300 in the developed countries. This is partly as a result of lack of adequate prenatal care (Ghana Health Service, 2009).

A prenatal care model developed by the World Health Organization (WHO) recommends a minimum of four medical care visits and provides detailed instructions on the basic components of care for the four visits for both developed and developing countries (WHO, 2001). However, prenatal care in most developing countries often fails to meet these standards due to lack of human resources, equipment and supplies (Zanconato, Msolomba, Guarentil, and Franchi, 2006). Costs of prenatal care include travel costs, test fees and service costs and have been identified as a barrier in seeking care mostly in developing countries, (Simkhada, Teijlingen, Porter, and Simkhada, 2008).

In order to help achieve the minimum requirements of prenatal care and to improve health outcomes, a number of developing countries including Colombia, Ghana, Namibia, and Peru have recently introduced social health insurance programs in part to help improve primary health care. By making modern health care more accessible and affordable, policy makers hope that more women will seek prenatal care thereby reducing maternal and infant mortality. This paper looks at the role of social health insurance on prenatal care utilization and expenditure using a two-part model for modeling health expenditures as well as how social health insurance affects the number of prenatal care visits. In particular, I answer three questions: (1) Does health insurance increase the propensity of households to seek prenatal care? (2) How does the responsiveness of prenatal care expenditures to the insured compare to the responsiveness of prenatal care expenditures of the uninsured? Finally; (3) Does the number of prenatal care visits increase for the insured relative to the uninsured?

In this study, I address the aforementioned questions with an analysis of the link between social health insurance and prenatal health care utilization, out-of-pocket expenditures, and prenatal care visits by Ghanaian households. Because insurance in Ghana is voluntary, actual insurance status is likely endogenous. I therefore proxy for health insurance using the variable intent to treat, an exogenous event which is defined as whether a respondent is in a district in which the national health insurance scheme was already in operation at the time the household was surveyed.

Ghana is one of the few African countries that have successfully implemented a social health insurance program. The government of Ghana instituted the National Health Insurance Scheme (NHIS) in 2003. The primary goal of this scheme was to

ensure equitable and universal access to health care services for all Ghanaians and to replace the "cash and carry[9]" system which required prompt payment for health services. The NHIS program requires voluntary enrollment for persons in the informal sector, approximately 80 percent of the population. Voluntary enrollment is widely recognized as problematic for insurance systems because sicker and older people, who will cost the system more, enroll in greater numbers than the young and healthy.

There is scant economic literature in the area of prenatal care and health insurance, and most of the papers published in this area address issues only from a policy stand point with very few robust econometric strategies. Two earlier papers that studied prenatal care and health insurance looked at Medicaid's effect on prenatal care (Grossman and Jacobwitz, 1981; and Corman and Grossman, 1985). In a developing country context, there have been several papers that have studied various issues regarding prenatal care and health insurance Simkhada et al.(2008) evaluated the factors affecting the utilization of antenatal care in developing countries. They found that among the many predictors of antenatal care, maternal education, marital status, cost of care, household income, and having a history of obstetric complications were the most important factors of antenatal care. Smith and Sulzbach (2006) studied the Community-Based Health Insurance (CBHI) and access to maternal health services focusing on the evidence from three West African countries and found that CBHI is a potential demand-side mechanism to increase maternal health care access. Complementary supply-side

[9] Cash and carry is a sales policy or a method of purchase in which the customer must remit payment at the point of service and must take the item with you. In the context of this paper, it can be seen as paying for health care before you receive the necessary treatment.

interventions to improve quality of and geographic access to health care are however also critical for improving health outcomes in this region. Finally, the work by Long et al. (2010) examined the utilization, contents and costs of prenatal care under a rural health insurance program.

This is the first paper to apply a two-part model to prenatal care health expenditures to address this very important policy issue within the literature. The two-part model has gains over the use of ordinary least squares when there are a lot of zeros in the expenditure data. The zeros primarily arise from non-usage of services during the recall period of the survey.

4.2 Health Care Financing and Health Insurance in Ghana

The health insurance program introduced in Ghana in 2003 is the most recent of several major reforms of Ghana's health system since the nation achieved independence in 1957. After independence, the government embarked on the implementation of a social welfare system which involved free health care for all its citizens at public health facilities. Health care was primarily financed by taxes and external donor support, user fees were removed and attention was directed to developing a wide range of primary health care facilities across the country. However, by the early 1970s, the country was facing stagnating economic growth and could therefore not support its health financing with tax revenues alone.

In 1985, the government introduced health care reforms as part of the ongoing structural adjustment programs aimed mainly at reducing government spending to

address budgetary deficits. The reforms included introducing cost recovery mechanisms through user fees (known in Ghana as “cash and carry”) in order to discourage unnecessary use of services and liberalize health services to allow private sector involvement (The World Bank 2007). This system led to dramatic declines in health care utilization, with outpatient visits to hospitals dropping from 4.6 million to 1.6 million in 1985 (Ghana health service 2009). Beginning in 1989, community-based health insurance schemes, also known as mutual health organizations, were introduced in certain districts throughout the country to encourage greater usage of health services. However, coverage rates were very low, covering less than 5 percent of the population, leaving many Ghanaians vulnerable in the event of a catastrophic illness (Ghana health service 2009).

In response, the government of Ghana passed the National Health Insurance Act (650, 2003), whose primary goal was to reduce out-of-pocket expenditures and improve access to, as well as the quality of, basic health care services through the establishment of district-wide insurance schemes coordinated by the National Insurance Authority. The primary funding source is the National Health Insurance Levy (2.5 percent of V.A.T.); secondary sources are payroll deductions (2.5 percent of income) for formal sector employees and premiums for informal sector members. Other funds come from donations or loans.

Membership in the NHIS is mandatory for formal sector workers, unless alternative private health insurance can be demonstrated. Membership is optional for non-formal sector workers who make up the majority of the population. For formal sector workers, a payroll deduction of 2.5 percent is transferred to the NHI fund as part

of their contribution to the Social Security and National Insurance Trust fund. Premiums by those outside the formal sector was intended to vary by income such that the lowest-income group pays an annual premium of 72,000 cedis, roughly US$ 8, while those in the highest income group pay a premium of 480,000 (US$53) per annum for each enrolled individual. In reality, a flat premium payment of 72,000 cedis per annum is charged due to the difficulty of assessing and verifying income in the informal sector. Once the premium is paid, the only additional costs are the annual registration fee which serves as renewal costs to the members. Annual registration fees (paid by all enrollees, including those exempt from premiums) ranged between 7,000 and 50,000 cedis per annum. There are no co-payments or deductibles however, provided the ailment falls within the defined benefits package.

The National Health Insurance Act (NHIA) mandates a pre-defined benefits package that covers 95 percent of the disease burden in Ghana. Services covered include outpatient consultations, essential drugs, inpatient care and shared accommodation, maternity care (vaginal and caesarean delivery), eye care, dental care and emergency care. Excluded benefits include echocardiography, renal dialysis, heart and brain surgery, organ transplantation as well as drugs not listed in the approved drugs list. Several groups are exempted from premium payments, and these include pensioners, the elderly, children under age 18, indigents and pregnant women (as of 2008). There is a six-month gap between joining and being eligible for benefits (Government of Ghana 2004). By the end of 2008, Ghana's national insurance program covered 61 percent of the population, with District Mutual Health Insurance Schemes operating in all districts (Asenso-Boadi, 2009).

Table 4.1 shows a breakdown of the insurance enrollment trends within different categories over time, from 2005 to 2008. Figure 4.1 is an accompanying graph to table 4.1. Clearly, children below age 18 formed majority of persons who enrolled over the entire period. This is because persons under age 18 automatically qualify under their parents insurance. Of those who actually pay premiums, informal sector adults form the biggest group. It can be seen that until year 2008, pregnant women were not a different category and rather was distributed across the other categories. In the year 2008, the government of Ghana issued a directive to add pregnant women to the exempt category. The overall enrollment figures over the period 2005 to 2008 mirrors a step function, since enrollment has progressively increased over time.

4.3 Data and Descriptive Statistics

This study uses data from the most recent round of the Ghana Living Standards Survey (GLSS) round five (GLSSV) conducted by the Ghana Statistical Service (GSS) in 2005/06. The GLSS is a nationally representative multi-purpose survey of households in Ghana.[10] A two-stage stratified random sampling design was adopted in the survey. A total of 550 enumeration areas were included at the first stage of sampling, followed by a fixed take of 15 households per enumeration area. The distribution of the selected enumeration areas into the ten regions or strata was based on proportionate allocation using the population.

[10] A household, according to the definition of GSS, consists of a person or group of related or unrelated persons, who live together in the same housing unit, who acknowledge one adult male or female as the head of the household, who share the same housekeeping and cooking arrangements.

The round five (GLSSV) survey sampled 37,128 individuals from 8,867 households. Since the focus of the paper is prenatal care, the sample used for this study includes only women of child bearing age, ages 15 through 49 who were pregnant within sometime in the recall period, which is within a year to the survey date. This reduces the sample to 1012 observations for the analysis. The survey collected information on socio-demographic characteristics of the population, education, health, employment and time use, migration, housing conditions and household agriculture. The third section of the survey includes information on health including condition of illness, prenatal care usage, health expenditures, and insurance status.

Table 4.2 presents the descriptive statistics for the variables used in the analysis. The majority of the differences in proportions and means between the insured and their uninsured counterparts are statistically significant, with the exception of a few characteristic like age of the woman, relation to household head as well as some of the lower income quartiles.

The average age for the insured sample is approximately 19 years while the average age for the uninsured sample is about 18 years. The average household size for the insured household is 4 persons per household while uninsured households had an average household size of 2 persons. Approximately 44 percent of the insured group was married women, followed by 32 percent of the sample being single women. For the uninsured group, 48 percent were married, while 37 percent were single. As typical of a developing country, agriculture dominated as the occupation of women in my sample, followed by trading, with the professional (formal sector) occupation being the least common occupation among the sample. The income quartiles show insurance coverage

by different income groups. Wealth is seen to be positively correlated with insurance enrollment, such that the proportion of people who are insured increases with wealth.

Figure 4.2 shows a histogram showing the distribution of prenatal care out-of-pocket expenditures for a typical first doctor visit for the insured and uninsured, excluding outliers for costs greater than GH ₵60,000. The figure clearly shows that the uninsured spend more out-of-pocket on average for their first prenatal care consultation than the insured.

4.4 Empirical Methodology

One concern in analyzing the relationship between insurance and prenatal care is self-selection into the insurance program due to the voluntary nature of the insurance program. Unobserved heterogeneity is a major source of endogeneity and describes a situation where some unobserved characteristic (such as unobserved health status or unobserved preference of seeking prenatal care) is related to both the dependent variable (prenatal care decisions) and one or more independent variables (insurance).

To address the endogeneity of the insurance variable, I utilize an exogenous variable called ‘intent to treat’ to proxy for insurance status. I define ‘intent to treat’ as whether a respondent is in a district which has the national health insurance scheme already in operation at the time when he is surveyed. Using this variable helps us avoid the problem of endogeneity, since it represents an exogenous event similar to a natural experiment.

4.4.1 Prenatal Care Utilization and Health Expenditures

An empirical challenge when analyzing health expenditures is the high percentage of zeros often observed in the data. In the present application, this occurs when pregnant women do not seek care and hence have no expenditure. In estimating the health care costs during prenatal care visits, I examine the role of health insurance as well as other covariates in affecting the cost of prenatal care. The functional form of the outcome equation takes the form:

$$EXP = \alpha + \beta INS + \delta Z + \varepsilon \qquad (1)$$

where the dependent variable, *EXP* represents expenditure on prenatal care, *INS*, represents the main regressor, a binary variable for insurance status and *Z*, a vector of control variables representing individual, household and community characteristics which include gender, age, income quartile of household, relationship to household head, occupation, education, marital status, and regional dummies.

In addition to the problem of high proportion of zeros, my dependent variable is highly skewed and approximately log-normally distributed. A number of papers have discussed the difficulties of modeling medical expenses appropriately including; Duan et al. (1982); Duan (1983); Hay and Olsen (1984), among others.

Using the Tobit model to estimate equation (1) would be inappropriate since the Tobit model assumes that a single mechanism determines both likelihood as well as the amount spent on health care. An alternative to using a Tobit model is the self-selection or Heckman model. However, as shown by a number of authors including Duan et al.

(1983), the Heckman model is rejected for various reasons, such as: assuming that the functional form is known a priori and that it yields a bivariate normal error; displaying poor numerical and statistical properties (in particular, the inability to separate selection effects from heteroscedasticity and nonlinearity) and; estimating *unconditional* (uncensored) expenditures when, in fact, the zeros in health care expenditures are true zeros and not merely missing information.

As a result of these problems, a more appropriate model is the two-part model. The two-part model provides an approach to account for the mass of zeros. In a two-part model, a binary choice model is estimated for the probability of observing a zero versus positive outcome. Then, conditional on a positive outcome, an appropriate regression model is estimated for the positive outcome. The simple model for household health care expenditures in a two-part model then takes the form:

$$E(EXP|Z) = \Pr(EXP > 0|Z) * E(EXP|EXP > 0; Z) \qquad (2)$$

The two parts of the expression forms the two-part equation model, with the first part being

$$\Pr(EXP > 0|Z) \qquad (3)$$

which represents the probability of having positive health care expenditures, with the variable Z being a vector of explanatory variables including my main policy variable insurance enrollment using the probit model.

In the second equation, I model health care expenditures using ordinary least squares, conditional on having positive expenditure values and thus estimated using a subset of the data. The second stage of the two-part model takes the form:

$$E(EXP|EXP > 0; Z) \qquad (4)$$

Given the skewed nature of the expenditure variable in the second part of the model and hence the non-normality of the log scale error term, I perform the regressions on a log transformation of cost. However, in calculating expenditure predictions from the model, one runs into the problem of retransformation back to raw-scale expenditures. A commonly used retransformation technique is Duan's smearing transformation from the OLS model for ln(expenditure).

4.4.2 The Number of Prenatal Care Visits

The objective of the third research question is to evaluate the impact of social health insurance on the number of prenatal care visits. To accomplish this, a count model is used since the dependent variable (number of prenatal care visits) is a nonnegative integer. Based on past research, the Poisson regression model is a natural first choice for modeling such discrete and nonnegative data sets. However, a major limitation of the Poisson regression model is that the variance of the dependent variable is constrained to be equal to its mean. There is a fairly large body of literature (see, e.g., Cameron and Trivedi (2007)) that suggests that most count data, particularly data on doctor visits, are likely to be overdispersed (i.e., the variance will likely be significantly greater than the mean).

In the situation when the mean and variance of the data are not approximately equal, the variances of the estimated Poisson model coefficients tend to be underestimated and the coefficients therefore become biased. The negative binomial distribution is used in such instances to overcome the limitation. The negative binomial model can be considered as a generalization of Poisson regression since it has the same mean structure as Poisson regression, and it has an extra parameter to model the over-dispersion.

To derive the negative binomial model I first start with the Poisson model and follow the methodology by Farbmacher (2012). Let N be a random variable representing the number of prenatal care visits. This variable is said to have a Poisson distribution with parameter γ and takes on values n = 0, 1 2,..... with probability

$$P(N = n) = \frac{\exp(-\gamma)\gamma^{\mathrm{n}}}{\mathrm{n}\,!} \qquad (5)$$

where $P(\mathrm{N} = \mathrm{n})$ represent the probability of a prenatal care visit, n times within the recall period of the survey. For γ>0, the mean and variance of the distribution is shown to be

$$E(N) = Var(N) = \gamma \qquad (6)$$

A Poisson regression is fitted to data by specifying the Poisson parameter γ to be a function of the explanatory variables and takes the form

$$\ln \gamma = \beta X \qquad (7)$$

where β is a vector of estimable coefficients and X, a vector of explanatory variables

The Poisson regression equations defined in (5) and (7) can be estimated using the standard maximum likelihood methods with the likelihood function

$$L(\beta) = \prod_i \frac{exp[-exp(\beta X_i)][exp(\beta X_i)]^n}{n\,!} \qquad (8)$$

As mentioned earlier, the Poisson regression model is inappropriate when the mean and variance of the distribution is approximately not equal. If this equality does not hold, corrective measures must be taken to prevent model specification errors. The typical approach used is to apply the negative binomial model. The negative binomial model is derived from the Poisson model by adding an independently distributed error term ε to (7), such that

$$\ln \gamma = \beta X + \varepsilon \quad (9)$$

where exp(ε) represent a gamma-distributed error term with mean one and variance α. This gives a conditional probability

$$P(n|\varepsilon) = \frac{exp[-\gamma\, exp(\varepsilon)][\gamma\, exp(\varepsilon)]^n}{n\,!} \qquad (10)$$

Integrating ε out of this expression produces the unconditional distribution of n. Simplifying the results leads to a negative binomial model that allows the mean to differ from the variance in the form

$$Var(n) = E(n) + \alpha E(n) \qquad (11)$$

where α, the variance of the gamma-distributed error term is the measure of dispersion and can be derived using standard maximum likelihood techniques.

The appropriateness of the negative binomial relative to the Poisson model is determined by the statistical significance of the estimated coefficient, α. If α is not significantly different from zero (as measured by *p-value*), the negative binomial model simply reduces to a Poisson regression with, $Var(n) = E(n)$. If α is significantly different from zero, the negative binomial is the appropriate choice of model and the Poisson model is inappropriate. The likelihood ratio test on the alpha variable as presented at the bottom in table 4.9 shows that alpha is statistically significantly different from zero. This result thus provides support for the negative binomial regression model.

4.5 Empirical Results

Tables 4.3 through 4.6 present the results for the research questions 1 and 2, namely to determine the propensity of households to seek prenatal care and the magnitude of out-of-pocket spending when insurance is made available. These results come from the two-part model described in the previous section. Tables 4.3 and 4.4 include estimation results from the baseline model, while tables 4.5 and 4.6 serves as a robustness check by adding an interaction term between insurance status and urban residency status. The first stage of the two-part model shows the probability of spending at least ₵1 on prenatal care (see tables 4.3 and 4.5), while the second stage shows the amount of spending conditional on any spending (see table 4.4 and 4.6). From the first stage estimations (table 4.3), insured pregnant women are more likely to seek (and hence

spend at least ₵1) on prenatal care compared to uninsured pregnant women. However, as a result of the social insurance program, in the second stage results, insured women actually spend less out-of-pocket conditional on any spending relative to the uninsured. Insured pregnant women are more likely to spend at least 0.45 cedis, but, conditional on spending any amount, they spend less out-of-pocket compared to their uninsured counterparts.

Results from tables 4.5 and 4.6 presents robustness check estimation to the baseline result from tables 4.3 and 4.4, by adding an interaction term between insurance status and urban residency status. The interaction term equals one if an individual is insured and also resides in an urban area. People in this group are ex-ante more likely to have insurance compared to others. This addition does not change the significance of the effect of insurance. For the interaction term, insured pregnant women living in urban areas were more likely to seek and hence spend at least ₵1 on prenatal care. However, conditional on spending any amount they did not differ significantly from other pregnant women on the magnitude of out-of-pocket spending.

With the results from tables 4.7 and 4.8, I predict the total out-of-pocket spending on prenatal care for the insured and uninsured pregnant women respectively. Clearly, uninsured pregnant women spend much more compared to insured pregnant women. The predicted total out-of-pocket spending on prenatal care for an insured pregnant woman is about ₵ 3,600 ($0.40) for her first prenatal care visit, while the predicted total spending for an uninsured pregnant woman stands at about ₵ 21,600 ($2.40) for her first visit.

The national average monthly income in Ghana during the survey period was about ₵1,000,000. Hence a typical uninsured pregnant woman is likely to spend on average a little over to 2 percent of her household income on her first prenatal care visit only. These results are clearly showing the gains in having health insurance compared to being uninsured.

Results for the final research question, the effect of social health insurance on the number of prenatal care visits is shown in table 4.9. As per the recommendations of the World Health Organization, pregnant women are advised to have a minimum of four medical care visits to help promote healthy health outcomes. The left panel of table 4.9 presents the baseline negative binomial regression results when insurance status is still endogenous. The right panel shows the same estimation results but with the 'intent to treat' variable, which is a proxy for insurance status. Instead of reporting the regular negative binomial regression coefficients which measures the difference between the logs of expected counts, I report the incident rate ratio (IRR) estimates, which are the exponentiated form of the negative binomial regression coefficients. The IRR in this case, measures the change in prenatal care visits in terms of a percentage increase or decrease, with the precise percentage determined by the amount the IRR is either above or below 1.

Results from the left panel of table 4.9 suggests that having insurance increases the number of prenatal care visits by 40% relative to being uninsured, holding all the other controls constant. This result is robust to using the intent to treat variable as a proxy for insurance status. In the right panel of table 4.9, the insured have approximately 24% more visits compared to the uninsured. These results support the

finding shown in the histogram in figure 4.3. Consistent with the goal of the National Health Insurance scheme in Ghana, insurance does increase the number of prenatal car visits.

4.6 Conclusion and Policy Implications

Infant and maternal mortality rates across developing countries have remained very high over the past two decades, despite the advances in medicine and medical care. For example, there were 47.26 deaths per 1000 live births in Ghana in the year 2010 (WHO 2010). In the year of the survey (2005), Ghana recorded 560 maternal deaths per 100,000 live births. These alarming statistics underscore the importance of the United Nation's pursuit to reduce infant mortality and improve maternal health outcomes by the year 2020. Governments and policy makers in a number of developing countries in response to this problem have introduced social health insurance programs, with the aim of increasing access to health care at affordable prices.

This paper answers three research questions. (1) Does health insurance increase the propensity of households to seek prenatal care? (2) How does the responsiveness of health care expenditures to the insured compare to the responsiveness of health care expenditures of the uninsured? Finally; (3) Does the number of prenatal care visits increase for the insured relative to the uninsured? Results show that having insurance increases a woman's likelihood of seeking prenatal care, and conditional on any spending, they do spend less on prenatal care compared to the uninsured. Also, the insured have more prenatal care visits compared to the uninsured.

One goal of the World Health Organization is to increase the number of pregnant women who seek prenatal care services. Their new model requires pregnant women to have a minimum of four medical care visits during pregnancy. This paper shows that the Social Health Insurance program in Ghana is helping the country reach this goal. Such insurance programs result in more women seeking prenatal care at a more affordable prices compared to being uninsured. Other countries should therefore be encouraged to introduce such social insurance programs, since it has been shown to produce the desired result.

Table 4.1: Insurance enrollment trends per categories (Aggregated from 2005-2008)

	2005		2006		2007		2008	
CATEGORIES	**NUMBER**	**(%)**	**NUMBER**	**(%)**	**NUMBER**	**(%)**	**NUMBER**	**(%)**
Informal Sector adult	309.88	22.99	1,099.52	28.43	2,482.83	30.34	3,725.97	29.76
Formal Sector (SSNIT) contributors	135.42	10.04	332.01	8.58	618.18	7.56	798.57	6.38
Formal Sector (SSNIT) Pensioners	13.84	0.01	29.56	0.76	48.93	0.60	65.65	0.52
Children aged below 18 years	739.29	54.84	1,989.57	51.44	4,222.79	51.61	6,325.38	50.52
Adults aged 70 years and above	126.50	9.38	345.05	8.92	651.28	7.96	881.73	7.04
Indigents	23.24	1.72	72.16	1.87	158.27	1.93	300.92	2.40
Pregnant women	-	-	-	-	-	-	421.23	3.36
Total (National)	**1,348.16**	**6.60**	**3,867.86**	**18.94**	**8,182.26**	**40.06**	**12,519.46**	**61.29**

Source: Ghana National Health Insurance Authority (NHIA)

Table 4.2: Descriptive Statistics by Insurance Status (Bivariate Comparison)

	INSURED		UNINSURED		
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Significance**
Age	18.57	14.04	17.70	13.82	
Income Quartiles					
1st income quartile	0.11	0.18	0.89	0.20	**
2nd income quartile	0.14	0.29	0.86	0.28	
3rd income quartile	0.25	0.23	0.75	0.21	
4th income quartile	0.36	0.22	0.64	0.17	***
Relation to Head					
Spouse	0.23	0.42	0.25	0.43	
Child	0.50	0.50	0.53	0.50	
Grand child	0.08	0.27	0.07	0.26	
Marital Status					
Married	0.44	0.49	0.48	0.49	
Divorced	0.25	0.21	0.16	0.23	**
Regional Dummy					
Western	0.09	0.28	0.09	0.29	*
Central	0.05	0.23	0.07	0.25	
Volta	0.03	0.18	0.08	0.28	**
Eastern	0.11	0.31	0.09	0.28	
Ashanti	0.25	0.43	0.16	0.37	**
Brong-Ahafo	0.20	0.40	0.07	0.26	***
Northern	0.07	0.26	0.14	0.34	
Upper East	0.06	0.23	0.09	0.28	
Greater Accra	0.11	0.31	0.12	0.32	**
Occupation					
Professional	0.04	0.35	0.07	0.42	***
Trading	0.27	0.44	0.19	0.39	*
Agriculture	0.52	0.50	0.61	0.48	**
Construction	0.18	0.19	0.14	0.20	
Education					
No Education	0.24	0.42	0.31	0.46	***
Primary	0.36	0.16	0.43	0.16	
Secondary	0.23	0.42	0.17	0.37	***
Household Size	3.90	2.78	2.03	2.88	*
Urban	0.27	0.44	0.28	0.45	*

NB: *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively

The categorical variables have their means as proportions

Table 4.3: Probit regression on the likelihood of spending at least ₵1 on prenatal care

Prenatalcare Expenditure	**Coef.**		**P>|z|**
Insurance status: Insured = 1	**0.456**	**	0.011
Demographics			
Age	-0.072		0.229
Age^2	0.001		0.217
Household size	0.018		0.615
Urban	-0.019		0.920
Income Quartiles			
2nd Income quartile	0.140		0.452
3rd Income quartile	0.209		0.359
4th Income quartile	-0.002		0.996
Relation to Household Head			
Spouse	0.039		0.802
Child	0.046		0.894
Grandchild	-0.177		0.785
Marital Status			
Married	0.020		0.895
Single	0.091		0.835
Regional Dummies			
Western	**1.027**	***	0.001
Central	**0.603**	**	0.024
Volta	**0.874**	***	0.002
Eastern	**0.841**	***	0.004
Ashanti	**1.282**	***	0.000
Brong-Ahafo	**1.214**	***	0.000
Northern	-0.063		0.713
Upper East	-0.082		0.700
Greater Accra	**1.172**	***	0.000
Occupation			
Trading	-0.374		0.127
Agriculture	0.130		0.579
Construction	-0.398		0.350
Education			
No Education	0.128		0.542
Primary Education	-0.006		0.986
Secondary Education	0.329		0.129
Constant	0.545		0.574

Number of obs = 890; LR $\chi^2(28)$= 131.13; Prob > χ^2= 0.000

* p = 0.1, ** p=0.05, *** p = 0.01

Table 4.4: Ordinary least squares regression on the magnitude of out-of-pocket spending on prenatal care.

LN Prenatal care Expenditure	Coef.		P>|z|
Insurance status: Insured = 1	**-0.303**	**	0.049
Demographics			
Age	-0.029		0.524
Age^2	0.000		0.578
Household size	0.027		0.200
Urban	0.069		0.590
Income Quartiles			
2nd Income quartile	-0.023		0.864
3rd Income quartile	0.040		0.813
4th Income quartile	0.297		0.226
Relation to Household Head			
Spouse	**-0.243**	**	0.042
Child	-0.183		0.431
Grandchild	-0.113		0.793
Marital Status			
Married	**0.318**	***	0.003
Single	0.233		0.417
Regional Dummies			
Western	**1.636**	***	0.000
Central	**1.386**	***	0.000
Volta	**1.644**	***	0.000
Eastern	**1.567**	***	0.000
Ashanti	**1.521**	***	0.000
Brong-Ahafo	**1.644**	***	0.000
Northern	**0.767**	***	0.000
Upper East	0.033		0.885
Greater Accra	**2.003**	***	0.000
Occupation			
Trading	-0.158		0.370
Agriculture	-0.089		0.576
Construction	-0.433		0.178
Education			
No Education	0.192		0.240
Primary Education	0.247		0.366
Secondary Education	-0.006		0.969
Constant	**9.047**	***	0.000

Number of obs = 691; F(28, 691) = 8.35; Prob >F = 0.000

* p = 0.1, ** p=0.05, *** p = 0.01

Table 4.5: Probit regression on the likelihood of spending at least ₵1 on prenatal care including an interaction between insurance and urban residency status.

Prenatalcare Expenditure	**Coef.**		**P>|z|**
Insurance status: Insured = 1	**0.429**	**	0.017
Interaction Term			
Insurance * Urban	**0.495**	**	0.011
Demographics			
Age	-0.071		0.243
Age^2	0.001		0.236
Household size	-0.020		0.577
Urban	**0.549**	***	0.006
Income Quartiles			
2nd Income quartile	0.174		0.367
3rd Income quartile	0.225		0.336
4th Income quartile	0.008		0.976
Relation to Household Head			
Spouse	-0.022		0.890
Child	0.038		0.914
Grandchild	-0.286		0.654
Marital Status			
Married	0.003		0.983
Single	0.026		0.953
Regional Dummies			
Western	**0.693**	**	0.023
Central	0.359		0.218
Volta	0.345		0.269
Eastern	0.367		0.221
Ashanti	**0.967**	***	0.000
Brong-Ahafo	**1.192**	***	0.000
Northern	-0.063		0.715
Upper East	-0.086		0.686
Greater Accra	0.471		0.188
Occupation			
Trading	-0.252		0.319
Agriculture	0.193		0.425
Construction	-0.230		0.608
Education			
No Education	0.050		0.819
Primary Education	-0.090		0.810
Secondary Education	0.247		0.269
Constant	0.646		0.513

Number of obs = 890; LR $\chi^2(29)$= 144.20; Prob > χ^2= 0.000

* p = 0.1, ** p=0.05, *** p = 0.01

Table 4.6: Ordinary least squares regression on the magnitude of out-of-pocket spending on prenatal care including an interaction between insurance and urban residency status.

LN Prenatal care Expenditure	Coef.		P>|z|
Insurance status: Insured = 1	**-0.313**	**	0.042
Interaction Term			
Insurance*Urban	0.036		0.762
Demographics			
Age	-0.028		0.538
Age^2	0.000		0.597
Household size	0.018		0.379
Urban	0.223		0.137
Income Quartiles			
2nd Income quartile	-0.024		0.856
3rd Income quartile	0.035		0.834
4th Income quartile	0.293		0.232
Relation to Household Head			
Spouse	**-0.251**	**	0.035
Child	-0.186		0.421
Grandchild	-0.102		0.812
Marital Status			
Married	**0.322**	***	0.002
Single	0.229		0.424
Regional Dummies			
Western	**1.555**	***	0.000
Central	**1.227**	***	0.000
Volta	**1.497**	***	0.000
Eastern	**1.465**	***	0.000
Ashanti	**1.477**	***	0.000
Brong-Ahafo	**1.643**	***	0.000
Northern	**0.769**	***	0.000
Upper East	0.035		0.878
Greater Accra	**1.831**	***	0.000
Occupation			
Trading	-0.142		0.420
Agriculture	-0.073		0.644
Construction	-0.407		0.205
Education			
No Education	0.177		0.278
Primary Education	0.240		0.378
Secondary Education	-0.016		0.921
Constant	**9.047**	***	0.000

Number of obs = 691; F(29, 651) = 8.37; Prob >F = 0.000

* p = 0.1, ** p=0.05, *** p = 0.01

Table 4.7: Predictive margins for the insured.

	Margin	**Delta-method**	**P>|z|**	**[95% Conf. Interval**	
Constant	3,612.65	684.02	0.000	2,271.99	4,953.31

Table 4.8: Predictive margins for the uninsured.

	Margin	**Delta-method**	**P>|z|**	**[95% Conf. Interval**	
Constant	21,577.40	1,225.60	0.000	19,175.27	23,979.52

Table 4.9: Negative binomial regression for the effect of insurance on the number of prenatal care visits.

	Insurance Status			Intent to Treat		
Number of prenatal care visits	**IRR**		**P>|z|**	**IRR**		**P>|z|**
Insurance status: Insured = 1	1.400	***	0.000	1.243	***	0.000
Demographics						
Age	1.022		0.334	1.022		0.338
Age^2	1.000		0.312	1.000		0.320
Household size	0.990		0.388	0.978	**	0.050
Urban	0.946		0.395	0.909		0.152
Income Quartiles						
2nd Income quartile	0.929		0.271	0.904		0.133
3rd Income quartile	0.946		0.503	0.964		0.657
4th Income quartile	1.033		0.767	1.003		0.981
Relation to Household Head						
Spouse	1.098		0.109	1.108	*	0.080
Child	1.039		0.730	1.043		0.708
Grandchild	0.811		0.338	0.812		0.343
Marital Status						
Married	0.893	**	0.030	0.918		0.103
Single	1.113		0.489	1.080		0.621
Regional Dummies						
Western	0.760	***	0.009	0.761	***	0.010
Central	0.968		0.749	0.875		0.217
Volta	0.750	**	0.011	0.914		0.395
Eastern	0.591	***	0.000	0.751	***	0.010
Ashanti	0.840	**	0.034	0.944		0.467
Brong-Ahafo	0.647	***	0.000	0.813	**	0.020
Northern	0.767	***	0.001	0.895		0.148
Upper East	0.841	*	0.073	0.855		0.105
Greater Accra	1.018		0.873	1.076		0.506
Occupation						
Trading	1.059		0.497	1.054		0.541
Agriculture	0.985		0.849	0.962		0.625
Construction	1.024		0.878	0.932		0.648
Education						
No Education	0.783	***	0.001	0.811	***	0.007
Primary Education	0.792	*	0.083	0.849		0.228
Secondary Education	0.959		0.588	0.996		0.956
Constant	5.859	***	0.000	5.693	***	0.000
	/lnalpha = -1.9021			**/lnalpha = -1.8624**		
	alpha = 0.1493			**alpha = 0.1553**		
Likelihood-ratio test of alpha = 0: chibar2 (01) = 390.97 ; Prob>= chibar2 = 0.000						

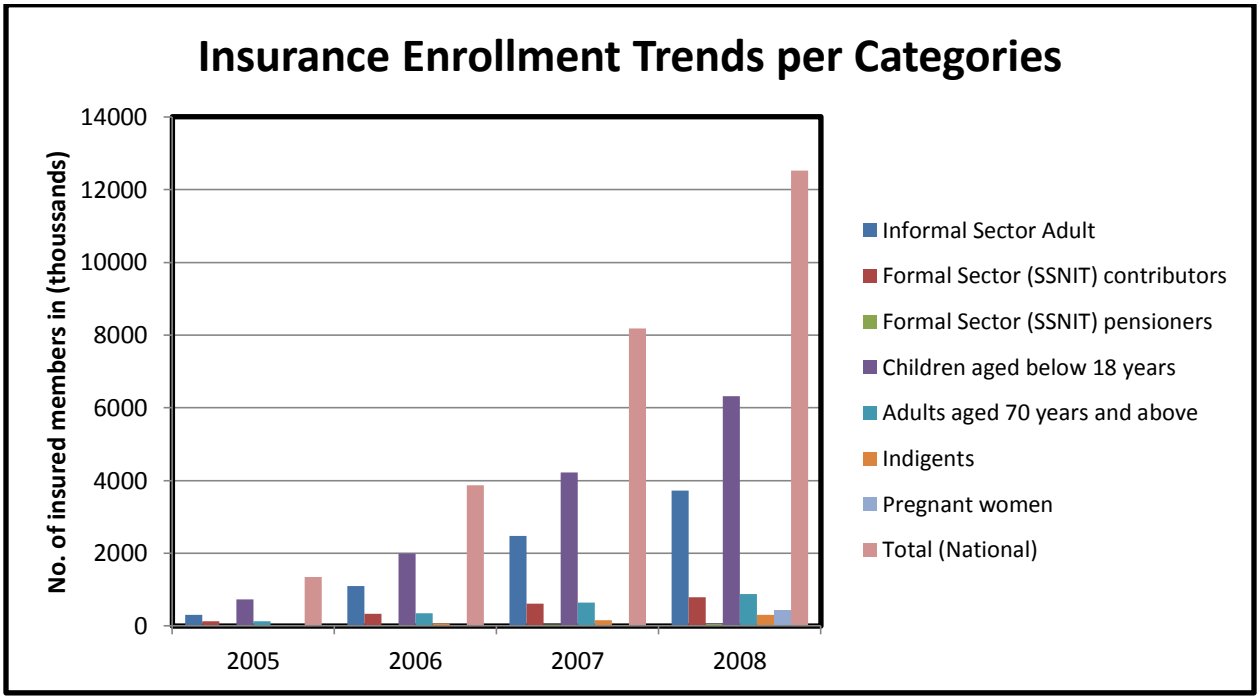

Figure 4.1: Insurance enrollment trends by various categories over time (in thousands).

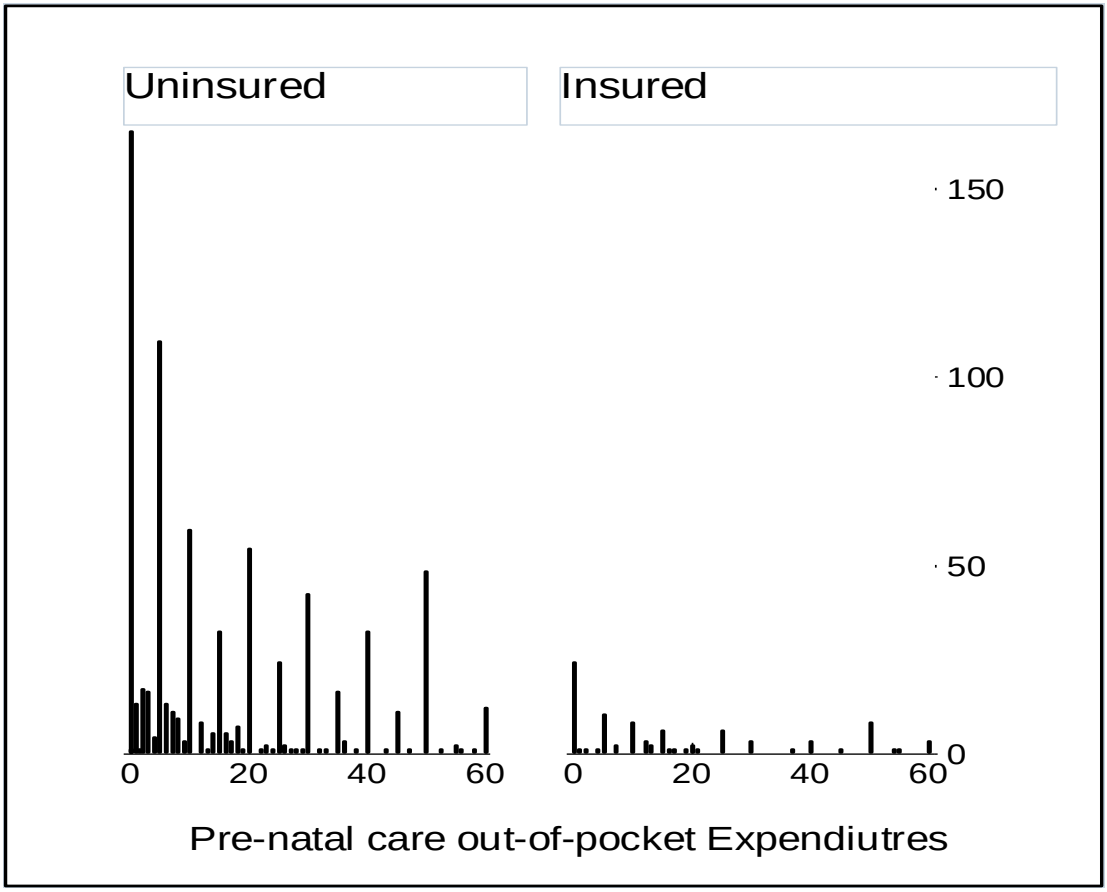

Figure 4.2: Distribution of costs by insurance status (in thousands of cedis).

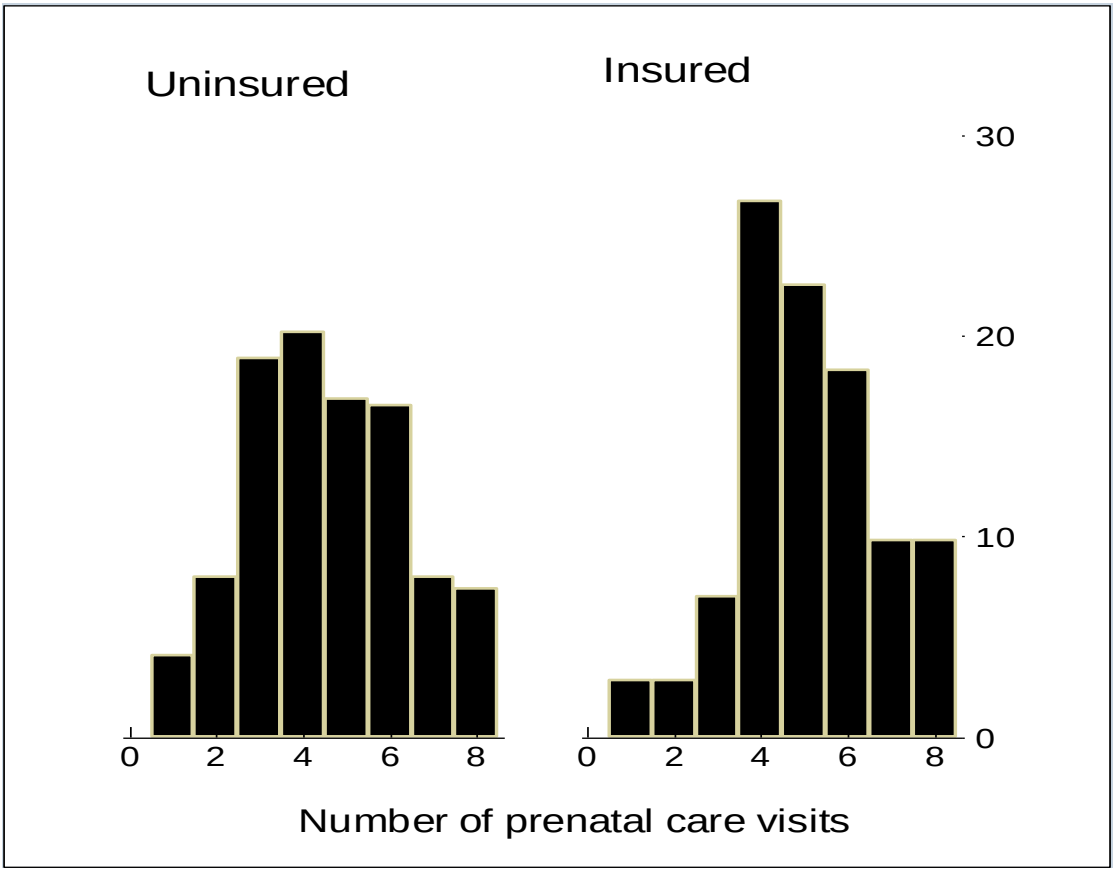

Figure 4.3: The number of prenatal doctor care visits for those with at least one visit.

CHAPTER 5

CONCLUSION, POLICY IMPLICATIONS, AND FUTURE RESEARCH

Most health care systems in developing countries have been faced with the problems of high cost to patients and inequitable access. Households in these countries can be forced to make huge unexpected out-of-pocket expenditures for emergency care, which results in financial strain. As a result of this concern and to improve health outcomes, over the past twenty years many developing countries, including Ghana, Peru, Colombia have pursued some health insurance options. Most of these insurance plans have been social health insurance programs aimed at making health care services more affordable through the use of public subsidies.

The dissertation is a collection of three essays looking at how individual health care choices changed as a result of the availability of insurance coverage in Ghana. The first essay evaluates health care choices and out-of-pocket expenditures after the introduction of Ghana's social health insurance program covering only modern health care services. When ill, an individual decides between a set of alternatives; no care, alternative medical care, modern care and both alternative and modern care. My results show that when health insurance becomes available, individuals take advantage of the insurance by either switching to modern medicine or complementing the use of alternative care with modern care. Finally, I find that out-of-pocket health expenditures decrease significantly across all the different types of care sought as a result of health insurance. Overall, my results show mixed evidence of both substitution and complementarity across the different health care choices. Even though theory predicts

the substitution result, the complementarity result is rather interesting and suggest that alternative[11] (i.e., traditional) medicine still plays a crucial role in the health of millions in developing countries.

Despite the positive impact of western medicine in Africa, it has not been able to integrate fully into the culture and society of these countries and traditional practitioners continue to be a vital part of the health care system. The complementarity result is likely due to the fact that most of the alternative sources of care (for example traditional healer, spiritualists) are more easily accessible and more affordable. Most of the modern care facilities (for example hospitals) are located in the larger towns and require some traveling time to access them. Also, hospitals may require appointments schedule well in advance or have longer waiting time compared to visiting a traditional healer.

One of the main challenges of social health insurance schemes is financing these highly subsidized programs. The program in Ghana, with no co-payments and very low premiums makes it a primarily tax-funded social health insurance system. According to Ghana Health Service (2007), approximately 76 percent of the National Health Insurance Fund revenue came from value added tax (V.A.T), 24 percent came from Social Security and National Insurance Trust (SNNIT) contributions of formal sector workers, and only 0.01 percent came from premiums received from people in the informal sector in the year 2006. With the informal sector forming a higher proportion of the population and with some individuals being in the premium exempt category, it makes the financial sustainability of the program in the near future questionable.

[11] Alternative medicine here broadly refers to non-western medicine and comprises of traditional healers, herbalists, chemical sellers and pharmacists.

As my result shows, insured households benefit from the significant drop in out-of-pocket spending for care and are more likely to seek modern care once insured. With the increasing pressure on the existing health facilities, the supply of modern health care may not be able to keep pace with expanding demand resulting from health insurance coverage. This is likely to lead to the continued reliance on traditional medicine.

The introduction of social health insurance programs in a number of developing countries is in part a response to two of the millennium development goals, namely reducing infant mortality and improving maternal health outcomes. By making modern health care more accessible and affordable, policy makers hope that more women will seek prenatal care and thereby improve health outcomes. The second and third essays look at how the insurance program affected fertility and prenatal care decisions, respectively. The second essay studies whether the availability of social health insurance affects the fertility decisions of women and examines whether the effect is due to women likely to become pregnant seeking out insurance (adverse selection effect) or women changing fertility decisions because they have insurance (moral hazard effect).

To disentangle the effects of adverse selection from moral hazard, I exploit an exogenous event, the district-level variation in the dates of implementation of the national health insurance, to instrument for insurance enrollment. I first run a standard probit regression of insurance status on fertility decisions of women, controlling for demographic, household, and community characteristics without controlling for endogeneity. The result from this estimation shows that the relationship between

insurance and fertility could be either the result of adverse selection or moral hazard or both. I then run an iv-probit estimation to account for the endogeneity problem.

My results suggest fertility actually did increase as a response to insurance. While some women who expected to become pregnant did enroll in the insurance program, the insurance also seems to have encouraged women to have more children, at least in the short run, likely by reducing the cost and risk of childbirth.

The third essay examines the effect of insurance on prenatal health care choices. First, I look at the role of social health insurance on prenatal care utilization and expenditure using a two-part model. Finally I evaluate the impact of social health insurance on the number of prenatal care visits. Sub-Saharan Africa accounts for approximately half of global maternal deaths (WHO, 2007). As a result of this alarming statistic, a prenatal care model was developed by the World Health Organization (WHO) and recommends a minimum of four medical care visits with detailed instructions on the basic components of care for the four visits (WHO, 2001). Most developing countries have often failed in the past to meet these standards due to lack of human resources, equipment and supplies (Zanconato, Msolomba, Guarentil, and Franchi, 2006).

A number of developing countries including Colombia, Ghana, Namibia, and Peru have recently introduced social health insurance programs in part to help improve primary health care and help attain WHO's prenatal care visit recommendations. My estimation results show that health insurance increases the propensity of pregnant women to seek prenatal care relative to the uninsured. I use a proxy variable for insurance status, called 'intent to treat', which is defined as whether a respondent is in a

district which had the national health insurance scheme already in operation at the time when he is surveyed. Using this variable enables me to avoid the problem of endogeneity of actual insurance status since it is an exogenous event similar to a natural experiment.

The results also show that insured pregnant women are more likely to seek and hence to spend at least 1 cedi on prenatal care, but conditional on any spending they actually do spend less out of pocket compared to the uninsured pregnant women. As a robustness check to the second research question, I added an interaction term between insurance status and urban residency status. People in this urban insured group are more likely to have insurance compared to others. However, even with the inclusion of this variable, insurance still has a significant effect on prenatal care choices.

Furthermore, the interaction term, insured pregnant women living in urban areas, were more likely to seek and hence spend at least 1 cedi on prenatal care. However conditional on spending any amount, they did not differ significantly from other pregnant women on the magnitude of out-of-pocket spending. Finally, I find that insurance increases the odds of having more prenatal care visits compared to not having insurance.

One goal of the World Health Organization is to increase the number of pregnant women who seek prenatal care services. Their new model recommends pregnant women to have a minimum of four medical care visits during pregnancy. This paper shows that the Social Health Insurance program in Ghana is helping the country reach this goal. Such insurance programs result in more women seeking prenatal care at more affordable prices compared to being uninsured.

There are some knowledge gaps in this area of research that needs to be further exploited. For example, this dissertation focused on the effect of insurance on health care choices and spending, but more detailed data is needed to demonstrate the effect of insurance on health outcomes. Other potential areas of research include the distributional impact of health insurance, and the impact of health insurance on household consumption smoothing patterns.

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APPENDIX

SUPPLEMENT TABLES TO

CHAPTER3:

THE IMPACT OF SOCIAL HEALTH INSURANCE ON HOUSEHOLD FERTILITY DECISIONS

Table A1. First stage IV-Probit Regression for baseline regression

Dependent Var: Insurance	Coef.		p-value
Timing of District Insurance Enrollment	**0.002**	***	0.008
Demographics (Age)			
Age	-0.003		0.524
Age^2	0.000		0.418
Income Quartiles			
2nd Income quartile	**0.044**	**	0.020
3rd Income quartile	**0.072**	***	0.003
4th Income quartile	**0.081**	***	0.003
Relation to Head			
Spouse	-0.026		0.146
Child	**-0.040**	*	0.064
Grandchild	-0.022		0.494
Marital Status			
Married	0.014		0.426
Divorced	**-0.064**	**	0.022
Occupation			
Trading	-0.018		0.396
Agric	**-0.087**	***	0.000
Construction	-0.063		0.109
Education			
No Education	**-0.143**	**	0.000
Primary Education	-0.016		0.657
Secondary Education	**0.056**	***	0.009
Household size	-0.003		0.223
Urban	**-0.070**	***	0.000
Constant	**0.473**	***	0.000

Adj R-squared = 0.0764, Number of obs = 5641

Two-step probit with endogenous regressors

* p = 0.1, ** p=0.05, *** p = 0.01

Table A2. First stage IV-Probit Regression for robustness chek I regression

Dependent Var: Insurance	Coef.		p-value
Timing of District Insurance Enrollment	**0.013**	***	0.000
Demographics (Age)			
Age	-0.011		0.134
Age^2	**0.000**	*	0.085
Income Quartiles			
2nd Income quartile	**-0.061**	**	0.048
3rd Income quartile	-0.030		0.430
4th Income quartile	-0.042		0.384
Relation to Head			
Spouse	-0.030		0.317
Child	-0.011		0.751
Grandchild	0.010		0.846
Marital Status			
Married	**0.124**	***	0.000
Divorced	**-0.086**	*	0.053
Occupation			
Trading	-0.039		0.222
Agric	-0.036		0.253
Construction	-0.058		0.300
Education			
No Education	**-0.067**	**	0.045
Primary Education	-0.075		0.164
Secondary Education	**0.042**	***	0.160
Village Characteristics			
Distance to Health Center	**0.002**	***	0.004
Household size	-0.003		0.516
Urban	**-0.124**	***	0.000
Constant	**0.514**	***	0.000

Adj R-squared = 0.0764, Number of obs = 5641

Two-step probit with endogenous regressors

* p = 0.1, ** p=0.05, *** p = 0.01

Table A3. First stage IV-Probit Regression for robustness chek II regression

Dependent Var: Insurance	**Coef.**		**p-value**
Timing of District Insurance Enrollment	**0.004**	*	0.000
Demographics (Age)			
Age	-0.004		0.279
Age^2	0.000		0.274
Income Quintiles			
2nd Income quintile	**0.069**	***	0.000
3rd Income quintile	**0.102**	***	0.000
4th Income quintile	**0.091**	***	0.000
Relation to Head			
Spouse	-0.017		0.288
Child	**-0.049**	**	0.014
Grandchild	-0.009		0.762
Marital Status			
Married	**0.039**	**	0.019
Divorced	**-0.055**	**	0.031
Regional Dummy			
Western	**-0.199**	***	0.000
Central	**-0.237**	**	0.000
Ashanti	**0.204**	***	0.000
Brong-Ahafo	0.025		0.233
Northern	**-0.221**	***	0.000
Upper East	**-0.177**	***	0.000
Greater Accra	**-0.252**	**	0.000
Occupation			
Trading	-0.003		0.869
Agric	**-0.086**	*******	0.000
Construction	-0.019		0.606
Education			
No Education	**-0.083**	*******	0.000
Primary Education	0.006		0.862
Secondary Education	**0.051**	***	0.010
Village Characteristics			
Distance to Health center	**0.003**	***	0.000
Household size	**-0.005**	**	0.022
Urban	**-0.094**	***	0.000
Constant	**0.506**	***	0.000

Adj R-squared = 0.217, Number of obs = 5641

Two-step probit with endogenous regressors

Wald chi2(27) = 841.79 Prob > chi2 = 0.000

* p = 0.1, ** p=0.05, *** p = 0.01