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Bringing Rigour and Evidence to Economic Policy Making in Africa

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Abstract

In many developing countries, financial risk protection for health is underdeveloped and negative health outcomes can be impoverishing. In this study, we sought to investigate the impact of negative health outcomes on household welfare and the role of public health insurance in mitigating this impact. We used Ghana's public-funded National Health Insurance Scheme as a case study. Data was from the sixth round of the Ghana Living Standards survey (GLSS). To address the potentially non-random nature of the Ghana health insurance scheme, a two-stage least squares (2SLS) estimation technique was used. The results suggest that longer days of illness leads to less hours of labour supply and this result was statistically significant across all specifications. We found no evidence of heterogeneous impact of negative health outcomes through health insurance coverage on hours of labour supply. However, disaggregating the results into the urban and rural, and the gender samples, we find that for rural dwellers and males who experienced longer days of illness, labour supply was less when they had access to health insurance. The findings call for policy that focuses on reforming the NHIS to ensure effectiveness and achieving its primary objectives. One option is to ensure availability of prescription drugs and to enhance the procedure for accessing services at healthcare centres to encourage participation and continuous renewal of subscription by Ghanaians.

Keywords: Health insurance, health outcomes, labour supply, Ghana

JEL: I13, I3, D12

1. Introduction

Negative health outcomes have significant implications for the welfare of individuals and households (Lenhart, 2019). This is particularly true because negative health outcomes are mostly unpredictable and, in some cases, significant proportions of household earnings are used in treatment. Lindelow and Wagstaff (2005) noted that the devastating impact of illness, for example, on welfare operates through factors such as medical expenditure and loss of income. Besides the direct burden of illness on income and expenditure of individuals and households, it also has negative effects on labour supply decisions of the sick individual, as well as other household members. For example, an ill individual in the household may require other household members to stop their productive activities or even skip school to provide assistance (Aakvik et al., 2019). In several developing countries, the absence of effective formal health insurance markets may exacerbate the economic impact of such illness. Households may have to bear the full impact of negative health outcomes through the loss of income from productive activities and the health expenditure incurred.

The potentially devastating effect of negative health outcomes has prompted global calls for policies directed towards reducing the burden of illness on individuals and households. In recent years, the achievement of Universal Health Coverage (UHC) has been the focus of national and international policy makers alike, with three pillars of equity, quality and protection against financial risk from the use of health care (WHO, 2016). In Ghana several health policy reforms have been implemented to mitigate the impact of negative health outcomes. These include the National Health Insurance Scheme (NHIS), the Community-based Health Planning and Services (CHPS) and the free maternal healthcare programme.

These policies sought to mitigate the impact of ill-health on households in Ghana with particular interest in vulnerable populations. For example, the NHIS exempts particular groups of people such as pregnant and nursing mothers, children under age 18 years and the aged (above 70 years), from paying annual premiums (NHIA, 2012). These groups of people receive the same care as those who pay annual premiums, creating some form of financial protection for the vulnerable and the ability to access health care when ill. This emphasizes the primary objective of the NHIS in Ghana, which is to provide financial risk protection. The introduction of the NHIS was a major deviation from the then “cash and carry” system where patients were required to pay out-of-pocket for services. The devastating impact of the “cash and carry” system was

profound as it created distortions in various economic outcomes. During this period, individuals who were ill had to deal with the pain, high medical expenditure and loss of productive labour hours. The introduction of the NHIS was, therefore, seen as a timely intervention to ameliorate the burden of negative health outcomes (Scheiber et al., 2012). However, while NHIS provides some cover for ill-health, not everyone is covered even though it was designed as a mandatory scheme. Most people in the informal sector are not covered as they are required to register with the scheme. Those who work in the public sector are enrolled through the Social Security and National Insurance Trust (SSNIT). Recent estimates suggest that about 38% of the population is covered under the scheme (NHIA, 2013). In addition, the scheme only covers medical expenses for selected health conditions1, which means that patients have to pay out of pocket for treatments that are not covered. Moreover, since benefits only include medical bills, other indirect costs of ill-health, such as loss of income and reduction in hours of labour supply due to hospital visits become a burden on the individual and household at large.

The literature on the economic implications of negative health outcomes has focused largely on developed countries (Wu, 2003; Smith, 2005; Lindelow and Wagstaff, 2005; Liu, 2016). In recent times, there has been growing literature on the relationship in developing countries. In Ghana, studies that have investigated the relationship mostly showed that the economic burden of specific diseases such as malaria are enormous and the impact extends beyond the household to the economy as a whole (Akazili, 2002; Asante and Asenso-Okyere, 2003). Several studies have also investigated the impact of health insurance coverage on health outcomes (Osei-Akoto and Adamba, 2011) or healthcare utilization (Sekyi and Domanban, 2012; Wang, Temsah, and Mallick, 2017; Abrokwa et al., 2019). To the best of our knowledge, no literature exists that investigates the role of health insurance in mitigating the economic implications of negative health outcomes in Ghana. This study, therefore, sought to extend existing studies on the economic consequences of negative health outcomes and to explore the role of formal public health insurance in mitigating these economic consequences in Ghana. Consequently, we sought to answer the question: does health insurance mitigate the economic impact of negative health outcomes?

1.1 Health Financing and Public Health Insurance in Ghana

Universal access to health care remains a major global concern and a key priority item of the World Health Organization (WHO). In most developing countries, financial barriers serve as a big constraint to accessing formal health care and meeting healthcare needs. In view of this, several countries have adopted different health financing mechanisms to protect individuals from financial risk as a result of ill-health. This is not different in Ghana, where access to basic health care has been of great concern to policy makers.

Ghana was among the first sub-Saharan African countries to introduce a National Health Insurance Scheme (NHIS) in 2003 through an Act of Parliament (ACT 650, Amended Act 852). Full implementation of the scheme started in 2004. This scheme was an amalgamation of existing mutual health insurance schemes that were operated in various districts in the country in response to the needs of the people within the districts. In the initial structure of the mutual health insurance schemes, people were restricted to use health facilities within the districts in which they were registered. However, the amalgamation of the schemes made it possible for people to enrol and be assured of receiving treatment when needed wherever they happened to be in the country. The NHIS was amended by Act 852 (2012), which required that every Ghanaian enrol in a health insurance scheme. This constitutional provision is, however, not effectively implemented because of the relatively large informal sector and weak administrative capability of the National Health Insurance Authority (NHIA) in Ghana. As at 2013[2], the scheme covered over 10 million people (approximately 38% of the national population).

The NHIS is financed through a central National Health Insurance Fund (NHIF) which is sourced from the National Health Insurance Levy (NHIL) of 2.5% value added tax (VAT) on selected goods and services, 2.5% of SSNIT contributions, largely by formal sector workers, payment of premiums and donor funds. Other sources of funding to the NHIF include money allocated by Parliament, grants, donations, gifts/voluntary contributions and interests accrued from investments. Wang, Otoo, and Dsane-Selby (2017) indicate that Ghana is the only country in the world that finances its health insurance scheme primarily through VAT revenue, which ensures that NHIS revenue automatically keeps pace with economic growth, and creates an implicit subsidy for basic care.

The NHIS does not provide coverage for all diseases suffered by insured members. The NHIA reports[3] that over 95% of disease conditions that afflict Ghanaians are covered by the NHIS. These include both out-patient and in-patient services. Example of typical conditions covered include, malaria, acute respiratory tract infection, diarrhoeal disease, skin disease and ulcers, hypertension, acute eye infection, rheumatism, anaemia, intestinal worms disorders, acute ear infection, typhoid fever, dental caries, diabetes mellitus, sexually transmitted infections, asthma, laboratory services, ultrasound scans and x-rays, HIV/AIDS symptomatic treatment for opportunistic infections, out-patient/day surgical operations, out-patient physiotherapy, prescription medicines on the NHIS Medicines List, and traditional medicines approved by the Food and Drugs Board and prescribed by accredited medical and traditional medicine practitioners. The scheme also covers oral health, eye care services, maternity care, and emergency medical services (including brain or heart surgery due to accidents, paediatric emergencies, obstetric and gynaecological emergencies, road traffic accidents and industrial and workplace accidents).

All residents of Ghana, including non-citizens, are eligible to enrol in the NHIS scheme, even though not all of them are required to pay premiums and/or processing fees. Contributors to SSNIT do not pay premiums. The government assumes that

this group of individuals has already paid premiums indirectly through their SSNIT contributions. However, they are required to pay processing fees during registration. Pregnant women, beneficiaries of the Livelihood Empowerment Against Poverty (LEAP) programme and indigents are completely exempted from paying premiums and processing fees. They are, however, required to register and possess a card to benefit from the scheme. Other groups of people exempted from paying premiums but not processing fees include children under age 18 years and those above 70 years of age (NHIA, 2012). The benefit package, however, is the same for all members registered under the scheme whether exempted from paying premiums and/or processing fees. The processing fee, as reported in the 2013 annual report of the NHIA, is 8 Ghana cedis (GHs) (USD 1.374) for children under the age of 18 years, adults above 70 years and SSNIT contributors. Adults aged between 18 and 30 years pay a premium of GHs 30 (USD 5.14) upon registration. However, for renewal, children under 18 years, adults above 70 years and SNNIT contributors pay GHs 5 (USD 0.86), while adults between 18 and 69 years pay GHs 27 (USD 4.46).

The scheme permits an individual to select a primary caregiver, but does not restrict the person from accessing services from other providers. This still ensures that people have access to services wherever they are. This is possible due to the selected drug list of the NHIS and the means of payment for services to the providers. Providers under the scheme are paid by the Ghana diagnosis-related-groups (GDRG) to ensure costs are contained. The GDRG are used for all in-patient and out-patient care. The scheme still reimburses pharmaceutical costs to providers on a fee-for-service basis, which reflects predetermined tariffs and quantities of drugs submitted by providers (Wang, Otoo, and Dsane-Selby, 2017).).

Despite the significant progress made with the NHIS, issues exist with respect to the perception of the quality of the service (Alhassan et al., 2015 ; Amo-Adjei et al., 2016; Badu et al., 2018 ; Nketiah-Amponsah, Alhassan, Ampaw, and Abuosi, 2019). For example, Alhasssan et al. (2015) report that even though health staff perceived the quality of services they render to clients as satisfactory, the clients of the accredited NHIS facilities perceived the quality of services to be dissatisfactory.

2. Literature Review

The theoretical link between health and economic outcomes is credited to Grossman's (1972) work on "the concept of health capital and the demand for health". Grossman's theory on health capital deviates significantly from earlier human capital theories (Mushkin, 1962; Becker, 1964) and argues that health capital is unique and should be distinguished from all other forms of human capital. Grossman viewed health capital as an endogenously determined capital stock and argued that individuals are born with an initial stock of health which depreciates over time. The level of depreciation can, however, be ameliorated by various forms of investments (e.g., exercise and medication). An individual's health stock influences the amount of time available to engage in market and non-market activities. This makes health capital different from other forms of human capital (e.g., education) that only influence market activities directly. The relevance of this theory to the proposed study lies in the prediction that health should be positively correlated with productivity and well-being through various returns to health such as wages.

Other researchers have introduced health insurance into the Grossman model and argued that while negative health outcomes decrease economic outcomes (such as labour supply) by decreasing taste for work, the situation may be different if the individual has health insurance coverage (Bradly et al., 2007). Bradley et al. (2007) hypothesized that individuals are more likely to secure insurance coverage due to its mitigating effect on negative health outcomes. In a more recent conceptual model, Alam and Mahal (2014) analysed the role of insurance in the economic impact of negative health outcomes. The authors opined that once individuals suffer from negative health outcomes they are likely to incur high out-of-pocket (OOP) health spending. However, the degree of out-of-pocket spending depends on the existence of social protection mechanisms, such as health insurance. Out-of-pocket expenses are likely to be low in the presence of functional health insurance coverage because insurance reduces the effective price of care for the insured. This implies that negative household economic outcomes, such as loss in income due to illness, may be limited in the presence of community-based insurance pools or formal health insurance schemes.

The Grossman (1972) theory on human capital has also served as the basis for several other theoretical propositions in the health economics literature. Various extensions to the basic Grossman model exist. For example, Schurer (2008) modified

Grossman's health capital model to account for heterogeneous effects of deteriorating health state on labour supply. The author argued that a lapse in Grossman's model is its assumption of a homogeneous health production function. The implication of this assumption is that "a doubling of health care utilization would lead to a doubling of illness-free days in the next period equally for all individuals". On the contrary, Schurer noted that the returns that an individual acquires from health investment could vary depending on specific "internal or external locus of control" (Schurer, 2008, 2014).

A fast-growing empirical literature exists on the relationship between negative health outcomes and the economic outcomes of individuals and households. However, for studies that explored this relationship, the exact direction of impact is still unclear with some studies finding no significant relationship (Monk and Teal, 2008) while others found a significant negative relationship (Stephen, 2001; Wu, 2003; Smith, 2005; Lenhart, 2019). For example, Monk and Teal (2008) provided evidence from Ghana, using data from the Ghana Household Worker Survey (GHWS), and found that there was no significant relationship between negative health outcomes, measured as days of illness, and labour supply decisions in Ghana. A significant and negative relationship was, however, found between days of illness and earnings only after controlling for labour force entry.

Conversely, Stephen (2001) found labour supply to be the main channel of the impact of negative health outcomes on consumption. Stephen (2001) also found a significant and negative long-term decline in consumption due to household head disability. A similar relationship was established by Smith (2005) who showed a consistently negative and significant relationship between negative health outcomes and household economic outcomes. The author also established that the relationship operated mainly through labour supply, compared to medical expenditure. Other studies have also found a significant and negative relationship between negative health outcomes and participation in the labour force (Levy, 2002) or medical expenditure (Wu, 2003). Similarly, Lenhart (2019) reports that negative health outcomes, measured by sudden health declines, lead to reductions in income and suggest that higher out-of-pocket health expenditure and reduced work productivity are potential mechanisms through which negative health outcomes affect earnings in the United Kingdom. Lenhart (2019) further report that the observed income losses are substantially larger for males and for individuals with higher levels of education.

An important observation from the empirical literature is that studies have focused primarily on the economic consequences of negative health outcomes, at the expense of the role of formal health insurance and poverty. Existing evidence on risk and risk management in this context has showed that mitigating strategies in the form of savings, informal networks, formal insurance among others, are used by households to smoothen consumption in the event of a negative shock. However, negative health outcomes are mostly excluded in such analysis with much focus on climatic and other idiosyncratic shocks (Morduch, 1995; Townsend, 1995; Dercon, 2002).

The limited number of studies that have attempted to explore the mitigating effect of health insurance on the economic impact of negative health outcomes

have showed mixed findings. For example, Lindelow and Wagstaff (2005) provided evidence from China to show that there exists a substantial and significant negative effect of negative health outcomes on household income and labour supply. The authors also found that negative health shock translates to a significant increase in out-of-pocket healthcare expenditure. Households that were insured had a smaller share of the impact relative to the uninsured, even though the relationship was not statistically significant. Other studies that explored similar relationships found no significant difference between the insured and uninsured of the economic impact of negative health outcomes in the USA (Smith, 1999; Levy, 2002). Wagstaff (2005) also provided evidence to show that negative health outcomes reduced household consumption in Vietnam with the relationship being particularly true for households that were not insured and non-poor. Yilma et al. (2015) also concluded that there is no evidence that enrolling in an insurance scheme in Ethiopia affects consumption or livestock holdings. The authors, however, concluded that the insurance scheme reduces reliance on potentially harmful coping responses such as borrowing that households were accustomed before the scheme was introduced.

Archaya et al. (2012), in providing a synthesis of existing literature, concluded that no strong evidence existed of the impact of socially provided insurance schemes on healthcare utilization. Additionally, the authors concluded that the literature does not show any strong evidence of protection from financial risk as a result of participation in a socially provided health insurance scheme. Finally, the authors reported that the impact of socially planned insurance programmes on health status is non-existent in the literature surveyed. The results provided by the authors are contrary to what the literature proposes for socially provided health insurance schemes and their impact on utilization and health status.

In Ghana hardly any studies have attempted to investigate the relationship between negative health outcomes and economic outcomes. Aside from Monk and Teal (2008), who focused on general negative health outcomes, other studies have also focused on the economic impact of specific diseases such as malaria (Akazili, 2002; Asante and Asenso-Okyere, 2003; Akazili et al., 2007). For example, Asante and Asenso-Okyere (2003) showed that malaria places an enormous economic burden on Ghanaian households and the economy at large. In a more recent study, Akazili et al. (2007) found that while the cost of malaria care was 1% of income of the rich households, it was 34% of a poor household's income. A significant proportion (71%) of cost of malaria care was from indirect sources. Others have investigated the general impact of negative health outcomes on poverty and found a significant positive relationship (Novignon et al., 2012). Studies that have looked at health insurance in this context in Ghana have either looked at the link between insurance coverage and negative health outcomes (Osei-Akoto and Adamba, 2011) or the effect of insurance coverage on healthcare service utilization (Sekyi and Domanban, 2012; Wang, Temsah, and Mallick, 2017; Abrokwa et al., 2019).

A critical gap in the literature reviewed is the absence of studies that seek to understand the role of insurance in the relationship between negative health outcomes

and economic outcomes. This is particularly important in Ghana because the country is one of the few countries in sub-Saharan Africa with a national health insurance scheme which has been operational for over 10 years.

Understanding the mitigating effect of the scheme in the economic impact of negative health outcomes will, therefore, be important for researchers and policy makers alike. Countries such as Ethipia and Rwanda have similar schemes (Yilma et al., 2015; Woldemichael et al., 2016).

3. Methodology

3.1 Theoretical framework

The study follows a static theoretical framework developed by Chetty and Looney (2006) to evaluate the marginal welfare gain from insurance following an income shock (such as a poor health state). The authors argue that where private insurance markets are ineffective and individuals are risk averse, social insurance arrangements can yield significant welfare gains. That is, risk averse individuals are more likely to purchase insurance to reduce welfare loss (negative economic outcome) in the event of a negative health shock. This theoretical proposition deviates from that of previous studies that generally conclude that the welfare gains from smoothening consumption through social insurance arrangements is insignificant if fluctuations in consumption due to a negative shock is small (Townsend, 1995). The proposition by Chetty and Looney (2006) is relevant to our study as many developing countries, including Ghana, face largely under-developed private insurance markets. Most individuals in these countries can be classified as risk averse since income levels are generally low and significant efforts are made to reduce fluctuations in income due to shocks. In this regard, the presence of a well-organized social insurance scheme is expected to have large impact on welfare. Ghana's NHIS is a typical example of a social insurance scheme and, in line with this normative theory, it can be hypothesized that the scheme will be a relief to risk averse individuals or households that would otherwise resort to distress sale of assets to mitigate negative health outcomes.

To further appreciate the pathways through which negative health outcomes may have an impact on economic welfare of households, we proposed a simple conceptual framework for the outcome variable. As mentioned earlier, the primary objective of the study was to estimate the impact of negative health outcomes on household economic outcomes (labour supply) and the mitigating effect of health insurance in this relationship. To achieve this objective, we defined a conceptual framework derived from Grossman's (1972) proposition that an individual's health stock at any point in time reduces time lost to illness and could potentially improve economic outcomes. The transmission mechanism from negative health outcomes to household economic outcomes deserves some discussion. The basic idea here is that an individual's exposure to negative health outcomes will affect the amount of time available for labour activities and labour productivity, and this may consequently

affect economic welfare. The reduction in productive time due to negative health outcomes may reduce labour supply and labour earnings.

3.2 Econometric model

To achieve the stated objective, we estimated the impact of negative health outcomes on labour supply using the following equation:

$$\ln y_i = \beta_0 + \beta_1 h_i + \beta_2 I + \beta_3 I_i h_i + \beta_4 x_i + \mu_i \quad (1)$$

where y_i is labour supply, h_i is the health outcome variable, x_i is a vector of household characteristics, I_i represents health insurance and u_i is an error term, which we assumed to be randomly distributed. To further examine the role of health insurance in mitigating the economic impact of negative health outcomes, we interacted the health insurance variable with the health outcomes variable as represented by the term $I_i h_i$ in Equation 1. β_3 is the coefficient for the interaction term. Equation 1 permits us to test whether the economic burden of negative health outcomes is different for the insured and uninsured in Ghana.

In this study, health insurance was coded as 1 if a respondent is enrolled on the NHIS scheme and 0 if otherwise. Also, the health status variable was coded as 1 if the respondent has been ill the past 2 weeks preceding the survey and 0 if otherwise. We also used a variable labelled duration of illness which we measured as number of days ill. The control variables we used in this study are level of education, coded as 0 for no education, 1 for primary, 2 for secondary and 3 for tertiary education. We also controlled for the 10 administrative regions in Ghana. The additional variables we controlled for include the sex of the household head, coded 1 for male-headed households and 0 if otherwise; location of household coded as 1 if household is in rural area and 0 if otherwise; and household size, which is the number of people in the household. The estimation of Equation 1 was preceded by a test of difference in means between the insured and the uninsured with regard to the hours of labour supply. Besides, we also tested the difference in means of hours of labour supply with respect to health status (ill or not) and health insurance (insured or not) for gender and location. This was done to help us understand the bivariate differences that exist among the respondents in the sample.

3.3 Estimation issues: Identification

The nature and design of the NHIS in Ghana raises concerns about potential self-selection bias in the estimation. While the scheme was designed as a mandatory national scheme, this is not the case in practice. Individuals, unless they are in the exempt category, are expected to pay some premium to subscribe to the scheme. This implies that coverage is not automatic. This also suggests that coverage under the scheme is not random or exogenous. This is likely to lead to an endogeneity

problem arising from self-selection bias. The fact that individuals have to self-select themselves into the insurance programme suggests that there may be several other unobservable factors that influence decision to participate. The omission of these unobservable factors means that the insurance variable and the error term may be correlated, creating some bias. For example, a person's age, pre-existing condition and risk attitude are potential determinants of decisions to participate in insurance. However, while age is observable and can be controlled for, a person's risk attitude is not directly observable in our data and was omitted from the model. This results in a potential correlation between the estimates and the error term hence, biasing the estimates.

Therefore, to ensure our estimates are unbiased and consistent, we tested for endogeneity using the Durbin-Wu-Hausman procedure (Durbin, 1954; Wu, 1973; Hausman, 1978) and used the two-stage least squares (2SLS) estimation procedure to correct for endogeneity. The 2SLS requires the use of a strong and valid instrument that is correlated with health insurance status but not the economic outcome measure. In this regard, we used the exemption criteria as an instrument for NHIS coverage. As noted earlier, the NHIS in Ghana is designed to provide financial protection to particular groups of individuals considered to be vulnerable or poor ((NHIA, 2012). These individuals include pregnant women, LEAP beneficiaries, contributors to SSNIT, SSNIT pensioners, children under 18 years, indigents and those aged 70 years and above). For example, a pregnant woman who is not covered under the scheme is automatically registered at the first visit to an accredited facility. The scheme is, therefore, largely financed from taxes: the National Health Insurance levy provides 74% of NHIS revenue, SSNIT deductions comprise another 20%, and premium payments provide just 3% (Wang, Otoo, and Dsane-Selby (2017). The criteria for exemption are predetermined in the design of the scheme and, therefore, participation for this group of people is exogenous to the household. Economic theory suggests that a good instrument satisfies two important conditions: (1) it must be a good predictor of our health insurance variable; and (2) it should not influence the economic outcome variable. The choice of this instrument satisfies these criteria in many regards.

First, we expect that households with more members in the exemption category are likely to have more people covered under the scheme. For example, a household head who is eligible for exemption is more likely to be covered under the scheme relative to heads who are not eligible. However, we do not expect any correlation between labour supply and the exemption status of a household head. This is because the criteria for exemption are entirely exogenous to the household and only determined by the design of the scheme. We, however, tested for the strength of the instrument. The health outcome variable is also another potential source of endogeneity in this analysis. To circumvent this challenge, we measured the health outcome variable at the cluster level. Specifically, we measured the average number of days an individual suffers from an illness in a particular cluster. This approach ensures that the health outcome measure is exogenous to the household and avoids potential bias of our estimates.

The identification strategy for the models with interaction terms deserve further explanation. Since health insurance status is treated as endogenous in these models, all interaction terms that involve this endogenous regressor may also be endogenous. To account for this, we follow Balli and Sørensen (2013), and interacted the instrument discussed above with the second term (in this case health outcome) in the endogenous interaction term. This interaction is considered exogenous and valid when used as instrument for the interaction term. We also tested the validity of this instrument.

3.4 Data and variables

The study relied on cross-sectional data from the sixth round of the Ghana Living Standards Survey (GLSS 6) conducted by the Ghana Statistical Service. The GLSS is a series of living standards data collected on various socio-economic indicators. The sixth round was conducted between October 2012 and October 20136. The data are nationally and regionally representative with comprehensive information on household income and expenditure as well as health outcomes. The data also include information on health insurance coverage. A total sample of 16,772 households was used in the analysis with 7,445 (44.4%) urban and 9,327 (55.6%) rural households (Ghana Statistical Service, 2014). Consistent with the literature, household level variables were generated and used in the analysis. We provide a detailed description of these variables in Table 1.

Table 1: Variable description

Variable	Description
Health outcome (illness)	Health outcome is defined as the average number of days suffered from an illness/injury. This captures duration of illness and measured at the cluster level.
Labour supply*	Total labour hours supplied per week
NHIS coverage	This is a dummy variable that takes on a value of one if a household head is covered by NHIS and zero if otherwise.
Sex of household head	This is a dummy variable that takes the value of 1 if household head is male and zero if otherwise.
Age of household head	Measured in years
Household location	This is a dummy variable that takes the value one if the household is located in rural area, zero otherwise
Household size	Number of people living within a household
Education of head	Level of education completed by the household head. Measured in four categories—none, primary, secondary and tertiary

Note: *indicates variables that were logged for the purposes of analysis

4. Results

4.1 Descriptive Statistics

Table 2 shows summary statistics of the key variables included in this study. The means and standard deviations of the variables are reported. The analysis was also disaggregated by incidence of illness and NHIS coverage. The total sample for the study was 14,337. Household heads who experienced illness worked fewer hours (39.7 labour hours) than household heads who did not experience any illness (44.0 labour hours). Furthermore, household heads with health insurance coverage worked more hours than those without health insurance. We also found that about 72% of the household heads are male and 56% of the households were in a rural area. In addition, 68% of the household heads are in union, either married or living together with the spouse in the household. In terms of education, our statistics indicate that about 45% of the household heads had secondary education while 28% and 21% had no education and primary education respectively. The total proportion of household heads with tertiary education was 5%, suggesting a low number of tertiary education degree holders in the sample. These results do not differ much when we disaggregated the sample into health status and insurance coverage.

Table 3 presents the test on the mean differences in hours of labour supply by health insurance status and incidence of illness using the t-test. The analysis was disaggregated by place of residence and gender of household head. The results indicate significant differences in hours of labour supply at the 5% statistical level. We found that household heads without insurance supplied, on average, 44.03 hours of labour, compared to household heads with insurance who supplied 42.50 hours of labour. . This result was consistent for the urban/rural and male/female samples where we still found significant differences in hours of labour supply. In the urban sample, household heads with insurance supplied 46.81 hours of labour while those without insurance supplied 50.01 hours of labour. Similarly, for the rural sample, household heads with insurance supplied 38.75 hours of labour, while those without insurance supplied 40.03 hours of labour. In addition, males with NHIS worked more hours (44.47) than females with NHIS who worked for 39.73 hours. Thus, our test of significance suggested that household heads with insurance, irrespective of the place of residence and gender, supply less hours of labour than household heads without insurance.

Table 3 also presents results from the mean difference test by health status. The

results suggest that households that reported illness worked less hours than those that did not report any illness, with the difference being significant at the 5% level of significance. For example, we found that from the total sample, households that reported illness worked 39.74 hours compared to those that reported no illness (43.95 hours). Further when the results were disaggregated into rural and urban samples, we found that household heads that reported illness in both the rural and urban locations, worked less hours than those who did not report any illness. These differences are significant at the 5% level of significance. For instance, while household heads who reported illness in urban areas worked 44.38 hours, those who did not report any illness worked 48.93 hours. Similarly, household heads in rural areas who reported illness worked 36.78 hours, but those who did not report any illness worked 39.98 hours. We also found that males who reported illness worked more hours (41.36) than their female counterparts who were ill (37.08 hours).

Table 2: Descriptive statistics

	Total sample		Ill = yes		Ill = no		NHIS = yes	
Variable	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev
Hours of work	43.24	20.35	39.74	21.16	43.95	20.12	42.50	20.54
Sex of hh head	0.72	0.45	0.60	0.49	0.74	0.44	0.67	0.47
Age of hh head	45.83	15.89	49.34	17.38	45.03	15.42	48.42	16.38
Rural location	0.56	0.50	0.60	0.49	0.55	0.50	0.53	0.50
Head in union	0.68	0.47	0.58	0.49	0.70	0.46	0.67	0.47
Education								
None	0.28	0.45	0.30	0.46	0.28	0.45	0.27	0.44
Primary	0.21	0.41	0.23	0.42	0.21	0.40	0.19	0.39
Secondary	0.45	0.50	0.43	0.50	0.46	0.50	0.48	0.50
Tertiary	0.05	0.22	0.03	0.18	0.06	0.23	0.07	0.25

Std. dev = standard deviation; hh = household.
Source: Authors' compilation

Table 3: Test of location and gender mean differences in hours of labour supply

	Health status (Yes = ill)	**Mean difference (standard errors)**	**Insurance status (NHIS)**	**Mean difference (standard errors)**
Total sample				
No	43.95		44.03	
Yes	39.74	**4.20 (0.455)*** **	42.50	**1.533 (0.340)*** **
Urban Sample				
No	48.93		50.01	
Yes	44.38	**4.56 (0.753)*** **	46.81	**3.207 (0.540)*** **
Rural sample				
No	39.98		40.03	
Yes	36.78	**3.205 (0.541)*** **	38.75	**1.274 (0.416)*** **

Gender (ill = yes)			**Gender (NHIS = yes)**	
Female	37.08		39.73	
Male	41.36	**-4.29 (0.888)*** **	44.47	**-4.72 (0.386)*** **
***indicates significance at 1%				

4.2 Validity of instrument and endogeneity test

As mentioned earlier, estimating the relationship between health insurance, negative health outcomes and economic outcomes raises concerns about endogeneity. This concern, if confirmed, could bias the estimates and may lead to incorrect conclusions. First, we tested for the presence of endogeneity in each of the models estimated using the Durbin Chi-square test statistic (Durbin, 1954) and the Wu-Hausman F statistic (Wu, 1973; Hausman, 1978). Both statistics are based on the null hypothesis that "variables are exogenous". The results (reported at the bottom of the respective tables) suggest that in each case, we rejected the null hypotheses, of no endogeneity, at various levels of statistical significance. This confirms the potential bias in our estimates arising from endogeneity if we used the ordinary least squares (OLS) technique without controlling for endogeneity. Thus, we also estimated the models using the instrumental variable 2SLS technique to correct for endogeneity.

Next, we assessed the validity of the instruments used in the various models in two steps. First, the significance of the correlation between the proposed instrumental variable and the endogenous variable was tested. Second, the Cragg-Donalds Wald statistic (Cragg and Donalds, 1993) and, in addition, the Stock and Yogo critical values (Stock and Wright, 2000; Stock and Yogo, 2005) were used to test the hypothesis of weak instruments. The results reported in Tables 4, 5 and 6 indicate a strong and statistically significant (at 5% level) relationship between the instrument and the endogenous variable. The results were robust across all model specifications. The direction of association was also consistent with expectations. For example, the results indicate that eligibility for exemption was positively associated with NHIS coverage and the relationship was statistically significant. The F-statistic from the first stage regressions were all statistically significant, indicating the joint significance of the regressors in the model. The strength of the instrument was also confirmed by the large Cragg-Donalds Wald statistics which were larger than the Stock and Yogo critical values. This implies that we rejected the null hypothesis of weak instruments in all the specifications. The foregoing suggests that the OLS results may be biased and favours the 2SLS results, which correct for endogeneity. While discussion of results was based on the 2SLS estimates, we reported both OLS and 2SLS estimates in the respective tables.

4.3 Effect of negative health outcomes on hours of labour supply

In Tables 4, 5 and 6, we present results on the interactive effect of health insurance and incidence of illness on hours of labour supply. Table 4 presents results for the total sample while in Tables 5 and 6, we disaggregated the results into gender and location of household head respectively. Results from the 2SLS and OLS regression are both presented in each table. For each set of results, we first presented the OLS and 2SLS models without interactions between illness and the insurance variable. The second set of results presents the interaction for both the OLS and 2SLS models. In general, we found that the mitigating effect of health insurance was mixed. While the interaction terms generally showed expected signs, the statistical significance of the coefficients was less widespread and inconsistent.

The findings presented in Table 4 show a negative and statistically significant relationship between illness and labour supply. This implies that in communities where average days of illness are longer, individuals were less likely to work for longer hours. This relationship is consistent in all the four estimations, with both the OLS and 2SLS estimators. The results suggest that negative health outcomes have a welfare-reducing impact on households by reducing the number of hours of labour supplied by the household head. In the case of NHIS coverage, we found a negative relationship with labour supply, albeit an insignificant effect. The heterogeneous impact of health insurance observed through the interaction variable, presented a negative sign, but was also not statistically significant. Thus, for the total sample, even though we found that negative health outcomes reduced hours of labour supplied, we found no evidence of the mitigating effect of health insurance. While this evidence contradicts expectations, recent developments in the implementation of the scheme may explain the lack of statistical significance. One would expect that individuals with health insurance would have easier access to health care and hence better labour market outcomes in the event of an illness. This may be explained by the various challenges faced by the scheme in recent years. Key among these challenges is the increased deficit levels that has left several providers unpaid. This has resulted in the reluctance of service providers to attend to patients visiting facilities with the NHIS card. It is widely reported that most clients who visit the health facilities with the NHIS card are dissatisfied with the services provided (Amo-Adjei et al., 2016; Badu et al., 2019 ; Nketiah-Amponsah et al., 2019) and therefore perceive that they are less likely to receive good treatment than are patients with the same condition who opt to pay out of pocket (Alhassan et al., 2016). Some providers have argued that since the government delays reimbursements, they find alternative means to raise funds to support hospital operations. This has been confirmed by reports that suggest significant claim payment delays in the NHIS7.

Table 4: Health insurance, health status and labour supply – Full sample

	Without interaction		With interaction	
	OLS	2SLS	OLS	2SLS
Number of days ill	-0.125***	-0.125***	-0.115***	-0.099***
	(0.013)	(0.012)	(0.018)	(0.021)
Covered by NHIS	-0.007	-0.009	-0.002	0.006
	(0.007)	(0.014)	(0.008)	(0.017)
Days ill*Insurance			-0.004	-0.011
			(0.005)	(0.007)
HH Head characteristics:				
Household size	0.073***	0.074***	0.073***	0.073***
	(0.006)	(0.010)	(0.006)	(0.010)
Sex of household head	0.400***	0.400***	0.400***	0.400***
	(0.036)	(0.033)	(0.036)	(0.033)
Age of household head	-0.030***	-0.030***	-0.030***	-0.030***
	(0.001)	(0.001)	(0.001)	(0.001)
Rural location	0.091***	0.090***	0.091***	0.091***
	(0.032)	(0.032)	(0.032)	(0.032)
Education level of head				
- Primary education	0.024	0.025	0.024	0.023
	(0.042)	(0.043)	(0.042)	(0.043)
- Secondary education	-0.019	-0.017	-0.018	-0.018
	(0.039)	(0.040)	(0.039)	(0.040)
- Tertiary education	-0.097	-0.095	-0.097	-0.097
	(0.072)	(0.073)	(0.072)	(0.073)
Administrative region:				
Central	0.048	0.048	0.048	0.047
	(0.064)	(0.063)	(0.064)	(0.063)
Greater Accra	0.285***	0.284***	0.286***	0.287***
	(0.063)	(0.062)	(0.063)	(0.062)
Volta	0.085	0.085	0.083	0.081
	(0.064)	(0.064)	(0.064)	(0.064)
Eastern	0.336***	0.336***	0.336***	0.336***
	(0.059)	(0.061)	(0.059)	(0.061)
Ashanti	0.324***	0.325***	0.324***	0.322***
	(0.058)	(0.059)	(0.058)	(0.059)
Brong Ahafo	0.353***	0.354***	0.352***	0.352***
	(0.059)	(0.063)	(0.059)	(0.063)
Northern	0.067	0.067	0.067	0.067
	(0.062)	(0.064)	(0.062)	(0.064)
Upper East	-0.203***	-0.201***	-0.204***	-0.205***
	(0.070)	(0.068)	(0.070)	(0.068)
Upper West	-0.197***	-0.194***	-0.198***	-0.201***
	(0.072)	(0.070)	(0.072)	(0.070)
Constant	5.135***	5.133***	5.122***	5.102***
	(0.082)	(0.078)	(0.083)	(0.081)

Observations	16735	16735	16735	16735
R-squares	0.104	0.104	0.104	0.104
Under-identification P-value		0.000		0.000
Weak IV Test		5567.436		2766.637

Note: *** indicates significant at 5% level ($p < 0.05$). Values in parenthesis are standard errors.
***Source**: Produced by the authors using GLSS 6 Data.*

We also observed interesting relationships between some household characteristics and economic outcomes. There was a positive relationship between male-headed households and hours of labour supply and this relationship was strongly significant (see Table 4). The results show that households headed by males were more likely to supply more labour hours than female-headed households. The results also indicate that the age of the household head was negatively related to the hours of labour supply. This suggests that households with relatively older heads were more likely to have lower hours of labour supply. The results also indicate that the size of the household has significant effect on the labour supply decisions of the household. The coefficient was positive and statistically significant across the two estimation techniques. The positive and significant coefficient shows that heads of larger households supplied more hours of labour than heads of smaller households. Specifically, the number of hours supplied by the household head increased with an increase in household size for the total sample. The results also imply that rural households supply more hours of labour than urban households, given the positive and significant coefficient. We also found significant variation in labour supply decisions across the 10 administrative regions in Ghana. We found that compared to the Western region, all the other regions, except Upper East and Upper West, supplied more labour hours. We did not, however, find a statistically significant effect of education on household labour supply.

The results were further disaggregated across rural and urban households and the results for the disaggregation are presented in Table 5. The disaggregation was necessitated by the fact that households in these locations face different economic conditions. Moreover, the exposure to negative health outcomes and its economic implications may vary significantly in different locations and settings. The operation of the health insurance scheme and access to health facilities in the event of an illness was also not the same in these locations. The results show that in both samples, there was a negative effect of illness days on hours of labour supply. Specifically, higher average illness days led to a fall in the number of hours of labour supplied by the household. The relationship was highly significant at the 5% level of significance in all the estimations, for both the OLS and 2SLS.

With regard to the interactive effect, the results showed a negative and significant effect on labour supply only in the rural sample using the 2SLS estimator. We did not find any interactive effect on labour supply in the urban sample. This result suggests that while NHIS coverage had a mitigating effect on labour supply in the rural sample, this was not the case in the urban sample. Individuals from communities with higher average illness days and covered by NHIS were likely to work fewer hours than those

without NHIS coverage. The realization of statistical significance in the rural sample justified the disparities in healthcare access and utilization between rural and urban areas. In Ghana, most rural areas only have access to public health facilities where NHIS is largely accepted. The situation is different in urban areas where individuals have alternatives in seeking health care. Due to the relatively low economic conditions in these rural areas, individuals are likely to place higher value on the utilization of NHIS services. This implies that significant differences in the mitigating effect of NHIS can be expected. The negative impact can also be explained by the fact that NHIS coverage in rural areas provides significant financial protection. Individuals covered under the scheme may have less financial pressure during illness and hence spend more time to recover than individuals without coverage. Individuals without coverage are forced to increase labour supply to cope with the financial pressure from health care. Indeed, this finding is in consonance with that of Nketiah-Amponsah et. al. (2019) that rural subscribers of the NHIS were found to identify more with better perception of quality of services provided by the NHIS than urban subscribers. Hence, despite the challenges of the scheme, rural dwellers tend to perceive a better quality of services rendered by NHIS than urban dwellers. This may be explained by several factors, including the fact that rural dwellers are mostly constrained by the choice of facilities available for health care compared to urban dwellers who may have several other options other than the public and NHIS accredited facilities to seek for care.

Table 5: Health insurance, health status and labour supply – By location

	Without interaction				With interaction			
	Rural: OLS	Rural: 2SLS	Urban: OLS	Urban: 2SLS	Rural: OLS	Rural: 2SLS	Urban: OLS	Urban: 2SLS
Number of sick days	-0.137***	-0.137***	-0.106***	-0.106***	-0.133***	-0.093***	-0.092***	-0.125***
	(0.017)	(0.015)	(0.021)	(0.020)	(0.022)	(0.025)	(0.029)	(0.039)
Covered by NHIS	-0.016**	-0.014	0.011	0.014	-0.014	0.010	0.018	0.004
	(0.008)	(0.015)	(0.013)	(0.029)	(0.009)	(0.019)	(0.015)	(0.033)
Number of days ill*Insurance					-0.002	-0.018**	-0.007	0.009
					(0.006)	(0.008)	(0.009)	(0.015)
HH Head characteristics:								
Household size	0.065***	0.064***	0.091***	0.089***	0.065***	0.064***	0.091***	0.089***
	(0.007)	(0.011)	(0.013)	(0.020)	(0.007)	(0.011)	(0.013)	(0.020)
Sex of household head	0.398***	0.398***	0.398***	0.398***	0.398***	0.400***	0.398***	0.398***
	(0.048)	(0.044)	(0.053)	(0.050)	(0.048)	(0.044)	(0.053)	(0.050)
Age of household head	-0.027***	-0.027***	-0.037***	-0.037***	-0.027***	-0.027***	-0.037***	-0.037***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
Education level of head								
- Primary education	0.047	0.046	-0.031	-0.032	0.046	0.043	-0.031	-0.032
	(0.049)	(0.050)	(0.080)	(0.079)	(0.049)	(0.050)	(0.080)	(0.079)
- Secondary education	0.018	0.016	-0.099	-0.101	0.018	0.014	-0.098	-0.102
	(0.047)	(0.048)	(0.069)	(0.070)	(0.047)	(0.048)	(0.069)	(0.070)

- Tertiary education	-0.090 (0.142)	-0.092 (0.143)	-0.158* (0.094)	-0.161 (0.099)	-0.089 (0.142)	-0.091 (0.143)	-0.158* (0.094)	-0.160 (0.099)
Administrative region:								
Central	0.188** (0.077)	0.188** (0.080)	-0.107 (0.105)	-0.105 (0.100)	0.188** (0.077)	0.190** (0.080)	-0.110 (0.106)	-0.103 (0.100)
Greater Accra	0.049 (0.137)	0.050 (0.132)	0.288*** (0.085)	0.289*** (0.085)	0.050 (0.137)	0.059 (0.132)	0.288*** (0.085)	0.288*** (0.085)
Volta	0.151** (0.076)	0.151** (0.076)	-0.056 (0.114)	-0.056 (0.111)	0.150** (0.076)	0.140* (0.076)	-0.055 (0.114)	-0.056 (0.111)
Eastern	0.412*** (0.071)	0.411*** (0.076)	0.240** (0.099)	0.240** (0.098)	0.411*** (0.071)	0.408*** (0.076)	0.242** (0.099)	0.238** (0.098)
Ashanti	0.379*** (0.077)	0.379*** (0.081)	0.265*** (0.089)	0.265*** (0.090)	0.379*** (0.077)	0.373*** (0.081)	0.263*** (0.089)	0.267*** (0.090)
Brong Ahafo	0.338*** (0.073)	0.336*** (0.080)	0.364*** (0.096)	0.362*** (0.101)	0.337*** (0.073)	0.329*** (0.080)	0.364*** (0.096)	0.362*** (0.101)
Northern	0.133* (0.073)	0.132* (0.076)	-0.027 (0.114)	-0.028 (0.114)	0.133* (0.073)	0.132* (0.076)	-0.027 (0.114)	-0.028 (0.114)
Upper East	-0.219*** (0.083)	-0.221*** (0.078)	-0.051 (0.133)	-0.055 (0.137)	-0.219*** (0.083)	-0.229*** (0.078)	-0.052 (0.133)	-0.052 (0.137)
Upper West	-0.135 (0.082)	-0.138* (0.080)	-0.302* (0.167)	-0.306** (0.149)	-0.136* (0.082)	-0.153* (0.080)	-0.300* (0.167)	-0.307** (0.149)
Constant	5.056*** (0.101)	5.058*** (0.095)	5.421*** (0.134)	5.424*** (0.130)	5.051*** (0.102)	5.006*** (0.098)	5.404*** (0.135)	5.445*** (0.135)
Observations	9304	9304	7431	7431	9304	9304	7431	7431
R-squares	0.110	0.110	0.106	0.106	0.110	0.109	0.106	0.106
Under-identification P-value		0.000		0.000		0.000		0.000
Weak IV test		3411.655		1973.134		1691.897		985.196

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.0$. Standard errors in parentheses.
Source: Produced by the authors using GLSS 6 data.

Our results indicate some important relationships between household characteristics and hours of labour supply. There was a positive and statistically significant relationship between male-headed households and hours of labour supply, and a negative but statistically significant relationship between age of the household head and hours of labour supply (see Table 5). The results show that households headed by males were more likely to supply more labour hours than were female-headed households and households with relatively older heads were more likely to have lower hours of labour supply. The results also indicate larger households supplied more hours of labour than did smaller households and this was statistically significant. Specifically, the number of hours supplied by the household head increased with an increase in household size for the total sample. We also found significant variation in labour supply decisions across the 10 administrative regions in Ghana. We found that compared to the Western region all the other regions, except Upper East and Upper West, supplied more labour hours. We did not, however, find a statistically significant effect of education on household labour supply.

A further disaggregation of the sample into gender (male and female), presented in Table 6, indicates that average days of illness affected labour supply for both males and females alike. The disaggregation was done to determine whether the effect of negative health outcomes on households differed by gender (Table 6). The results showed a negative effect of average number of days ill on labour supply for both males and females. This was significant at the 5% level in all the estimations, for both the OLS and 2SLS and with and without the interaction terms. We found that the health insurance variable only had a negative and significant effect on labour supply in the female sample, indicating that being insured for females reduced hours of labour supply at the 10% significance level. With regards to the interactive effect, the results showed a negative effect on labour supply in the male sample in both the OLS and 2SLS estimations, but were only significant in the OLS estimation for the female sample. The level of statistical significance was, however, stronger for the male sample in the 2SLS model.

While it is unclear why the mitigating effect of health insurance was significant for males and not for females in the corrected models, we speculated that this may be attributed to the selection bias. In Ghana the design of the NHIS suggests that women and children are relatively favoured in terms of access compared to men. Besides exemption policies that cover both men and women, women in pre- and post-natal periods are also exempted. This implies that selection bias to the NHIS may be larger for males than for females. Correcting for this bias in the estimation models will, therefore, likely result in significant differences between those who are covered under the scheme and those who are not. The negative impact is also in line with previous results in Table 5 and the explanations are, therefore, similar. That is, having NHIS coverage reduces some financial pressure that may drive individuals to work shorter hours when ill, compared to individuals without access.

The results, reported in Table 6, also suggested that male-headed households supply more hours of labour than female-headed households, significant in both estimations. A male-headed household supplied approximately 0.4 more hours than a female-headed household. Besides, the results implied that hours of labour supply fall as the household head ages. This is due to the negative and significant size of the coefficient. Thus, on average, older household heads supplied fewer hours of labour than did younger household heads in the sample. This was also significant across the two estimations with and without the interaction terms. The results also indicated that hours of labour supply increases with household size. Specifically, if the household size increased by one extra member, hours of labour supply increased between 0.064 and 0.091 hours. The coefficient was positive and statistically significant across the two estimation techniques, suggesting that as the household size increased, the hours of labour supplied also increased. Hence, on average, we should find a larger household, in terms of number of people in the household, supplying more hours of labour than a smaller household. This was also significant in both estimations for both genders. Again, as reported earlier, we found that significant variations in hours of labour supply exist across the 10 administrative regions in Ghana. We found that

compared to the Western region all the other regions, except Upper East and Upper West, supplied more hours of labour. We did not, however, find a statistically significant effect of education on household labour supply.

Table 6: Health insurance, health status and labour supply – By gender

	Without Interaction				With Interaction			
	Male: OLS	Male: 2SLS	Female: OLS	Female: 2SLS	Male: OLS	Male: 2SLS	Female: OLS	Female: 2SLS
Number of sick days	-0.125***	-0.125***	-0.125***	-0.128***	-0.098***	-0.082***	-0.169***	-0.161***
	(0.015)	(0.014)	(0.027)	(0.026)	(0.020)	(0.024)	(0.037)	(0.047)
Covered by NHIS	-0.006	0.006	-0.005	-0.060	0.007	0.028	-0.033	-0.083*
	(0.007)	(0.014)	(0.018)	(0.040)	(0.008)	(0.017)	(0.024)	(0.048)
Sick days*Insurance					-0.011*	-0.017**	0.023*	0.017
					(0.006)	(0.008)	(0.012)	(0.021)
HH Head characteristics:								
Household size	0.072***	0.065***	0.070***	0.101***	0.072***	0.064***	0.069***	0.101***
	(0.007)	(0.010)	(0.018)	(0.026)	(0.007)	(0.010)	(0.018)	(0.026)
Age of household head	-0.030***	-0.030***	-0.031***	-0.030***	-0.030***	-0.030***	-0.031***	-0.030***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
Rural location	0.060*	0.065*	0.140**	0.129*	0.060*	0.067*	0.138**	0.127*
	(0.036)	(0.036)	(0.066)	(0.066)	(0.036)	(0.036)	(0.066)	(0.066)
Education level of head								
- Primary education	-0.026	-0.030	0.116	0.130	-0.027	-0.034	0.115	0.129
	(0.048)	(0.049)	(0.083)	(0.085)	(0.048)	(0.049)	(0.083)	(0.085)
- Secondary education	-0.128***	-0.138***	0.197**	0.226***	-0.128***	-0.140***	0.192**	0.223***
	(0.044)	(0.045)	(0.079)	(0.082)	(0.044)	(0.045)	(0.079)	(0.082)
- Tertiary education	-0.196**	-0.212***	0.082	0.124	-0.197**	-0.216***	0.077	0.121
	(0.078)	(0.076)	(0.202)	(0.201)	(0.078)	(0.076)	(0.202)	(0.201)
Administrative region:								
Central	0.033	0.039	0.118	0.095	0.032	0.039	0.121	0.096
	(0.072)	(0.072)	(0.130)	(0.127)	(0.072)	(0.072)	(0.130)	(0.127)
Greater Accra	0.281***	0.288***	0.284**	0.266**	0.284***	0.293***	0.283**	0.265**
	(0.069)	(0.068)	(0.136)	(0.130)	(0.069)	(0.069)	(0.136)	(0.130)
Volta	0.069	0.068	0.121	0.134	0.064	0.062	0.125	0.138
	(0.071)	(0.072)	(0.133)	(0.132)	(0.071)	(0.072)	(0.133)	(0.132)
Eastern	0.306***	0.305***	0.397***	0.413***	0.306***	0.305***	0.398***	0.414***
	(0.064)	(0.068)	(0.129)	(0.129)	(0.064)	(0.068)	(0.129)	(0.129)
Ashanti	0.298***	0.297***	0.369***	0.374***	0.296***	0.294***	0.372***	0.377***
	(0.065)	(0.067)	(0.122)	(0.123)	(0.065)	(0.067)	(0.122)	(0.123)
Brong Ahafo	0.345***	0.335***	0.352***	0.396***	0.343***	0.330***	0.352***	0.397***
	(0.063)	(0.070)	(0.133)	(0.136)	(0.063)	(0.070)	(0.133)	(0.136)
Northern	0.007	0.005	0.128	0.149	0.007	0.005	0.132	0.153
	(0.066)	(0.068)	(0.182)	(0.176)	(0.066)	(0.068)	(0.182)	(0.176)
Upper East	-0.298***	-0.314***	0.001	0.061	-0.300***	-0.321***	0.004	0.066
	(0.078)	(0.074)	(0.153)	(0.153)	(0.078)	(0.074)	(0.153)	(0.153)

Upper West	-0.343***	-0.362***	0.266*	0.316*	-0.347***	-0.373***	0.273*	0.321*
	(0.080)	(0.075)	(0.162)	(0.164)	(0.080)	(0.075)	(0.162)	(0.164)
Constant	5.643***	5.656***	4.944***	4.912***	5.612***	5.608***	5.005***	4.955***
	(0.085)	(0.085)	(0.169)	(0.165)	(0.086)	(0.088)	(0.173)	(0.173)
Observations	12018	12018	4717	4717	12018	12018	4717	4717
R-Squares	0.091	0.090	0.079	0.077	0.091	0.091	0.080	0.078
Under-identification P-Value		0.000		0.000		0.000		0.000
Weak IV Test		4041.216		1414.459		2007.698		705.086

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.
Source: Produced by the authors using GLSS 6 Data

5. Discussion of results

The findings of the study deserve further discussions in relation to already existing studies as well as current policy efforts in Ghana. The findings on the impact of average illness days on labour supply are mostly consistent with findings from related studies. For example, Nwosu and Woolard (2017) showed a negative and significant impact of health on labour force participation in South Africa. While their results showed consistency between males and females, the impact was relatively profound for males. Similarly, Lindelow and Wagstaff (2005) found evidence that the incidence of a negative health outcome was associated with significant reduction in income and labour supply. This relationship meets a priori expectation and is also intuitively appealing. Healthier individuals are generally expected to have better economic outcomes for several reasons, including their relatively greater capacity to engage in productive activities (Jack and Lewis, 2009). As noted by Grossman's (1972) theoretical model on health capital, improved health stock has investment benefits where healthier individuals are able to work relatively more than their counterparts who suffer a decline in health status, and thus are able to improve their economic outcomes.

We also found evidence that the NHIS provides some protection for people living in communities with relatively higher illness days, even though statistical significance was limited. Indeed, the evidence in the literature is not consistent. While some studies found statistical significance, others found no impact. In Rwanda existing evidence suggests that direct benefits of the community-based health insurance scheme (CBHIS) include significant reduction in out-of-pocket health payments (Woldemichael et al., 2016). This is expected to indirectly improve welfare as resources can be channelled to other welfare improving expenditure items and reduce financial pressure. Other researchers have argued that financial protection for health care insulates households when they experience negative health outcomes. Evidence from Ethiopia's CBHIS showed that the scheme reduced the likelihood of borrowing to smoothen consumption in the event of a negative health outcome (Yilma et al., 2015).

Conversely, evidence from other parts of the world showed that public health insurance may have no significant impact on economic outcomes. For example, Lindelow and Wagstaff (2005) found no statistically significant impact of health insurance in reducing the impact of negative health outcomes on income in China. They attributed their findings to the absence of financial protection for some illnesses in the scheme in China. This implies that the mitigating impact of health insurance may

depend on the design and effectiveness of the scheme. Indeed, these findings from Lindelow and Wagstaff (2005) are not completely unfounded as our results indicate that the mitigation effect of health insurance is limited.

The findings of our study, therefore, provide indications for the need to improve implementation effectiveness, sustain and scale up the NHIS. While the NHIS is considered the most important reform in the history of Ghana's health system, its implementation has faced several challenges. Apart from ensuring its effectiveness, policy makers should extend the membership of the scheme, especially to vulnerable populations. It is also important to note that while NHIS coverage provides financial risk protection to healthcare access, it does not provide solutions to challenges regarding physical access. Indeed, this may explain the lack of a significant impact on labour supply. Improving healthcare infrastructure to ensure proximity, especially to deprived communities, will help improve the impact of the scheme.

In sum, the limited statistical significance of the interaction term should not be seen as an indication of irrelevance of the scheme in Ghana. However, the lack of significant interactive effect should emphasize the need for reforms that will improve the effectiveness of the scheme. In recent years, policy makers have unanimously supported the need to reform the operations of the scheme with particular focus on finding lasting solutions to the financial challenges. A national review commission was, therefore, formed to provide appropriate recommendations in reforming the scheme. Similar periodic reviews and reforms will be a step in the right direction in ensuring that the primary objectives of the scheme are achieved and maintained.

6. Conclusion

The study set out to examine how health insurance mitigates the impact of negative health outcomes on labour supply. To answer this question, we used data from the sixth round of the GLSS. The 2SLS technique was used to correct for endogeneity problems where they existed. The results suggest that average illness days had statistically significant impact on labour supply. However, for individuals with health insurance coverage, hours of work were lower in the face of an illness, relative to individuals without insurance coverage. This relationship was, however, only statistically significant for the rural and male samples. The findings support the need for policy makers to consider efforts to sustain and scale-up the NHIS in Ghana by addressing the various challenges of the scheme. Also, there is need to complement this programme with improved health infrastructure if significant impact is to be observed. While we used cross-section data to answer these questions, the study would have benefited from sufficient panel data to account for changes in health outcomes over time as well as endogeneity in the models. The absence of a panel data for Ghana limited our scope of analysis. Another limitation of the study was our inability to determine the sequence of events (occurrence of health shock and NHIS subscription). If individuals subscribe to the NHIS because they experience a negative health outcome, this may limit the validity of our interaction analysis. Unfortunately, we are unable to determine this sequence from the data used.

Notes

1 http://www.nhis.gov.gh/benefits.aspx (accessed 26th June, 2019).
2 The most recent publicly available official report of the NHIA was in 2013.
3 http://www.nhis.gov.gh/benefits.aspx (accessed 26 June 2019).
4 Using the exchange rate as at 16th April, 2020 (USD 1 to GHS5.83)
5 Detailed presentation of the framework is available in Chetty and Looney (2006) and summarized in Appendix 1.
6 See sixth GLSS report for further details about sampling procedure (Ghana Statistical Service, 2014).
7 https://www.graphic.com.gh/news/health/delay-in-nhis-claims-payment-affects-providers.html

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Appendix 1: Theoretical model

The study followed a static theoretical framework developed by Chetty and Looney (2006) to evaluate the marginal welfare gain from insurance following an income shock (such as poor health state). The starting point of the model is to assume an economic agent's utility over consumption given as *u(c)*. Let the disutility of obtaining *$c* of consumption be given by a linear function:

$$\psi(c) = \theta c \quad (1)$$

The authors noted that a negative health shock could be modelled in this framework as an increase in θ, which makes positive economic outcome more difficult. In a good health state, θ captures the disutility of effort required to generate more income under normal conditions. In a bad health state, θ rises because more costly activities (such as reducing human capital and health investments) are required to generate $c of consumption.

Let θ_g and θ_b represent good and bad health states, respectively, such that $\theta_b > \theta_g = 1$. This normalization implies that θ_b can be interpreted as how much more difficult it is to earn income in the bad state than the good state. For example, $\theta_b = 2$ implies that the disutility of generating consumption is doubled in the bad state. Let *p* denote the probability that a bad health state occurs while c_g and c_b denote consumption in good and bad state respectively. Consumption will differ in the bad and good states depending on whether insurance markets are complete or not. An insurance programme that raises c_b by $1 must lower c_g by $\frac{p}{1-p}$. The marginal welfare gain ($\tilde{w}$) from such programme is given as:

$$\tilde{w} = pu'(c_b) - (1-p)\frac{p}{1-p}u'(c_g) = p\left(u'(c_b) - u'(c_g)\right) \quad (2)$$

Equation 2 can be expressed in money metric terms by normalizing the welfare gain measure by the welfare change from a $1 increase in consumption in the good state. The welfare gain from social insurance relative to an increase in income in the good state is proportional to:

$$w \propto \frac{u'(c_b) - u'(c_g)}{u'(c_g)} \tag{3}$$

Taking a Taylor approximation to the utility function, Equation 3 can be expressed as:

$$w \approx -\frac{u''(c_g)}{u'(c_g)}\left(c_g - c_b\right) \tag{4}$$

$$w = \gamma \frac{\Delta c}{c} \tag{5}$$

where $\frac{\Delta c}{c} = \frac{c_g - c_b}{c_b}$ is the average observed consumption drop and $\gamma = \frac{u''}{u'} c_g$ is the coefficient of relative risk aversion. This implies that the marginal welfare gain from $1 of insurance (or, conversely, the marginal welfare cost of an income shock) depends on the size of consumption fluctuation ($\frac{\Delta c}{c}$) and the utility value of having a smoother consumption path (ɣ).

To further explore the welfare gains from insurance expressed in Equation 5) suppose an agent with CRRA utility over consumption in each state as follows:

$$u(c) = \frac{c^{1-\gamma}}{1-\gamma} \tag{6}$$

In this case, the individual chooses consumption in each state by solving:

$$\max_c \frac{c^{1-\gamma}}{1-\gamma} - \theta c \tag{7}$$

Hence, by taking the first order condition and equating to zero, we have:

$$c^*(\theta) = \theta^{-1/\gamma} \tag{8}$$

The change in consumption from the good health state to the bad state is, therefore:

$$\frac{\Delta c}{c} = \frac{c_g - c_b}{c_g} = 1 - \left(\frac{1}{\theta_b}\right)^{1/\gamma} \tag{9}$$

Equation 9 suggests that $\frac{\Delta c}{c}$ is decreasing in ɣ and increasing in θ.

This implies that risk averse individuals (ɣ is high) are likely to take insurance to reduce welfare loss (negative economic outcome) in the event of a serious negative health shock (θ is high).

Appendix II: First stage regression results

	nNHIS	sdaysnhis	nNHIS	sdaysnhis
NHIS exemption	0.716***	-0.378***	0.669***	-0.396***
	(0.010)	(0.035)	(0.018)	(0.045)
Number of sick days	-0.052***	1.395***	-0.061***	1.098***
	(0.012)	(0.032)	(0.017)	(0.035)
Household size	0.413***	0.526***	0.406***	0.508***
	(0.006)	(0.015)	(0.010)	(0.019)
Sex of household head	-0.107***	-0.001		
	(0.032)	(0.069)		
Age of household head	0.008***	0.011***	0.005***	0.007***
	(0.001)	(0.002)	(0.001)	(0.002)
Primary education	0.255***	0.218**	0.139**	0.158
	(0.041)	(0.109)	(0.056)	(0.100)
Secondary education	0.583***	0.536***	0.395***	0.540***
	(0.037)	(0.095)	(0.053)	(0.095)
Tertiary education	0.810***	0.633***	0.411***	0.665***
	(0.068)	(0.133)	(0.133)	(0.236)
Central	-0.379***	-0.750***	-0.282***	-0.356**
	(0.060)	(0.137)	(0.084)	(0.149)
Greater Accra	-0.198***	-0.439***	-0.066	-0.250
	(0.058)	(0.117)	(0.085)	(0.154)
Volta	0.022	0.046	0.098	0.007
	(0.062)	(0.154)	(0.088)	(0.156)
Eastern	0.167***	0.363***	0.283***	0.577***
	(0.059)	(0.137)	(0.086)	(0.153)
Ashanti	0.214***	-0.142	0.208**	0.136
	(0.057)	(0.124)	(0.082)	(0.146)
Brong Ahafo	0.585***	0.375***	0.643***	0.661***
	(0.060)	(0.139)	(0.088)	(0.157)
Northern	0.127**	-0.019	0.214*	0.114
	(0.062)	(0.158)	(0.117)	(0.208)
Upper East	1.083***	1.194***	0.942***	1.033***
	(0.063)	(0.183)	(0.097)	(0.174)
Upper West	1.028***	0.774***	0.810***	0.874***
	(0.064)	(0.202)	(0.106)	(0.190)
Number of sick days # NHIS		0.982***		1.003***
Exemption		(0.021)		(0.025)
Rural location				-0.232***
				(0.078)
Constant	-0.718***	-2.358***	-0.442***	-1.938***
	(0.073)	(0.178)	(0.108)	(0.195)
Observations	16735	7431	4717	4717
R-Squares				

Standard errors in parentheses $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Source: Produced by the authors using GLSS 6 Data.

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