The Incidence of Health Shocks, Formal Health Insurance, and Informal Coping Mechanism

By Samuel Amponsah*

In recent years, both theoretical and empirical research has been accumulated in development economics regarding the household behaviour in response to shocks in developing countries. Especially the impact of weather-related shocks such as droughts/floods and the efficiency of informal mechanisms to cope with these shocks are explored in depth in the literature. In sharp contrast, our knowledge on the economics of health shocks in low-income developing countries is rather limited. Few studies have documented that low incomes and poor health insurance coverage account for catastrophic medical expenditures in the event of a health shock. The current study uses different Ghanaian household survey datasets to examine the different coping mechanisms employed by uninsured household to protect themselves from incidence of health shocks. It explores the impact of formal health insurance (the National Health Insurance Scheme (NHIS)) on households out-of-pocket (OOP) spending and catastrophic health expenditure.

In recent years, both theoretical and empirical research has been accumulated in development economics, regarding the household behaviour in response to shocks in developing countries (Dercon 2005; Kurosaki 2009). Especially the impact of weather-related shocks such as droughts/floods and the efficiency of informal mechanisms to cope with these shocks are explored in depth in the literature. In sharp contrast, our knowledge on the economics of health shocks in low-income developing countries is rather limited. Among the few important studies, Berki (1986), Wyszewianski (1986) and Russell (2004) have documented that low incomes and poor health insurance coverage account for catastrophic medical expenditures in the event of a health shock. The cost of required healthcare sometimes absorb a large share of the household budget as it requires the sacrifice of current consumption and/or leaves a long-term welfare consequence due to borrowing or depleting assets to pay for health. Poor households tend to employ these different but limited informing coping mechanisms because full insurance is often not accessible. For example, on the one hand, Leive and Xu (2008) demonstrate that coping with health care payment through borrowing and selling of assets is common in many African countries. Their estimates ranges from 23 percent of households in Zambia to 68

* Amponsah: Institute for International Strategy Tokyo International University 1-13-1 Matoba-kita, Kawagoe, Saitama 350-1197,Japan, email: samponsa@tiu.ac.jp, mobile: +818050737341

percent in Burkina Faso. On the other, Kurk, Goldmann and Galea (2009) show that the extent of informing coping is not limited to Africa, their work on hardship financing that covered more than half of the global population, revealed that 22 percent of households borrowed to cope with the cost of illness.

The literature on health shocks and coping mechanisms show informal coping mechanisms employed by households to mitigate cost of illness can have implications for both transient poverty and long-term poverty traps if households are resource and credit constraint. In fact, if health payments are financed out of current income, but smoothing is imperfect, this may lead to increased transient poverty. However, in situations where health payments cannot be completely financed through current income, informal coping strategies, such as depletion of assets and buffer stocks, or utilization of social networks that leads to more debt can have long-term negative effects for the households income generating capacity and their ability to cope with future shocks (De Weerdt and Dercon 2006). Moreover, when households are faced with covariate shocks and chronic illness, coping mechanism become less effective and informal insurance fails (see, Gertler and Gruber 2002). In effect, some households may be forced to forgo treatment altogether because of lack of assets and social network, which may have long-term consequences through reduced health and depreciation of human capital.

These factors have generated public interest in national health insurance schemes that can be effective in protecting poor households against health shock. The empirical literature on the effect of formal health insurance on household welfare estimates either on out-of-pocket (OOP) and catastrophic healthcare spending (Wagstaff and Pradhan 2006; Wagstaff et al. 2009; Sparrow, Suryahadi and Widyanti 2013; Limwattananon et al. 2013), utilization of health services, including both outpatient and in-patient care (Trujillo, Portillo and Vernon 2005; Giedion 2007; Wagstaff and Lindelow 2008; Wagstaff et al. 2009; Wagstaff 2010; Amponsah 2013), or health outcome (Wagstaff and Pradhan 2006). Wagstaff and Pradhan (2006) examine the effect of Vietnam's social health insurance that was introduced in the 1990s on OOP and catastrophic health spending. They find that the introduction of the social health insurance in the country led to decreased OOP and catastrophic health spending, increased health care utilization, and improved health outcomes. One major conclusion of their study was that by reducing financial risk, households had to rely less on coping mechanisms such as savings. In contrast, Wagstaff (2010) find no impact of Vietnam's recent health care fund for the poor on utilization, although there is evidence to suggest that it has reduced OOP health spending. In similar analyses, this time in rural China, Wagstaff et al. (2009) find positive effect of a voluntary health insurance scheme on utilization of health services between 2003 and 2005, but find no effect on OOP health spending. However, for urban China, Wagstaff and Lindelow (2008) find that health insurance has contributed to an increase in OOP spending and catastrophic payments, which

according to the authors can be attributed to increased utilization and behavioural responses by health care providers. Sparrow, Suryahadi and Widyanti (2013) investigate targeting and impact of Indonesia's *Askeskin* programme using panel data and applying difference-in-differences estimation in combination with propensity score matching. They find that social insurance have improved access to health care through increased utilization of outpatient among the poor, while OOP spending seems to have increased for *Askeskin* insured urban areas. Limwattananon et al. (2013) using different cross-section data and difference-in-differences estimation method measured the impact of health care and household OOP medical expenditure of a major health insurance reform in Thailand. While finding that the reform reduced the likelihood that someone goes without formal treatment when sick by 11 percent, it also increased inpatient admission by 18 percent and reduced mean household medical expenditure by more than 10 percent. Trujillo, Portillo and Vernon 2005 and Giedion 2007 find evidence of increased healthcare utilization in Colombia due to subsidized health insurance for the poor. In Ghana, Amponsah (2013) shows that the introduction of the NHIS increased health care utilization of insured households, while Nguyen, Rajkotia and Wang (2011) find a positive financial protection effect of health insurance in Ghana. However, their study did not aim to discuss whether the introduction of health insurance alters the coping strategies employed by households.

Scholars to date have made progress in analysing and quantifying the effect of health insurance on healthcare utilization and outcomes, however, little is known about the extent to which formal health insurance reduces vulnerability to health shocks in the sub-Saharan Africa (SSA) region, where formal health insurance is hardly accessible. And even when health insurance is accessible, the lack of accurate data make it extremely difficult to conduct a study that aims at examining the impact of health insurance and/or anticipatory coping practices employed by households who experience health shocks. The objective of this paper is to empirically evaluate whether formal health insurance reduces OOP expenditures, and also examine whether it changes the informal coping mechanisms used by households.

The rest of the paper is structured as follows. The next section describes the data used for the analysis. Section II describes the empirical approach used. Section III presents the results, whilst section IV discuses the results and policy implications. Section V carries the concluding remarks to the study findings.

I. Data

A. Ghana Living Standards Survey Microdata

This analysis draws on various rounds of the Ghana Living Standards Survey (GLSS), conducted by the Ghana Statistical Service (GSS). In particular, we use the GLSS Rounds 4 to 6. Beginning September 1987, Ghana with the assistance of the World Bank, has conducted surveys of living standards of nationally representative samples of households at regular intervals.

GLSS1 was conducted in 1987/88, GLSS2 in 1988/89, GLSS3 in 1991/92, GLSS5 in 1998/99 and covered the entire country with a sample of 5,998 households; GLSS5 was conducted in 2005/06, covered the entire country and had sample size of 8,687 households while GLSS6 was conducted in 2012/2013, covered the entire country with a sample size of 16, 772 households. It bears to note that each succeeding round of the GLSS covered more households as well as provided more detailed information about the living standards of the Ghanaian households than the previous ones. These detailed information include those on the socioeconomic status and demographic background of households, self-reported incidence of illness or injury, health care utilization, participation in NHIS or private mutual health insurance scheme. The surveys also include a detailed expenditure module, for both food and non-food items.

Using the Rounds 4 to 6 we are able to investigate the pre-NHIS and post-NHIS information on households in terms of the various coping mechanisms used to finance OOP spending. Our analysis of health shock and catastrophic OOP is at the household level. The GLSS reports household members usage of outpatient and inpatient services. The information on outpatient service and other informal services is from the question about whether an individual has experienced illness or injury during the two weeks preceding the survey, and also whether she/he has experienced hospitalization because of illness. For this analysis our measure for OOP payments for health care is defined to include all reported health expenditure (including health insurance premiums).

B. Incidence of Health Shocks

Households usually face different kinds of health shocks, and the impact of these health shocks are strongly affected by the variables used to identify them. Prior research on health shocks has identified major aspects of health shock to be used in studies of vulnerability (Gertler and Gruber 2002). While each illness may pose a potential risk for households, the fundamental criteria for measuring the health shock is that it should be major, and not simple minor illness. However, for the measured health shock variable to be valid, it is required that assessment of the health shock be the same across units in the sample and not subject to cultural conditioning that is likely to be found in self-assessment of health (Bales 2013).

In this study, three different health measures are provided with two of these measures identified as health shock variables. The first is self-reported health status (illness), which was obtained from Section 3A question one of the GLSS questionnaires. The question identifies whether a household member suffered illness or injury in the 2 weeks preceding the survey. As shown in Table 1, on average, roughly 64 percent of households reported illness in 1998/99, compared to about 52 percent in 2005/06, and about 38 percent in 2012/13/12. For the survey years 2005/06 and 2012/13, illness events were common among the insured households than the unisured households. The figures in the table show that in

2005/06, 56 percent of insured households reported illness, while about 42 percent did same in 2012/13. On the other hand, for the uninsured households, 51 percent reported illness in 2005/06, while only 30 percent did same in 2012/13/2013.

The two health shock variables are "member illness" and "member hospitalization". The former is defined as the household reporting that one or more household members usual activities were stopped due to illness or injury for 10 or more days, while the later is defined as the household reporting that one or more household members were hospitalized for 3 or more days on account of the illness or injury suffered. The information on member illness is routed through a question about whether an illness or injury has caused a household member to stop the usual activities because of his/her condition, and that on member hospitalization is also routed through a question on how many nights a household member stayed in a hospital or health facility over the preceding 12 months. Although the GLSS do not capture the explicit criteria about severity of illness, the duration of illness and hospitalization help to ensure that these measures are more comparable across survey units than self-reported illness.

Table 1—Descriptive Statistics on Incidence of Health Risk

	Survey Year					
	1998/99		2005/06		2012/13	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Health Shocks						
Reported illness	0.644	0.479	0.524	0.499	0.382	0.486
Member illness	0.131	0.338	0.105	0.306	0.074	0.263
Member hospitalization	0.020	0.141	0.017	0.137	0.016	0.124
			Uninsured			
			2005/06		2012/13	
			Mean	Std. dev.	Mean	Std. dev.
Reported illness			0.515	0.500	0.304	0.460
Member illness			0.103	0.304	0.048	0.214
Member hospitalization			0.017	0.128	0.009	0.093
			Insured			
			2005/06		2012/13	
			Mean	Std. dev.	Mean	Std. dev.
Reported illness			0.561	0.496	0.419	0.394
Member illness			0.110	0.312	0.087	0.281
Member hospitalization			0.020	0.140	0.019	0.135

Note: This table presents the descriptive statistics on household reported illness, and the two health shock variables used in this study.
Source: Author's analysis based on GLSSs 1998/99 – 2012/13 household cross-section.

Following Bales (2013) who used a threshold of 14 days to measure health shock, this study used a threshold of 10 days of member illness and 3 days of member hospitalization because we assume that in the case of Ghanais these two thresholds are huge enough to cause catastrophic health expenditure for a

household.[1] Table 1 show that in 1998/99, a little over 13 percent of households reported member illness, compared to about 11 percent in 2005/2006, and roughly 7 percent in 2012/13. On member hospitalization, overall , only about 2.0 percent of households faced member hospitalization in both 1998/99 and 2005/06, relative to 1.6 percent in 2012/13/2013. The figures also show that the insured are more likely to report both member illness and member hospitalization.

C. Coping Mechanisms

Households rely on different coping mechanisms to fend off external shocks such as a health shock, many of these coping mechanisms including savings and loans have been identified in the literature (Flores et al. 2008; Leive and Xu 2008; Bales 2013). Fortunately, information on some of these identified coping mechanisms are available in the GLSS data, hence, they can be proxied for the present analysis. The GLSSs also provide information on financiers of medical bills including outpatient and inpatient usage. To give a sense of time-series

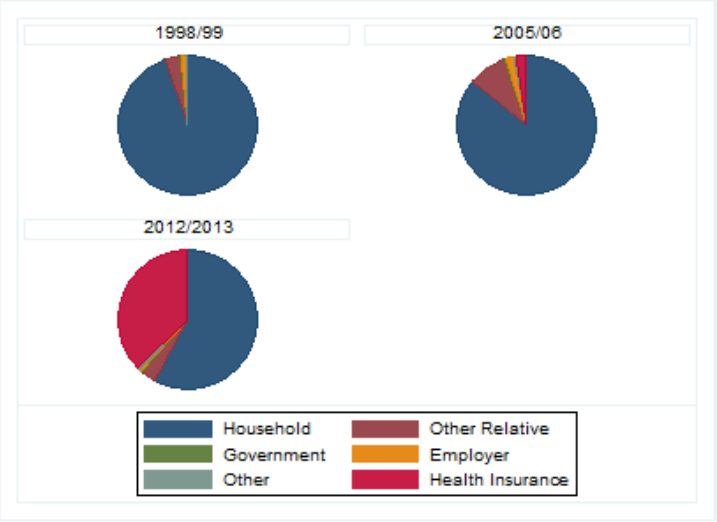

Figure 1. Distribution of Medical Bill Financiers 1998/99 – 2012/13

Note: This figure plots a bar chart of the distribution of financiers of medical bills including cost of outpatient and inpatient admissions.

variation in the distribution of these medical bill financiers over the three survey periods, Figure 1 shows the distribution in each year. The figure shows large change in 2012/13. Before the introduction of NHIS, and even when the scheme started its operations in earnest in 2005, the burden on household head and

[1]Although in the case of Bales (2013), a thresholds of 14 days was used, the data on OOP show that 10 days of bedridden and 3 days of hospitalize may cause a health shock that is strong enough to send the household into vulnerability.

other relatives was extremely high (close to 99 percent) in 1998/99 and (about 95 percent) in 2005/06. However, Figure 1 shows that health insurance has taken almost 40 percent of this burden, leading to a decline in the burden on households (stands at about 56 percent) in 2012/13. Summary statistics on the various coping mechanisms employed by households to finance their medical bills (OOP) are presented in Table 2. These include the use of loans, self-reported dissaving, and remittance. Information on household borrowing was used to create two variables indicating other loan and loan from relatives. The self-reported dissaving variable was created using information on household withdraws from their savings account (including informal savings called Susu). Unearned income includes incomes from formal transfers from central government (social security, state pension, others), and income from other sources such as dowry or inheritance. Informal transfers covered include remittances from relatives and others. Finally, we include in the table information on insured households for the 2005/06 and 2013–13 survey years. All the coping variables with the exception of remittance and unearned income are in the form of dummy variables indicating the presence or absence of insurance, pension, debt, or dissavings.

Table 2—Descriptive Statistics on Coping Mechanisms

	Survey Year					
	1998/99		2005/06		2012/13	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Financier of Medical Bills)						
Household Member (= 1)	0.946	0.226	0.858	0.349	0.580	0.493
Other family(= 1)	0.034	0.180	0.090	0.286	0.032	0.175
Government (= 1)	0.003	0.050	0.005	0.073	0.003	0.059
Employer (= 1)	0.013	0.114	0.017	0.130	0.007	0.085
Other (= 1)	0.005	0.067	0.006	0.079	0.004	0.063
Health Insurance (= 1)			0.024	0.151	0.374	0.484
Use of Coping Mechanism						
Health Insurance (= 1)			0.199	0.399	0.682	0.466
Health Insurance (benefits = 1)			0.048	0.215	0.630	0.483
Pension	0.054	0.225	0.094	0.291	0.107	0.309
Loan from family(=1)	0.363	0.481	0.275	0.447	0.090	0.286
Other loans (=1)	0.160	0.367	0.134	0.341	0.081	0.273
Overall Dissaving (=1)	0.255	0.436	0.900	0.299	0.862	0.345
Reported dissavings (=1)	0.077	0.267	0.258	0.437	0.157	0.364
Remittance (=1)	0.394	0.350	0.477	0.437	0.322	0.467
Value(Ghana Cedis)						
Per capita remittance income	9.62	39.38	35.47	118.04	135.76	783.46
Unearned Income	1.59	11.57	5.47	147.57	45.49	686.68

Note: The means and standard deviations are based on household level data for all years. All monetary values are in April 1999 prices, per capita terms.
Source: Author's analysis based on GLSS4 to 6.

The most striking fact on copping revealed from the table is that the number of households who reported taking loans from relatives has reduced drastically

from about 36 percent in 1998/99 to roughly 9 percent in 2012-13. Similarly, the number of households who reported taking loans form other sources has also reduced from 16 percent to 8 percent. This is consistent with the fact that about 10 percent of loans taken by households in each of the three survey years was for emergency situation, which includes payment of medical bills. Another notably observation from the table is the decline in household self-reported dissaving. In 1998/99, household self-reported dissaving stood at about 8 percent, this figure increased to roughly 26 percent in 2005/06, but declined to 16 percent in 2012/13.

The analysis on participation in formal health insurance scheme shows that in 2005/06 about 18 percent of households were covered by the NHIS, compared to 51 percent of households in 2012/13. Further probe of the information on health insurance coverage shows that in 2005/06, all the insured individuals were members of the District mutual health insurance scheme under the NHIS, however, in 2012/13, we found that about 1 percent of the insured belongs to the Private mutual health insurance schemes and other private health insurance companies. Among the insured households, the table shows that only about 5 percent benefited from the scheme in 2005/06, relative to about 63 percent in 2012/2013.

D. Other Covariates

The key variables of interest are the coping mechanisms variables discussed above, however, time variant explanatory variables that could potentially confound the OOP expenditure and health insurance relationship have been obtained from the dataset to serve as controls. In addition to household demographic variables such as age, gender, and education of level the household head, the covariates include number of adults aged 70, number of children below 18 years, household size, and number of household members within the health insurance premium paying age in a household. Socio-economic variables include poverty status of household, number of adult members in formal work, and pension status. Preventive health and community-level variables include access to quality drinking water, source of lighting, type of household dwelling, and value of remittance into the household, as well as social network (in-migrant and return migrant).

Table A2 presents pre-and post-NHIS summary statistics of OOP health expenditure and other covariates discussed above for all households (pre-NHIS sample), and by insurance status for the post-NHIS sample.

II. Empirical Approach

A. Impact of Coping Mechanisms on those in need of financial protection

The starting point of our empirical anaysis is to derive the OOP spending of households. The literature on catastrophic OOP payments shows that the variation in OOP health spending may not reflect difference in exposure to adverse health shocks; but rather it is likely to reflect a combination of health care needs and affordability (Sparrow, Suryahadi and Widyanti 2013). Hence,

this study considers the potential exposure to idiosyncratic health spending events in terms of the expected OOP payments one would require in order to obtain some reference level of health care. Using a model proposed by Pradhan and Prescott (2002) and cited in Sparrow, Suryahadi and Widyanti (2013) we derive the distribution of expected required OOP payments from the observed distribution, given a demographic profile of households as followed:

$$OOP_i = E(OOP|D_i, H_i, PCE = q^{75}, L = Accra) \tag{1}$$

where OOP is the expected required OOP health spending for a household, given its demographic characteristics (D), health status (H), but with a level of wealth (PCE) of the 75th per capita expenditure percentile, and facing health care supply found in Accra. As explained in Sparrow, Suryahadi and Widyanti (2013), the choice of expenditure reference point is arbitrary, and considering the fact that households in Ghana spend roughly a little over 2 percent of the total expenditure on health, we choose the 75th percentile as we assume that this is the level of wealth at which health care needs can be met. Accra is chosen because it has the most comprehensive health care supply in Ghana. It should be mentioned that because this predicted OOP spending cannot be interpreted independently, it merely used as a relative measure. Using a tobit specification, we regress actual pre-NHIS per capita household OOP spending on in 1999 on per capita household expenditure, household size, the member illness indicator, indicators for household composition (children below 18 years of age, adults aged 70, and household members between 18 and 69 years), and locality dummy.

B. Impact of Formal Insurance and Informal Coping Mechanisms on Health Care Spending

As discussed above, the objective of this study is to evaluate the impact of formal health insurance and informal coping mechanisms on access to health care, in terms of OOP spending, budget shares and incidence of catastrophic expenditure. Catastrophic health expenditure is defined as OOP spending that exceeds a selected threshold. Following the practice in the existing literature, we used three different thresholds, i.e., expenditures that exceeds one of the following three thresholds: 2.5 percent of non-food consumption expenditure, 5 percent of non-food consumption expenditure, and 10 percent of non-food consumption expenditure. The non-food consumption expenditure is used because it is believed that the poor are the most vulnerable, therefore, any amount of health expenditure required of them is catastrophic. For the poor households who struggle to meet their daily consumption needs, an extract expenditure demand of even 1 percent is considered severe enough to constitute catastrophic health expenditure.

To identify the impact of the different coping mechanisms as well as formal health insurance on our dependent variable, we exploit the there different

cross-sectional data discussed above. The GLSS 4 was conducted before the start of the NHIS, hence providing a baseline. One of the most appropriate estimation techniques usually employed for this kind of analysis is difference-in-difference (DID) approach. Unfortunately, we do not have information on insured households in our baseline sample that could allow us to perform an effective DID estimation.

In this instance, a Two-Part model (2PM) is considered. Notably, a limited dependent variable like OOP expenditure is continues over most of its distribution but has a mass observation at one or more specific values, such as zero. For example, the proportions of households without OOP expenditure the three survey years are 22 percent, 20 percent and 44 percent, respective. In order to accommodate the feature of zero values in the observed OOP expenditure data, two-stage estimation procedures, such as the 2PM, are frequently employed. Notably, this comprises a probit model for the probability that an individual makes any OOP on health care (equation 2) and OLS, applied only to the subsample with nonzero expenditures, to estimate correlates of positive level of expenditure (equation 3. This expectation, $E[ln(y_{ht})|y_{ht} > 0]$, is modelled under the linear regression model, and it is estimated using Ordinary Least Square.

$$Pr[y_{it} > 0] = \Phi\{\alpha + HI_{it}\beta + Z_{it}\eta + X_{1it}\delta + \nu_{it}\} \tag{2}$$

$$E[ln(y_{it})|y_{it} > 0] = exp\{\gamma + HI_{it}\varphi + Z_{it}\lambda + X_{it}\psi + \epsilon_{it}\} \tag{3}$$

The subscripts i and t denote the individual household and survey year, respectively. Φ represents the standard normal cdf. The log of positive OOP expenditure, $ln(y_{it})$ is modelled at the household level. The coefficients of interest are β, η, φ and λ. Furthermore, α and γ denote constant terms, HI_{it} represents the number of household members insured, while Z_{it} is a vector of informal coping covariates (i.e, loan from a relative, any other loans, dissaving and remittance). X_{it} is a vector of exogenous covariates comprising household head characteristics, household characteristics, and other policy variables, with δ and ψ being the corresponding vector of coefficients, ν_{it} and ϵ_{it} are the stochastic terms.

In estimating this second model, we consider potential confounding time variant unobservables, which if ignored may lead to a biased estimates. Analysis of the impact of health insurance generally suffers from endogeneity, in which an unobserved health shock would affect the demand for health services and the likelihood of a household purchasing health insurance for a member. In this situation, failure to control for omitted variables will lead to overestimation of the health insurance effect. One approach to cope with omitted variables is to

use instrumental variables estimation method, however, in reality instruments are readily available. To control for health status we include the member illness variable in the regression.

III. Empirical Results

A. OOP Payments in Ghana

Table 3 presents the actual annual per capita health expenditure as the share of total per capita households expenditure. The table also show the annual per capita health expenditure as share of non-food expenditure for comparison because studies have shown that the family burden of OOP payments on household budgets may be better reflected by the share of non-food expenditure (Wagstaff and Van O'Donnell 2003). Some interesting observations emerged from Table 3.

Table 3—Distribution of Actual Out-of-Pocket Expenditure Shares and Incidence of Catastrophic Payment (percentages)

	share of total consumption expenditure			share of non-food consumption expenditure			Catastrophic health payment		
	1998/99	2005/06	2012/13	1998/99	2005/06	2012/13	1998/99	2005/06	2012/13
Extreme Poor	2.16	1.32	0.82	4.33	2.35	2.23	8.71	3.88	5.70
familyPoor	2.27	1.56	0.98	4.44	2.80	2.63	6.78	5.22	6.94
Non-poor	1.83	1.33	0.97	3.83	2.56	2.29	7.43	4.34	5.27
Urban	1.82	1.21	1.14	4.02	2.36	3.04	7.81	3.93	7.73
Rural	2.02	1.44	0.83	3.98	2.70	1.74	7.51	4.68	3.66
Total	1.94	1.34	0.97	3.99	2.55	2.32	7.63	4.36	5.47

Note: Catastrophic spending on health care is defined as out-of-pocket health expenditure exceeded 10 percent of household non-food expenditure.
Source: Author's analysis based on GLSS4 to 6.

Before the introduction of the NHIS in Ghana, households in the country allocate on average about 2 percent of their annual total expenditures to health care, with higher OOP payments observed for the poor and households in rural areas. In 1999 the share of OOP payments in total households consumption expenditure was 2.16 for the extreme poor and 1.83 for the non-poor. Although in terms of differences in affordability of care and the propensity to spend between the extreme poor and non-poor, the opposite was expected as was found in Indonesia (Sparrow, Suryahadi and Widyanti 2013). In the case of Indonesia, the share of OOP payments in total spending was highest among the richest quartile. These patterns of OOP payments show that before the introduction of formal health insurance in Ghana, the burden on the poor households in terms of health care expenditure was very serve, it was a little bit pro-poor than what was observed in Indonesia. The incidence of catastrophic health expenditure shows that in 1999 about 9 percent of the extreme poor had

OOP health expenditure that exceeded 10 percent of the household's non-food expenditure budget.

Table 4—Distribution of Predicted Out-of-Pocket Expenditure Shares and Incidence of Catastrophic Payment (percentages)

	share of total consumption expenditure			share of non-food consumption expenditure		
	1998/99	2005/06	2012/13	1998/99	2005/06	2012/13
Extreme Poor	2.57	1.39	1.61	5.36	2.58	4.35
familyPoor	2.01	1.25	1.07	4.11	2.45	3.42
Non-poor	1.61	1.41	1.02	3.49	2.32	2.62
Urban	1.80	1.17	1.06	4.13	2.36	3.42
Rural	1.86	1.19	1.02	3.81	2.35	2.30
Total	1.84	1.17	1.03	3.92	2.35	2.80

Note: Predicted out-of-pocket health expenditures are based on tobit estimates reported at the appendix. The tobit linear predictions are truncated at a lower bound of zero, with per capita expenditure fixed at the 75th percentile and location at Accra.
Source: Author's analysis based on GLSS4 to 6.

Table 3 reports the predicted annual per capita health expenditure as the share of total per capita households expenditure for comparison. Compared to the actual OOP expenditures, the expected OOP requirements show a little improved more pro-poor distribution. In 2012/2013, OOP expenditure for a household from the extreme poor to obtain a required level of healthcare would account for about 1.61 percent of total household budget and 4.35 percent of the non-food budget on average. For the non-poor households, this is 1.02 percent and 2.62 percent. Expected required OOP expenditure relative to non-food expenditure is about 48 percent higher for households in urban areas as compared to households in rural areas. After having controlled for regional price difference as well as rural-urban locality in the regression, it is plausible that this difference is likely due to differences in household composition, with urban households having a demographic profile that demands relatively more healthcare services.

B. Impact of Informal Coping Mechanisms on OOP Payments: Pre-NHIS Era

Table 5 presents the regression results from the 2PM for the pre-NHIS survey year, while Table 6 reports the results for the post-NHIS survey years . To focus on the salient results for the key attributes of interest, we refrain here from reporting the estimation results of the first-stage Probit models, and instead present the combined marginal effects of key variables of interest. These key figures of interest are those for "informal coping mechanisms (loan from familymember, any other loan, and reported dissaving)" on OOP expenditure. Columns (1) and (2) present the benchmark result based on equation 2 for all

the sample. Column (1) omits health status (member illness) variable while Column (2) controls for this variable. Columns (3), and (4) report the results for poor and non-poor households, respectively. All models include household characteristics presented in Table A2, namely head's age, gender, household size, education, migration status, dwelling, source of water and lighting as well as locality variable. The standard errors of the marginal effects are calculated by applying the Delta method, which uses a first Taylor expansion to create a linear approximation of a non-linear function.

Turning first to the pre-NHIS model, the associated combined marginal effects of the 2PM indicate that almost all the informal coping variables are in the expected direction. The effects of loan from familymember, any other loan, and reported dissaving as well as remittance are all strong and their signs, as expected are positive. The results indicate that before the introduction of the NHIS, household faced with OOP expenditure would likely have to depend on some of the aforementioned coping mechanisms to finance health care. Columns (1) and (2) show that the marginal effects of all the coping variables

Table 5—Estimated Average Marginal Effects of Coping Mechanisms on OOP expenditure for 1998/99

	OOP expenditure per capita			
	(1)	(2)	(3)	(4)
Reported illness (=1)	—	1.848***	0.675***	1.965***
		(0.143)	(0.067)	(0.216)
Loan from family(=1)	0.714***	0.685***	0.393***	0.463**
	(0.132)	(0.132)	(0.080)	(0.199)
Other loans (=1)	0.839***	0.809***	0.340***	0.587**
	(0.151)	(0.150)	(0.095)	(0.216)
Reported dissaving(=1)	0.596***	0.305*	0.064	0.552**
	(0.183)	(0.181)	(0.097)	(0.271)
Remittance	0.035**	0.032**	0.023**	0.038*
	(0.014)	(0.005)	(0.009)	(0.021)
Household Characteristics	Yes	Yes	Yes	Yes
Observation	5,998	5,994	1,840	4,099

Note: This table shows combined marginal effect estimates of η and λ from equation (2) and equation (3) in the text using as dependent variable the log of OOP expenditures. Each column presents results from a separate regression for the total sample without health status indicator, total sample with health status indicator, for the poor, and non-poor households, respectively. We control for households characteristics, which include age age squared, gender, household size, education, migration status, dwelling, source of water and light as well as locality variable. Standard errors are robust.

∗ ∗ ∗ Significant at the 1 percent level.
∗∗ Significant at the 5 percent level.
∗ Significant at the 10 percent level.

are higher when negative health status indicator is not controlled for, suggesting

that the derived estimates could be on the upper bound if poor health status has not been fully controlled.

Borrowing was found to be important means for household to cover their OOP expenditures. Specifically, the results suggest that in 1998/99, each unit increase in OOP spending was associated with 0.68 increase in borrowing. This varies between the population groups, while the significance level of borrowing was higher for households classified as poor than those classified as non-poor, the magnitudes are higher for non-poor households. In addition, the poor seemed more likely to borrow from family members than non-family members, while the non-poor seemed more likely to borrow from non-family members than family members.

Dissaving reported by households was significant and positive in the initial model without health status variable. But when the health status is included in the model it became less significant (i.e., in the Column (2) it was significant a the 10 percent level, insignificant in Column (3), and significant at the 5 percent level in Column (3)). This suggest that pre-NHIS period, dissaving reported by households did not appear to be important coping mechanism for the poor.

Remittances from non-family members of households did prove to be an important source of financing OOP expenditure. Although small, the marginal effects of remittance for poor was significant at the 5 percent level, while that of the non-poor was significant the 10 percent level. An increase in remittance by GHS1 per year into a households increases her chance of being able to finance her OOP expenditure by 0.032, to put it differently, this results suggest that remittance is able to finance just about 1.3 percent of household health expenditure in a year–if we consider an average per capita expenditure of 2.57 in 1998/99.

C. Impact of Formal Health insurance and Informal Coping Mechanisms on OOP Payments: Post-NHIS Era

The second question in this study is whether the introduction of formal health insurance reduces household OOP spending. This is of particular interest in development policy, as growing evidence shows that the the introduction of formal health insurance does not necessarily reduce households health expenditure. Turning to the post-NHIS ear, we incorporate formal health insurance variable into our model and evaluate its effect on households OOP expenditures, and also verify whether household informal coping mechanisms will change due to the availability of formal health insurance. This section reports the results of the 2PM based on equation (2) and equation 3 for the 2005/06 and 2012/13 survey years. Similar to the analysis in the preceding section, Table 6 panel A, Columns (1) to (2) present the results for overall sample without health status variable, overall sample with the health status variable controlled for, subsamples of poor households, and non-poor households, respectively for 2005/06.

As aforementioned, estimates from the GLSS5 data show that the health

TABLE 6—ESTIMATED AVERAGE MARGINAL EFFECTS OF INSURANCE AND COPING MECHANISMS ON OOP EXPENDITURE FOR 2005/06 AND 2012/13

	OOP expenditure per capita			
	(1)	(2)	(3)	(4)
Panel A				
2005/06				
member illness (=1)	—	5.280***	1.897***	7.601***
		(0.494)	(0.350)	(0.727)
Number of insured HH members	2.257***	1.867***	0.640***	2.465***
	(0.112)	(0.108)	(0.092)	(0.141)
Loan from family(=1)	3.610***	2.888***	0.621**	3.794***
	(0.463)	(0.417)	(0.129)	(0.572)
Other loans (=1)	2.853***	2.231***	0.454	2.711***
	(0.473)	(0.424)	(0.318)	(0.596)
Reported dissaving(=1)	7.423***	5.811***	1.558***	7.224***
	(0.401)	(0.359)	(0.239)	(0.502)
Remittance	0.071**	0.071**	0.027	0.081*
	(0.036)	(0.032)	(0.238)	(0.045)
Household Characteristics	Yes	Yes	Yes	Yes
Observation	8,687	8,687	2,092	6,595
	(5)	(6)	(7)	(8)
Panel B				
2012-13				
Member illness (=1)	—	17.1094***	3.733***	14.398***
		(2.568)	(0.933)	(2.274)
Number of insured HH members	-0.989***	-1.839***	-0.206***	-2.200***
	(0.238)	(0.199)	(0.078)	(0.292)
Loan from family(=1)	6.522**	5.119	2.739**	4.049
	(2.714)	(3.796)	(1.211)	(3.535)
Other loans (=1)	8.737***	9.258***	-1.284	7.821***
	(1.731)	(2.159)	(1.195)	(1.959)
Reported dissaving(=1)	-2.001	-1.301	-0.416***	-1.145
	(1.520)	(1.957)	(0.781)	(1.756)
Remittance	0.421***	0.420***	0.139**	0.373***
	(0.094)	(0.122)	(0.780)	(0.110)
Household Characteristics	Yes	Yes	Yes	Yes
Observation	16,772	16,772	4,014	12,758

Note: This table shows combined marginal effect estimates of β, η, φ and λ from equation (2) and equation 3) in the text using as dependent variable the log of OOP expenditures. Each column presents results from a separate regression for the total sample without health status indicator, total sample with health status indicator, for the poor, and non-poor households, respectively. We control for households characteristics, which include age age squared, gender, household size, education, migration status, dwelling, source of water and light as well as locality variable In panel A are the results for GLSS 5 and in panel B are results for GLSS 6Standard errors are robust.

∗ ∗ ∗ Significant at the 1 percent level.

∗∗ Significant at the 5 percent level.

∗ Significant at the 10 percent level.

insurance rate in 2005/2006 was 18 percent, and among the insured only about 5 percent of households said they have ever benefited from the NHIS. Incorporating the number of household members covered by formal insurance into our model, the findings for 2005/06 from Table 6 Panel A, Columns (1) to (4) show that health insurance effect is very significant, and the sign not as expected, positive (i.e., insurance has shown to increase OOP among the insured).

Conversely, the findings for 2012/13 in Panel B, Columns (5) to (8) of the same table suggest that the marginal effects of insurance are highly significant and the sign, as expected negative. Thus, formal insurance has been shown to reduce household OOP expenditures among the insured. This suggest that among households making some payment at the point of service delivery, mean per capita health expenditure for the insured is reduced by GHS1.73, or 6.9 percent. When same is considered for the subsamples of poor and non-poor households, we have a corresponding reduction of GHS0.19, or 3.3 percent for the poor, and GHS1.86, or 6 percent for the non-poor households.

It is noteworthy that in all the models, the incorporation of the health insurance variable hardly changed the significance of level of the four coping variables used in this study, suggesting that even after the implementation of formal health insurance–borrowing, dissaving, and remittances are stills being used as risk coping mechanisms.

For the overall sample, the likelihood of borrowing from family member in presence of OOP was positive and significant at the 1 percent level in 2005/06 and at the 5 percent level in 2012/13, with the magnitude been much more higher in the latter year. In 2005/06, the incidence of borrowing from family member increases with each unit increase in OOP by 0.62 to 3.79, and is much higher for the non-poor households. While in 2012/13, the incidence of borrowing from family members increases with each unit increase in OOP by 2.74 to 6.4, but this time it was not significant for the non-poor households, which indicators that loans from family members became less important for the non-poor.

Turning to any other loan, OOP significantly increases the likelihood of borrowing from other sources for the overall sample in both 2005/06 and 2012/13, but the magnitude was bigger for the non-poor than the poor households. As a matter of fact, for the poor, borrowing from other sources to cover medical expenditure became less important with a negative marginal effect in 2012/13, which seems to suggest that insurance has provide some kind of financial assistance for the poor, protecting them from borrowing from other sources to finance health care – to the extent that even if they do borrow from other sources, the money is channelled elsewhere instead of using it to finance their medical expenditure.

In contrast to the results present for the 1998/99 and 2005/06 survey, dissaving reported by households as a coping strategy became less important in 2012/2013. The marginal effects for the reported dissaving variables are

negative and insignificant, which could indicate that formal insurance is offering more financial protection for households in Ghana in terms of their medical expenditures.

Households reliance on remittance as a copping mechanism still remained important in 2012/13. The marginal effects on remittance are positive and significant at the 10 percent level for both the poor and non-poor households.

D. The Effect of formal Insurance on Catastrophic Payment

In this section, we present the results for the effect of formal insurance on catastrophic OOP payments. Table 7 shows the estimation results for the three catastrophic OOP expenditure measures used in this study. The results show that at the various threshold levels membership of health insurance is negatively associated with the probability of catastrophic OOP payments on health services. The marginal effects show a clear and consistent pattern across all the measures. Depending on the indicators, the probability of catastrophic health expenditure decreased by 0.6 percentage point (for expenditure of at least 10 percent non-food expenditure) to 1.4 percentage point (for expenditure of at least 2.5 percent of non-food expenditure) among the insured households, which translate to a reduction of 5.7 percent to 11.6 percent of the sample means (Table A2).

Table 7—Estimated Marginal Effects of formal Insurance on Catastrophic OOP Expenditure on Health, 2012/13

	OOP constitutes at least		
	2.5% of non-food expenditure budget	5% of non-food (expenditure budget)	10% of non-food expenditure budget
Reported illness (=1)	0.107***	0.083***	0.044***
	(0.015)	(0.012)	(0.007)
Number of insured HH members(=1)	-0.014***	-0.009***	-0.006***
	(0.002)	(0.002)	(0.001)
Loan from family (=1)	0.044*	0.006	-0.002
	(0.027)	(0.019)	(0.012)
Other loans (=1)	0.012	-0.002	0.004
	(0.015)	(0.012)	(0.008)
Reported dissaving (=1)	-0.002	-0.000	0.004
	(0.013)	(0.009)	(0.006)
Remittance (=1)	0.002**	0.002**	0.001**
	(0.001)	(0.002)	(0.000)
Rural	-0.081***	-0.061***	-0.029***
	(0.010)	(0.002)	(0.005)
Household Characteristics	Yes	Yes	Yes
Observation	16,772	16,772	16,772

Note: Each column report the estimated marginal effects of probability catastrophic OOP expenditure for the chosen threshold. Standard errors are robust.

∗ ∗ ∗ Significant at the 1 percent level.

∗∗ Significant at the 5 percent level.

∗ Significant at the 10 percent level.

Finally, also in Table 7, we consider the effect of locality on catastrophic

payment. Convincingly, rural residents were less likely to incur catastrophic payment. The effects for the rural areas can simply be explained by fact that public health centres dominate these areas, hence, the cost of seeking medical care might be less expensive than in the urban areas. Higher incidence of catastrophic health payments might exist in urban areas because in urban aears the availability of healthcare providers is more varied, health insurance premium and registration fees are much higher, and also it is possible that the price of health services is high too. The high catastrophic payment in urban areas suggests that the insured had to beat part of the cost of health care services.

IV. Discussion

It is evidently clear from our paper that the degree of health shock in Ghana has gradually decreased between 1998/99 and 2012/13. We have shown in this paper that in the pre-NHIS period, when faced with health shocks and for that matter health expenses, both the poor and non-poor households seem to employ similar coping mechanisms to mitigate OOP payments. Whilst the poor households rely more on borrowing (i.e., from family members and other sources), and remittances to pay for health treatment, the non-poor households use borrowing and dissaving as well as remittance (although the significance was just at the 10 percent level). Our findings reinforce earlier discussion and support findings from previous study that also noted that extreme poor and relative poor households rely more on borrowing to pay for health treatment cost (Leive and Xu 2008). Previous studies have shown that these kinds of coping mechanisms become less effective when treatment are high, especially for inpatient treatment costs, or for extremely high cost outpatient services.

The introduction of health insurance in Ghana was aimed at providing financial protection against high cost of health care, as such in this paper we tried to verify if the introduction of health insurance did changed the coping mechanisms employed by households. Overall, incorporating health insurance variable in our model did not alter the significance of the four identified household coping mechanisms. Therefore, it is plausible to conclude that some households still rely on these coping mechanisms, because health insurance does not entirely obviate the need for coping strategies. Also our study show that about 30 percent of household in Ghana are not insured, hence, for these households, these coping mechanisms serve as a means of health financing. As discussed earlier, our results show that post-NHIS, poor households rely on loans from relatives and dissaving, while the non-poor uses other sources of loan and dissaving. Remittances was important for both the poor and non-poor. Our results collaborates the importance of loans as a means of health financing less developed countries (Nguyen et al. 2012).

More important for this paper is the evidence we find that health insurance decreases household OOP expenditure in the long run. Our results for 2005/06 suggest that health insurance increased OOP in the initial stages of the implementation of the NHIS. While similar results has been noted elsewhere

(Wagstaff and Pradhan 2006; Sparrow, Suryahadi and Widyanti 2013), our findings are not strange because NHIS members have to wait for six months after registration to begin accessing services, and also there were serious delay in issuing of cards for registered members. These factors might have affected the level of penetration of formal health insurance, and also the number of households who should have benefited from the scheme at that time. Another possible reason for not observing a negative association between health insurance and OOP expenditure in that survey year could be due to the payment of health insurance premium by the insured households, because for majority of these households, the payment of health insurance premium for the first time might have increased their health expenditure.

Table 8—Estimated Marginal Effects of formal Insurance on Catastrophic OOP Expenditure on Health, 2012/13

	OOP constitutes at least		
	2.5% of non-food expenditure budget	5% of non-food (expenditure budget)	10% of non-food expenditure budget
Penal A			
Extreme poor	-0.017***	-0.011**	-0.007**
	(0.005)	(0.004)	(0.003)
Relative poor	-0.011**	-0.008**	-0.003
	(0.004)	(0.003)	(0.003)
Non-poor	-0.015***	-0.010***	-0.006***
	(0.004)	(0.002)	(0.095)
Urban	-0.014***	-0.009***	-0.005***
	(0.003)	(0.002)	(0.002)
Rural	-0.015***	-0.011***	-0.006***
	(0.003)	(0.002)	(0.002)
	Relative reduction % of the sample means		
Panel B			
Extreme poor	-7.84	-8.97	-14.97
Relative poor	-4.02	-5.12	-4.38
Non-poor	-5.78	-7.16	-10.86
Urban	-3.53	-3.72	-3.79
Rural	-3.25	-2.89	-2.31

Note: Panel A of this table reports figures obtained from separate estimations among the extreme poor, relative poor, non-poor, urban and rural households, whilst panel B provides the simulation results. Standard errors are robust.

∗ ∗ ∗ Significant at the 1 percent level.
∗∗ Significant at the 5 percent level.
∗ Significant at the 10 percent level.

Conversely, the results for 2012/13 survey, provide evidence that health insurance helped reducing OOP expenditure as well as incidence of catastrophic OOP. Our results collaborate the findings of earlier studies that have been

conducted in Ghana and given credit to insurance health as a safety net mechanism that reduces a household's probability of incurring huge OOP health expenditure (Nguyen, Rajkotia and Wang 2011). In terms of the absolute amount of OOP expenditure, health insurance's marginal effect seems to be small but highly significant. Depending on the indicators considered, the probabilities of catastrophic OOP expenditure decreased by 0.6 to 1.7 percentage point among the insured households.

Table 8 shows how insurance coverage affects the various subsamples. In terms of locality, the protective effect of health insurance is effectively strong among the urban households. The simulation presented in Table 8, Panel B shows that for urban households, the probability of catastrophic OOP expenditure reduced between 3.5 percent to 3.8 percent compared to the mean, whilst for the rural areas, the probability of catastrophic OOP expenditure reduced by 2.3 percent to 3.3 percent.

The protective effect of health insurance against catastrophic OOP expenditure is particularly strong among the extreme poor, who are particularly vulnerable to health shocks than the relative poor and the non-poor. The findings show that a unit increase in health insurance scheme in the extreme poor household that spend at least 2.5 percent to as high as 10 percent of its non-food budge expenditure on health care can decrease the probability of catastrophic OOP expenditure by 1.7 percentage point to 0.7 percentage, which is a reduction of 7.8 percent to 15 percent, compared to the mean respectively. Our findings reinforces earlier studies that have provided evidence to suggest that the effect of insurance coverage will be higher for the extreme poor. Earlier studies that found lower insurance coverage among the poor households urged that the Ghanaian government should relax the criteria for being considered as "indigent" so as to expand coverage for more poor individuals or households (Nguyen, Rajkotia and Wang 2011; Amponsah 2013). It seems that this policy plead has worked because findings from this study show that the poor households are presently not undercover. Our findings using the GLSS6 dataset shows that the present insurance coverage rate in Ghana for the extreme poor, relative poor and non-poor are 67.8 percent, 69.0 percent and 68.2 percent, respectively.

V. Conclusion

This paper explores incidence of health shock, pre-NHIS and post-NHIS coping mechanisms employed by households in the event of a health shock that leads to catastrophic OOP payment. The study further investigated the impact of formal health insurance on household's OOP payments and also its impact on household's probability of catastrophic payment on health services. This study had several limitations. First, there is no information in the survey questionnaire about the type of illness and severity. Hence, we are unable to discuss any association between coping mechanism and the type of illness. Second, the size of loans and dissaving as well as the nature of loans were not considered: small loans or dissaving are less likely to disrupt the welfare of households than the large ones

(Kurk, Goldmann and Galea 2009). Thirdly, we acknowledge that there might be some important coping mechanisms available to households that have not been accounted for in this study.

Despite these limitations, our study makes some important contribution to the literature on health insurance and coping mechanisms. The welfare implications of our findings are clear-cut in terms of the effect of insurance on OOP expenditure and catastrophic OOP payments. Households, especially, the extreme poor are better of having health insurance than without one. This study further provides strong evidence that the implementation of health insurance in a less developed country does alter the coping mechanisms employed by households, but it does not eliminate them. This lesson adds to the lesson we have already learned from the literature that instituting health insurance by itself is not adequate to remove fully the out-of-pocket for health care (Nguyen, Rajkotia and Wang 2011).

REFERENCES

Amponsah, Samuel. 2013. "Adverse Selection, Moral Hazard, and Income Effect in Health Insurance: The Case of Ghana." *Bulletin of Political Economy, Tokyo International University*, , (14): 35–55.

Bales, Sarah. 2013. "Impact of Health Shocks on Household Welfare in Vietnam - Estimates Using Fixed Effects Estimation." Institute of Health Policy & Management (HEFPA) Working Paper 18. Working Paper.

Berki, SE. 1986. "A Look at Catastrophic Medical Expenses and the Poor." *Health Affair*, 5(4): 138–145.

Dercon, Stefan. 2005. *Insurance Against Poverty.* Oxford University Press.

De Weerdt, J., and Setfan Dercon. 2006. "Risk-Sharing Networks and Insurance against Illness." *Journal of Development Economics*, 81: 337–56.

Flores, G., J. Krishnakumar, O. O'Donnell, and E. Van O'Donnell. 2008. "Coping with Health-Care Costs: Implications for the Measurement of Catastrophic Expenditures and Poverty." *Health Economics*, 17(12): 1393–1412.

Gertler, Paul, and Jonathan Gruber. 2002. "Insuring Consumption Against Illness." *American Economic Review*, 92(1): 51–70.

Giedion, U. 2007. "The Impact of Subsidized Health Insurance on Access, Utilization, and Health Status: The Case of Colombia." World Bank, Washington D. C. Mimeo.

Kurk, Margaret E., Emily Goldmann, and Sandra Galea. 2009. "Borrowing and Selling to Pay for Health Care in Low- and Middle-Income Countries." *Health Affair*, 28: 1056–1066.

Kurosaki, Takashi. 2009. *Economic Analysis of Poverty and Vulnerability.* Tokyo:Keiso Shobo.

Leive, Adam, and Ke Xu. 2008. "Coping with Out-of-Pocket Health Payments: Empirical Evidence from 15 African Countries." *Bull World Health Organization*, 86: 849–856.

Limwattananon, Supon, Sven Neelsen, Owen O'Donnell, Phusit Prakongsai, Viroj Tangcharoensathien, Eddy van Doorslaer, and Vuthiphan Vongmongkol. 2013. "Universal Coverage on a Budget: Impacts on Health Care Utilization and Out-of-Pocket Expenditures in Thailand." Institute of Health Policy & Management (HEFPA) Working Paper 14.

Nguyen, Kim Thuy, Oanh Thi Hai Khuat, Shuangge Ma, Duc Coung Pham, Giang Thi Hong Khuat, and Jennifier Prah Ruger. 2012. "Coping with Health Care Expenses Among Poor Households: Evidence from a Rural Commune in Vietnam." *Social Science and Medicineg*, 74: 724–733.

Nguyen, Kim Thuy, Yogesh Rajkotia, and Hong Wang. 2011. "The Financial Protection Effect of Ghana National Health Insurance Scheme: Evidence ffrom a Study of Two Rural Districts." *International Journal for Equity in Health*, 10(4): 1–12.

Pradhan, Menno, and N. Prescott. 2002. "Social Risk Management Options for medical Care in Indonesia." *Health Economics*, 11(5): 431–446.

Russell, Steven. 2004. "The Economic Burden of Illness for Households in Developing Countries: A Review of Studies Focusing on Malaria, Tuberculosis, and Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome." *American Journal of Tropical Medicine and Hygiene*, 71(supp 2): 147–155.

Sparrow, Robert, Asep Suryahadi, and Wenefrida Widyanti. 2013. "Social Health Insurance for the Poor: Targeting and Imapact of Indonesia's Askeskin Programme." *Social Science and Medicine*, 96(264-271).

Trujillo, A. J., J. E. Portillo, and J. A. Vernon. 2005. "The Impact of Subsidized Health Insurance for the Poor: Evaluating the Colombian Experience Using Propensity Score matching." *International Journal of Health Care Financing and Economics*, 5: 211–239.

Wagstaff, Adam. 2010. "Estimating Health Insurance impacts under unobserved heterogeneity: The Case of Vietnam's Health Care Fund for the Poor." *Health Economics*, 19(2): 189–208.

Wagstaff, Adam, and E. Van O'Donnell. 2003. "Catastrophic and Improverishment in Paying for Health Care: with Applications to Vietnam 1993-98." *Health E*, 12(11): 921–934.

Wagstaff, Adam, and Mangus Lindelow. 2008. "Can insurance increase financial risk? The Curious Case of Health Insurance in China." *Journal of Health Economics*, 27(4): 990–1005.

Wagstaff, Adam, and Menno Pradhan. 2006. "Health Insurance Impacts on Health and Nonmedical Consumption in Developing Country." World Bank, Washington, D.C. Policy Research Working Paper 3563.

Wagstaff, Adam, Mangus Lindelow, Gao Jun, Xu Ling, and Qian Juncheng. 2009. "Extended Health Insurance to Rural population: An Impact Evaluation of Chinafs New Cooperative Medical Scheme." *Journal of Health Economics*, 28(1): 1–19.

Wyszewianski, L. 1986. "Financially Catastrophic and High Cost Cases: Definitions, Distinctions and their Implications for Policy Formulation." *Inquiry*, 23(4): 382–94.

Descriptive Statistics Table

Table A1—Descriptive Statistics on Other Covariates

	Pre-NHIS		Post-NHIS			
	1998/99		2005/06		2012/13	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
			Insured			
Female household head	0.319	0.466	0.314	0.464	0.315	0.465
Age of household head (years)	44.93	15.05	48.06	15.87	46.58	15.67
Head's education						
No education	0.552	0.497	0.255	0.435	0.278	0.448
Primary school	0.128	0.335	0.256	0.418	0.240	0.427
Junior secondary school	0.227	0.418	0.324	0.468	0.301	0.458
Senior high school	0.071	0.256	0.137	0.344	0.128	0.334
Higher education	0.022	0.146	0.058	0.234	0.053	0.224
Indoor plumbing	0.147	0.354	0.217	0.413	0.099	0.299
Electricity	0.410	0.492	0.692	0.462	0.732	0.442
HH dwelling is a bungalow	0.175	0.380	0.168	0.374	0.264	0.441
In migrant	0.408	0.491	0.502	0.500	0.460	0.498
Returned migrant	0.577	0.494	0.227	0.419	0.189	0.391
Insured HH members			3.22	2.31	3.32	2.34
Adults aged 70	0.083	0.276	0.134	0.340	0.091	0.288
Children below 18	0.759	0.428	0.697	0.460	0.676	0.468
Extreme Poor	0.201	0.401	0.045	0.207	0.054	0.226
Poor	0.101	0.301	0.048	0.214	0.109	0.312
Non poor	0.698	0.459	0.907	0.290	0.836	0.370
Locality of residence (rural = 1)	0.633	0.482	0.453	0.498	0.556	0.497
Value(Ghana Cedis)						
Per capita expenditure	144.09	139.49	854.59	806.78	3180.21	3185.64
Per capita non-food expenditure	74.31	85.08	506.55	599.54	1645.31	2236.63
Per capita food expenditure	69.78	69.93	348.04	318.71	1534.91	1505.72
Per capita health expenditure	2.57	5.08	14.11	25.38	28.15	76.90
Catastrophic Health Expenditure						
OOP expenditure $\geq$ 2.5%	0.479	0.499	0.400	0.490	0.250	0.433
OOP expenditure $\geq$ 5%	0.234	0.423	0.183	0.387	0.132	0.338
OOP expenditure $\geq$ 10%	0.076	0.265	0.067	0.249	0.051	0.220
Observations	5,998		1,646		11,870	

Note: The means and standard deviations using relevant sample weights provided by the GSS to produce nationally representative estimates. All monetary values are in April 1999 prices, per capita terms. The pre-NHIS figures aree for all households, while the post-NHIS figures have been disaggregated for insured and uninsured households.
Source: Author's analysis based on GLSS 4 to 6

Table A2—Descriptive Statistics on Other Covariates

	Post-NHIS			
	2005/06		2012/13	
	Mean	Std. dev.	Mean	Std. dev.
	Uninsured			
Female household head	0.290	0.454	0.284	0.450
Age of household head (years)	44.22	15.50	41.80	14.89
Head's education				
No education	0.371	0.483	0.278	0.448
Primary school	0.223	0.416	0.223	0.416
Junior secondary school	0.305	0.460	0.350	0.477
Senior high school	0.078	0.269	0.109	0.312
Higher education	0.021	0.144	0.040	0.295
Indoor plumbing	0.126	0.332	0.069	0.254
Electricity	0.442	0.497	0.646	0.478
HH dwelling is a bungalow	0.089	0.285	0.246	0.430
In migrant	0.476	0.499	0.523	0.499
Returned migrant	0.226	0.418	0.163	0.369
Insured HH members				
Adults aged 70	0.081	0.273	0.058	0.233
Children below 18	0.676	0.468	0.550	0.497
Extreme Poor	0.130	0.336	0.054	0.227
Poor	0.083	0.276	0.110	0.313
Non poor	0.787	0.409	0.835	0.371
Locality of residence (rural = 1)	0.597	0.491	0.549	0.498
Value(Ghana Cedis)				
Per capita expenditure	681.75	719.18	3631.40	3736.94
Per capita non-food expenditure	373.10	516.87	1779.53	2545.94
Per capita food expenditure	308.65	295.69	1851.87	1712.73
Per capita health expenditure	7.31	26.10	32.52	98.35
Catastrophic Health Expenditure				
OOP expenditure $\geq$ 2.5%	0.216	0.490	0.250	0.445
OOP expenditure $\geq$ 5%	0.101	0.387	0.145	0.352
OOP expenditure $\geq$ 10%	0.037	0.249	0.062	0.242
Observations	7,041		4,902	

Note: The means and standard deviations using relevant sample weights provided by the GSS to produce nationally representative estimates. All monetary values are in April 1999 prices, per capita terms. The pre-NHIS figures aree for all households, while the post-NHIS figures have been disaggregated for insured and uninsured households.
Source: Author's analysis based on GLSS 4 to 6