Household Health Care Expenditure and Catastrophic Payments: Evidence From The Ghana Living Standards Survey V

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Out of pocket payments are a significant component of health expenditures in Ghana. Their influence on household welfare therefore merits investigation. This study investigates the determinants of household health expenditures and the incidence of catastrophic health care payments using information from national household living standard measurement surveys. The results show poor households are more likely to spend on health care than wealthy households. Health care expenditures have a low degree of responsiveness to household income and complement food expenditures. The incidence of catastrophic health care payments has improved over time but at the expense of a higher concentration among the poor. The implication is that Ghana National Health Insurance Scheme is an appropriate policy in the right direction and must use effective household means-testing methods to identify and target vulnerable households.

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INTRODUCTION

Empirical evidence suggests that catastrophic health spending - when a household must reduce its basic expenditure over a period to cope with health costs- occurs with out of pocket payments that exceed 2.5-40% of different measures of household discretionary income (Wagstaff & Van Doorslaer, 2008; Okunade, Suradetcha & Benson, 2010; Xu et al, 2011). Per the World Health Organization (2011) and World Bank (2015) databases out of pocket payments for health care are prominent in Ghana, and averaged 39.2% of total health spending in 2013. Private spending comprised 51% of total health care spending for the period of 2000-2009 and out of pocket payments averaged 78.4% of this amount, increasing to 92% in 2013. Moreover, Ghana is undergoing epidemiological transition whereby chronic non-communicable diseases like cardiovascular disorders and cancer are becoming leading causes of mortality and morbidity (Ministry of Health Ghana, 2011). This trend in addition to pervasive infectious and parasitic diseases, and the growing physical injuries from accidents and violence means a triple disease burden. The health system is more acclimatized to acute treatment interventions than preventive services (deGraft Aikins, 2007; Hill & Douptcheva, 2011). This combination of factors leads to households having a higher dependency on curative and acute care which raises the stakes for affordability of health care, and consequently out of pocket payments. The government sponsored National Health Insurance Scheme (NHIS) in operation since 2005 has the intent to improve out of pocket payments. Evidence suggests most households unable to afford the NHIS, desire insurance coverage

(Akazli et al, 2014). Besides, NHIS excludes coverage for most cancers, renal dialysis and HIV/AIDS anti retroviral therapy. An investigation into the relative importance of ability to pay and the need for health services could provide useful information for effective implementation of reforms to protect households against the financial risks of seeking health care.

Several studies on health care demand and out of pocket payments in Ghana exist and often concern specific cases like malaria, maternal services and health insurance demand, often limited to sampled districts as program evaluation or due to impracticality of carrying studies nationwide. Therefore, this paper contributes to the knowledge base by using nationally representative data sets to estimate the determinants of household health care expenditures, and incidence of catastrophic payments. The goal is to identify income and non-income factors which are significant determinants of household health expenditures, and the incidence of catastrophic health spending across welfare groups.

Specifically, this study attempts answers to these three questions:

i. Does income have a comparable influence as health needs in the decision to spend?

ii. Does the level of health care expenditures reflect household income and welfare?

iii. What proportion and which households experience catastrophic health spending?

In a health system like Ghana's where out of pocket payments are significant, one may question to what extent out of pocket health expenditures reflect demand for necessary health care versus household consumption level and wealth endowment, for a given health need, price and intensity in health care use. The absence of a statistically significant evidence that health expenditures vary with income could imply households treat health care as a necessity as has been found in other countries (Wagstaff & van Doorslaer; Okunade, Suraradetcha & Benson; Xu et al, 2011). The negative implications are greatest for households with higher health risks and limited financial protection. If health care has significant variation with income, then public policy and implications for financial protection are complicated by other concerns as inefficiencies and overutilization of health care.

Therefore, the hypotheses for empirical analysis are as follows:

i. Health need is the only significant influence in the decision to spend on health care

ii. Household income has a weak correlation with amount of health expenditures because health care behaves as necessity.

iii. Health need is the strongest determinant of catastrophic health spending irrespective of income status.

The findings suggest that health needs have a very strong influence on the decision to seek care while income does not after taking other household characteristics into account. When income is measured by the ratio of food expenditures, there is a strong negative effect leading to the conclusion that, in Ghana, health expenditures are nondiscretionary and a reliable but simple way to identify vulnerable households is a disproportionately large food budget. Proximity to health services, locality of residence, social networks and other household control variables behave as expected in the decision to spend, except for aging and education. The presence of seniors 60 years or more in the household reduces the likelihood to spend. Education has no influence on the likelihood.

Section 2 provides the theoretical background to this study and details about the empirical model adopted and section 3 is a discussion of results form the empirical analysis. The potential catastrophic health care payments by households and key factors that increases the likelihood are discussed in section 4. Section 5 gives some implications for policy and concluding remarks.

MODELLING HOUSEHOLD HEALTH CARE EXPENDITURES

The traditional economics approach views the demand for health care as derived from an underlying demand for health (Grossman, 1972; Fuchs, 1980; Wagstaff, 1986). Individuals consume health care as an input in the production of health subject to a budget constraint. Expect less demand for health care if consumers derive little satisfaction or the efficacy is below expectation. It is assumed that health production is an increasing function of health care consumption, that better-informed consumers are considered more efficient at transforming health care inputs into desired outcomes and therefore

education is given a key role in health care decisions (Grossman, 1976; Anderson, 1995; Cutler & Lleras-Muney, 2006). Aging would have an increasing impact in health care demand in that a faster depreciation of one's stock of health implies more health care consumption to maintain a given health status. Relative increases in the price of health care imply less demand, all things equal. Income has an increasing effect on health care demand, all things being equal. However, empirical evidence suggests that while higher income is linked to better health status, health care is income inelastic (Koc, 2004; Okunade et al, 2010). Health care may simply behave as a necessity. Alternately, health care demand may be induced by the decision of the provider especially where consumers face information asymmetry and uncertainty about treatment outcomes (Polheimer & Ulrich, 1995; Nguyen, Rajkotia & Wang, 2011).

The Anderson and Newman model on health care use (Anderson & Newman, 1973; Anderson, 1995) has improved the discussion about the factors that determine household health care utilization. The model categorizes environment, population characteristics, health behavior, and health outcomes as four major determinants of health care use. This qualitative model accommodates a dynamic and recursive nature through feedback effects among the factors to further impact health care use and outcomes. Environment describes the health care system and external environment of the family unit or individual. Population characteristics imply predisposing factors, enabling resources and need. Health behavior implies personal health practices and the use of health services. Outcomes describe perceived health status, evaluated health status and consumer satisfaction that results from health care use.

From the traditional theory of demand, and the Anderson-Newman Model of health care utilization, the theoretical determinants of household health care expenditures may be categorized as follows: perceived needs, sociodemographic characteristics, economic resources, environmental factors, relative prices. It may be observed that much of the empirical literature on health care utilization or expenditures includes at least one indicator from the first four but on relative prices given the challenges of data (O'Donnell, van Doorslaer, Wagstaff & Lindelow, 2007; Okunade et al, 2010; Xu et al 2011)

The Empirical Model

Peculiar features of health care expenditures and the underlying data generation process create challenges for statistical analysis. The usual observation is a right-tailed distribution: a large percent of the population report none or low expenditures while a small group report very high expenditures. Another concern is the identification problem with the likely interdependence between health expenditures and indicator variables. For example, unobserved community, household and individual characteristics that influence health behaviors and perceptions of illness may as well influence provider choice and in turn the level of health expenditures. The skewed distribution of health care expenditures, possible interdependence between health care expenditures and explanatory variables consequently possible heterogeneity in the error structure may render ordinary least squares (OLS) estimator biased or inefficient (Rous & Hotchkiss 2003; Sen & Rout, 2007; Nketiah-Amponsah, 2009).

Decision identification equations

One way to counteract the identification problem is a two-stage decision modeling. The first stage concerns the decision to spend and the second concerns the level of spending (Tobin, 1958; Heckman, 1979; Newman, Henchion & Matthews, 2003; Powers, 2007). The approach in this paper follows Heckman's (1979) sample selection methods that explicitly model the correlation between the probability of an outcome and the level of the outcome (Manning, Duan & Rogers, 1987). The assumption is that households first decide whether to spend, and conditional on this decision, how much to spend. Hence desired health expenditures (some latent variable y_i^*) is a two-stage decision process where in the first stage it is a binary decision and the second stage is governed by different set of factors (vector X_2).

Hence, the first stage decision about whether to spend (selection equation) is as follows:

$$\mathbf{d_i}^* = \mathbf{X_{1i}b} + \boldsymbol{u_i} \quad (1)$$

$$\mathbf{d_i} = \mathbf{0 \text{ if } d_i^* \leq 0} \quad (2)$$

$$\mathbf{d_i} = \mathbf{1 \text{ if } d_i^* > 0} \quad (3)$$

$$u_i \sim N(0, 1) \quad (4)$$

The second stage decision about how much to spend (primary equation) similarly is:

$$\mathbf{y_i}^* = \mathbf{X_{2i}b} + \boldsymbol{\varepsilon_i} \quad (5)$$

$$\mathbf{y_i} = \mathbf{y_i^* \text{ if } y_i^* > 0} \quad (6)$$

$$\mathbf{y_i} = \mathbf{0 \text{ if } y_i^* = 0} \quad (7)$$

$$\boldsymbol{\varepsilon_i} \sim \mathbf{N}(\mathbf{0}, \boldsymbol{\sigma}^{\mathbf{2}}) \quad (8)$$

and

$$\boldsymbol{corr}(\mathbf{u_i}\, \boldsymbol{\varepsilon_i}) = \boldsymbol{\rho} \neq \mathbf{0} \quad (9)$$

The error terms u_i and ε_i are assumed to be correlated hence interdependency is accommodated. Using this framework, full information maximum likelihood estimation methods involving pooled regressions yield consistent, asymptotically efficient estimates for all parameters on condition that the model is correctly specified (Manning et al 1987; StataCorp 2011).

Equation 10 is the specified selection (first stage) equation:

$$prob(d_i) = (\alpha + \partial_1 logincomec_i + \partial_2 quintile_i + \partial_3 drelpays_i + \partial_4 dgovpays_i + b_1 dummy\_ill_i + b_2 propipd_i + d_1 dh\_sch_i + d_2 gendhead_i + d_3 dh\_religion_i + d_4 propd5_i + d_5 propd60_i + \phi_1 loc2_i + u_i > 0) \quad (10)$$

where for the *i*th household d_i is a binary indicator that takes on the value of 1 if health expenditures are greater than zero, and takes the value zero otherwise. The definitions for the variables are as described in TABLE **1**.

TABLE 1
DESCRIPTION OF VARIABLES

lgfexpendc	log of household food expenditures
quintile	an indicator variable for quintile of welfare
dgovpays	an indicator variable for government-, employer-, or health insurance as the main financier of household health expenditures
drelpays	an indicator variable for an individual other than household head as the major financier of health care expenditures
propill	proportion of members ill or injured
propipd	proportion of members hospitalized
age	years in age of head of household
ageheadsq	the square of *age*
gender	binary variable indicator for gender of head
educhh	number of the years of school attendance by household head
dh_sch	binary variable indicating if household head has ever attended school
dh_religion	indicator variable of religion of household
hhsize	the number of household members
dtravelt	binary indicator variable for length of time to health facility exceeding the average
loc5	indicator variable of the locality of household's community of residence in terms of five rural, urban and ecological regions
loc2	binary indicator variable as for rural or urban locality of residence
u_i and e_i *are assumed to be normally distributed errors*	

Similarly, equation 11 is the specified primary (second stage) equation to estimate the level of health care expenditures:

$$lgheh_i = prob(\alpha + \partial_1 lgfexpendc_i + \partial_2 drelpays_i + \partial_3 dgovpays_i + b_1 propill_i + b_2 propipd_i + d_1 educhh_i + d_2 gendhead_i + d_3 hhsize_i + d_4 prop\mathrm{d}5_i + \phi_1 loc5_i + \gamma_1 dtravelt_i + e_i > 0) \quad (11)$$

where for the *i*th household *lgheh* is the log of total household health care expenditures and the other variables are as described in TABLE **6**. Health needs are measured by the incidence of illness, injury and hospitalization in the household. In comparing the effect of health needs and income on health spending, other factors that need to be controlled are access to information and social networks (education, religious status), access to health provider and health services (distance travelled), community (urban, rural locality) and other household demographics (age, gender, size). Better educated households are in general expected to have better access to information and studies have found a statistically significant relationship exists between educations and health care demand though the direction of influence is not fixed (Grossman, 1976; Anderson, 1995; Cutler & Lleras-Muney, 2006). Better access to, or better use of health information could imply better health outcomes and therefore a lower demand for health care. At the same time, it could imply higher participation in health care market and hence higher demand. The conventional health system in Ghana has a strong history in Christian missionary posts. Therefore, one would expect religious status, culture and associated social networks to be a significant influence in health care demand. One would expect urban locales to have a greater demand for health care given the higher concentration of health facilities.

As in most developing countries, consumption expenditures are more reliable than reported income given the challenges of inadequate employment data records, and recall and measurement errors. The

choice of explanatory variables to include is somewhat arbitrary but one may not include the same set of regressors in each stage to avoid difficulty in correctly identifying the selection parameters. In the literature, double hurdle models applied to consumption expenditures research often assume that the first stage is dominated by non-income variables, and the second stage is dominated by direct income factors that influence ability to pay (Newman, Henchion & Matthews, 2003; Okunade et al. 2010; Nguyen et al. 2011). In this study age indicators are adopted as selection variables in the selection equation while the primary equation includes additional income indicators but excludes the selection variables that are statistically insignificant. Though price is theoretically a determinant of demand we do not explicitly include the price of health services as an explanatory variable given the nature of the data and computational difficulties involved in determining price indices for general household health care expenditures. Alternately, the health care expenditures have been weighted by regional price indices (with 1999 Accra prices as base index) to account for some of the differences in cost of health care across locations. Given the context of a predominantly out of pocket health care payments system the empirical analysis in this study views observed household health care expenditures as an approximation of the demand for health care. The dependent variable, household expenditures on health care in a two-week period of recall, comprise information on the payments but not on the quality or quantity of the health services demanded hence quality differences and intensity of use are not controlled in this study. Given the skewed distribution of expenditures and income data in levels log transformations are preferred.

Summary of the Data

The empirical analysis uses data from the fifth round of the Ghana Living Standards Surveys (GLSS). The GLSS are the most comprehensive, nationally representative household surveys in Ghana. These surveys are administered in about five year intervals by the Ghana Statistical Service with assistance from the World Bank. The GLSS5 was conducted from September 1, 2005 to August 31 2006 (Ghana Statistical Service, 2008). The sample includes 37128 individuals in 8687 households in 148 communities (enumeration areas). A multistage stratified sampling method selects the communities the households so each has an equal chance of being selected. Enumeration zones are randomly selected, with the probability of being included directly proportional to the population size. The GLSS4 in 1998/1999 used similar methods to collect information on 26411 individuals in 5998 households.

TABLE 2
THE GHANA LIVING STANDARDS SURVEY V (GLSS5) SAMPLE

	Percent of sample	Sample	Percent female
Minors (0-14 years)	40.3	14,985	49.0
Working age (15-59 yrs)	52.9	19,637	52.8
Elderly (60 years or more)	6.8	2,506	54.3
Household members	100.0	37,128	51.3
Head of household	23.3	8,687	28.0

Source: Calculations based on GLSS5 data, Ghana Statistical Service, 2008.

Health expenditures are grouped into four categories in the GLSS: (a) consulting fees (b) travel costs (c) overnight stays or inpatient services (d) medicines and supplies. Households report information about incidence of illness or injury, health care seeking and related expenditures in the two weeks preceding the interview. For each households member, information includes the number of days one had been ill or injured, and for how many days one had stopped usual activities due to illness or injury; whether an individual had consulted a health practitioner, who was consulted (e.g., doctor, nurse, chemical seller, traditional healer), for what reason (e.g., illness, injury, follow-up, prenatal), where consultation took place (e.g., hospital, pharmacy, consultant's home) and whether the facility was public or private-owned irrespective of whether the individual reported an illness or injury. For everyone who consulted a

provider, information includes amount paid for consulting, the cost of travel to and from provider, the length of time travelled. Other information includes payments for medicines and medical supplies irrespective of illness or injury status, or provider consultation. Hence, the total health care expenditures per household is the calculated total of payments reported for each member of household irrespective of illness status or health facility visit. The information in Table **8** shows summary statistics on the composition of household health care expenditures. Medicines and supplies make up a very large proportion of out of pocket payments. Inpatient services are the next costly component where an illness occurred in the household. The distribution of health care payments is relatively similar across rural and urban localities although the levels of spending differ. Urban households reported an average of US$15.7, the equivalent of 15% of total consumption expenditures in two weeks. Similarly, rural households spent US$10.3, the equivalent of 17% total consumption expenditures.

TABLE 3
DISTRIBUTION OF HOUSEHOLD HEALTH CARE EXPENDITURES BY SERVICE CATEGORY, LOCATION AND ILLNESS STATUS, GLSS5

	Households reporting no illness		Households reporting an illness	
	Mean	SD	Mean	SD
	Urban households			
Average total payments ₵ (US$)	61,622 (8.2)	183,609(24.5)	136,567(18.2)	726,233(96.8)
	Percent of total health care expenditures			
Consulting	5	2	7	1
Inpatient	1	1	21	9
Medicine	89	4	66	8
Travel	5	2	6	1
	Rural households			
Average total payments ₵ (US$)	28,549(3.8)	84,331(11.2)	89,447(11.9)	185,253(24.7)
	Percent of total health care expenditures			
Consulting	4	1	10	1
Inpatient	0	0	11	2
Medicine	93	2	72	2
Travel	2	1	7	1

Source: Calculations based on GLSS5 data
Note: The GLSS5 exchange rate is ₵7,500= US$1.

Considering the reported health care expenditures for individuals, less than 2% of payments were covered by a third party (government, employer or insurance) as illustrated in **TABLE 4**. In 86% of the time the household head was responsible for the greatest portion of expenses for a member of household. This observation underscores the importance of out of pocket payments and a critical role by the head of household in health care expenditures.

TABLE 4
SUMMARY STATISTICS ON HEALTH CARE EXPENDITURES FOR INDIVIDUALS, GLSS5

Who is responsible for the greatest proportion of the expenses	Head of household	Another individual	Employer, government or health insurance
Sample	31,207 (85.7%)	3820 (10.4%)	1399 (4%)
	In nominal US$		
Mean payments	6.0	7.7	16.4
SD	17.9	28.3	178.8
Median	2.0	2.0	2.4
75th percentile	5.3	5.9	6.7
99th percentile	67.3	84.0	82.7
Maximum	872.0	476.7	3,520.0
Total payments (percent)	423,255.8 (96.2)	10,284.2 (2.3)	6,385.1 (1.5)

Source: Calculations based on data from the GLSS5.
Note: GLSS5 exchange rate of old cedi ₵7,500 to US$1

TABLE 5
SUMMARY STATISTICS OF HOUSEHOLD INCOME AND HEALTH CARE EXPENDITURES, GLSS5

	All		Nonzero health care spending		Zero health care spending households		Zero health care spenders but used health care	
Household Sample	8687		5218		3469		44	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
	US$ (nominal)							
Health care expenditures in two-weeks	13.0	40.0	13.3	53	-	-	-	-
Total income (annual)	1,573	2,853	1,747	2,933	1,293	2,707	1,333	1,667
Food expenditures (annual)	1,253	947	1,373	987	1,067	840	1,240	813

Source: Calculations based on GLSS5 data.
Note: GLSS5 exchange rate is ₵7,500 to US$1

As illustrated in Table **5**, about two-third households reported some health care expenditure, the average being US$13.3. A negligible proportion of households (0.54%) reported health care use but zero health expenditure. This subset of households has statistically more coverage by government, insurance or employer compared to households that reported health care payments. For the other explanatory variables

TABLE 6
SUMMARY STATISTICS OF HOUSEHOLD INDICATORS, GLSS5

	All households		Nonzero health care expenditure households		Zero health care expenditure households		Zero health care expenditure but consulted provider	
Number of households	8687		5218		3469		44	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Household size	4.2	2.8	5.0	2.9	3.0	2.3	4.8	3.4
Proportion of household members ill or injured	0.28	0.28	0.32	0.01	0.02	0.11	0.32	0.33
Proportion of household members hospitalized	0.01	0.05	0.01	0.06	0	0	0.02	0.8
Proportion of households by who pays the greatest portion of health care expenses:								
Household head	0.90		0.90		0.90		0.80	
Other household member or relative	0.02		0.03		0.10		0.20	
Government/employer/insurance	0.07		0.01		0.01		0.04	
Age distribution of household members:								
Proportion under 5 years	0.11	0.15	0.12	0.12	0.08	0.15	0.10	0.20
Proportion over 59 years	0.09	0.23	0.07	0.07	0.12	0.28	0.07	0.20
Characteristics of the head of household:								
Gender (male)	0.70		0.7		0.7		0.7	
Years of schooling	4.1	4.5	4.1	4.5	4.0	4.5	3.2	4.5
Age in years	45.4	15.6	46.1	14.7	44.3	16.8	45.1	15.9
Age squared	2300.6	1592.7	2337.9	1512.9	2244.4	1704.5	2281.2	1653.7
Distribution of households by locality of residence:								
Greater Accra	0.1		0.1		0.1		0.1	
Other Urban	0.3		0.3		0.3		0.3	
Rural Coastal	0.1		0.1		0.1		0.1	
Rural Forest	0.3		0.3		0.2		0.1	
Rural Savannah	0.2		0.2		0.3		0.4	
Proportion of households exceeding average travel time 2.37/hour								
Travel time >2.37-hr	0.1		0.15		0.0		0.2	

Source: Calculations based on GLSS5 data.

as further illustrated in Table **6**, the differences in the averages between these two groups is not statistically significant per Student-t tests of the means. The Student-t tests suggest that health spending households on average have higher income and food expenditures than non-spending households. These summary statistics pre-empt the results from the maximum likelihood estimations of the effect of income on health care demand by households which follows in the next section.

RESULTS

Results from the Heckman Full Information Maximum likelihood (FIML) estimations (pooled regressions) appear in panels II-V of Table 7 and Table 8. These different versions of robust FIML models are estimated by replacing the log of food expenditures, with the log of income, and again with the share of food in total household expenditures to compare the effect of different measures of income on health expenditures. The decision equation is separately estimated (probit regression results in panel I of Table 7) and the primary equation separately estimated (ordinary least squares (OLS regression results in panel I of Table 8) provide a basis for comparison. The FIML models each produce an estimate of rho that is statistically significant (results not shown). This suggests a significant correlation between selection and decision equations. The pooled regressions produce reliable estimates. The different versions of the health care expenditures model produce similar results as demonstrated in Table 7 and Table 8.

Predictors of the Decision to Spend and the Level of Health Care Expenditures

As expected illness or injury in the household significantly increases the likelihood that health expenditures occur as confirmed by results in panel VI of Table 7. For an additional person that falls ill or injured, the chance of health care spending by the household increases by 47 percentage points with a 95% confidence interval of 45%-48% when all other variables are held constant at their means. With regards to the amount of expenditures, regardless of the income measure used in the estimation, a doubling of the proportion of ill persons leads to an 80% increase in health expenditures as illustrated in panels II-V of Table 8. The results similarly suggest that a doubling of the proportion of household members that are hospitalized quadruples the amount of expenditures by the household. Health needs indicators have relatively very large marginal effects on health care expenditures among the set of explanatory variables and therefore confirmed as the most significant in health care decisions by households.

On the contrary, the responsiveness of the amount of health expenditures to income is very low. The coefficient on log of income, interpreted as the income elasticity of health expenditures, is 0.03 as shown in panel II of Table 8. A percent increase in income only yields 0.03 percent increase in health care expenditures. A doubling of income would essentially increase health expenditures by just about 3%. When log of food expenditures is introduced as the measure of income (replaces log of income) as shown in panel III in Table 8 the income effect is slightly larger: a percent increase in food expenditures corresponds to 0.08 percent increase in health care expenditures. Another note here is that food and health care could be considered to complement each (since expenditures increase in the same direction), if one followed the predictions of the traditional demand model (Grossman, 1972; Koç, 2002). Similar observations are made when wealth quintiles substitute log of income as the measure of household income as shown in panel IV of Table 8. With the income elasticity coefficients being very low, these results confirm health care as a necessity although a normal good since the coefficients are positive. When *foodshare* (the share of food in total consumption expenditures) replaces the log of income as panel V in Table 8, the strong statistical significance of the relatively large and negative coefficient (-0.36) on *foodshare* confirms that households having larger food shares and therefore lower disposable incomes would have a lower spending on health care. Alternately a doubling of health expenditures would come at the cost of some 36 percentage points decrease in the share of food in the household budget, all things being equal. These observations are similar to the findings in other countries (Wagstaff & van Doorslaer 2003; Van Doorslaer et al., 2007; Okunade et al., 2010).

TABLE 7
PREDICTORS OF HOUSEHOLD HEALTH CARE EXPENDITURES, GLSS 5

	I	II	III	IV	V	VI	VII	VIII
	Probit model	Heckman Full Information Maximum Likelihood Estimation				Predicted change in probability	95% confidence interval	
Income measure in the primary model		Log of income	Log of food	quintile	food share			
Log of income	0.092***	0.085***	0.088***	0.088***	0.088***	0.02	0.01	0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)			
Quintile 5	-0.274***	-0.254***	-0.266***	-0.260***	-0.252***	-0.06	-0.08	-0.03
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)			
Illness in household	2.356***	2.366***	2.363***	2.364***	2.363***	0.47	0.45	0.48
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)			
Household head been to school	-0.008	0.020	0.018	0.019	0.019	0.00	-0.03	0.03
	(0.08)	(0.07)	(0.07)	(0.07)	(0.07)			
health expenses paid by relative	0.189***	0.178***	0.178***	0.178***	0.178***	0.04	0.02	0.06
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)			
Age of head of household in years	0.036***	0.037***	0.036***	0.037***	0.037***	0.01	0.00	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)			
Proportion members under 5yrs	0.693***	0.667***	0.663***	0.666***	0.666***	0.14	0.09	0.19
	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)			
Proportion members 60yrs or more	-0.305***	-0.315***	-0.308***	-0.312***	-0.313***	-0.06	-0.10	-0.02
	(0.11)	(0.10)	(0.10)	(0.10)	(0.10)			
N	8271	8271	8271	8271	8271			

Note: Standard errors are in parenthesis
* $p < 0.01$, ** $p < 0.05$, *** $p < 0.01$

TABLE 8
DETERMINANTS OF THE LEVEL OF HOUSEHOLD HEALTH CARE EXPENDITURES

	I	II	III	IV	V
	OLS	Heckman FIML			
Income measure	Log of income	Log of income	Log of food	Quintile	Food share
Log of income	0.046***	0.033**			
	(0.02)	(0.02)			
gov't/insurance/employer pays majority of expense	-0.118*	-0.129*	-0.128*	-0.130*	-0.127*
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
proportion ill	1.290***	0.799***	0.802***	0.788***	0.788***
	(0.07)	(0.09)	(0.09)	(0.09)	(0.09)
Proportion inpatient	4.005***	4.044***	4.042***	4.057***	4.065***
	(0.29)	(0.46)	(0.46)	(0.46)	(0.46)
Years of schooling	0.019***	0.019***	0.019***	0.019***	0.019***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Travel exceeds 2.37hr	1.217***	1.190***	1.184***	1.187***	1.184***
	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)
Proportion under 5yrs	0.345***	0.216*	0.219*	0.200	0.223*
	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
Log of food expenditure			0.077**		
			(0.03)		
Quintile 3				0.146**	
				(0.06)	
Quintile 4				0.130**	
				(0.07)	
foodshare					-0.361***
					(0.13)
N	5052(8271)	8271	8271	8271	8271

Note: Standard errors are in parentheses
* $p < 0.01$, ** $p < 0.05$, *** $p < 0.01$

Household age variables are chosen as the sample selection variables for the decision model. Specifically, the age of head of household and the proportion of household members 60 years are statistically significant in the selection model as shown in Table 7, but are not significant in the expenditures model (results not shown). This result confirms that these age indicators perform adequately as selection variables. A year increase in age of head of household results in 1 percentage point increase in the chance of spending, and a doubling of the proportion of seniors reduces the chance by 6 percentage points as shown in panel VI of Table 7. In contrast, the proportion of household members under age 5 has a positive influence both on the likelihood and the amount of total household health care expenditures,

holding all other variables constant at their means. A doubling of the proportion of little children leads to 14 percentage point increase in the chance of spending as shown in panel VI of Table 7, and 22 percentage point increase in the amount of expenditures as shown in panels II-V of Table 8. Health spending households in Ghana tend to be younger as illustrated in

Discussion

The evidence shows that illness has a significant impact on the decision to seek care and hospitalizations have the strongest influence on the level of health expenditures, which is not surprising. Considering that over 93% of cases that visited a provider did so for the reason of illness and, or injury, health care expenditures are synonymous with curative services and therefore critical needs. Interestingly wealthy households are less likely to spend on health care than the bottom quintile of households: for Quintile 5 in the decision models in Table 7, the predicted probability is 6 percentage points lower than an otherwise similar household in the bottom quintile (see panel VI). The evidence also indicates no difference between the amount of health care expenditures by a household in the lowest quintile and a household of otherwise similar characteristics in the highest quintile while households in the third or fourth quintile would respectively spend 15% or 13% more on health care than the lowest quintile, as demonstrated in panel V of Table 8. What might explain this observation? Summary statistics indicate that higher quintiles have higher rates of self-reported illness or injury and higher rates of health care provider consultations. In addition, the quintiles have similar rates of health risk as measured by hospitalizations in past twelve months. Summary statistics also suggest that 3% of households in the lowest quintile had government, employer or insurance coverage compared to 9%, 8.4% and 7% of households in the third, fourth and fifth quintile respectively. Accordingly, who pays the greatest proportion of health care expenditures has influence on the level of expenditures. Health care expenditures are 13 percentage points less in households for whom government/employer/insurance is the financier of the greatest proportion of the health care expenses, than the case of an otherwise similar household in which the household head is the main financier as shown in panels II-V of Table 8.

The influence of education is interesting given that it is not statistically significant as a predictor of health care spending and yet it is significant in amount of expenditures. Descriptive statistics show that the average proportion of members that reported illness or injury was 0.54 in the case of household head having no years of schooling, but 0.11 for households where the head had had some years of schooling. This suggests households in Ghana exhibit health seeking behaviours consistent with the predictions of the classical theory of demand for health and the ample empirical evidence about the positive effects of years of schooling (Becker, 1965; Grossman, 1972; Fuchs, 1980). It is not evident that the influence of education reflects differences in ability to pay in the case of households in Ghana. Summary statistics and bivariate regression analysis show years of schooling do not strongly correlate with the income indicators; this condition itself is an advantage in minimizing collinearity between the regressors. Moreover, Student's t-test statistics show no difference in the averages of employed (53%) versus unemployed (47%) household heads who had never been to school and those that had some years of schooling. Further analysis to understand the role of education in health care demand and outcomes in Ghana is a prospective area for research.

The other household social, demographic and community characteristics as control variables have expected outcomes on household health expenditure patterns. An additional member increases average health care expenditures by 12 percentage points holding other variables constant. The coefficient on gender of the head of household is not statistically significant either as a predictor or a determinant of health expenditures though. Religion has the expected influence: a non-Christian household is less likely than a Christian household to spend on health care. Time travelled exceeding the average 2.37 significantly increases the amount of health expenditures as shown Table 8.

Incidence of catastrophic health care expenditures

Further analysis of the data helps to identify the ability to pay for the reported health care payments in terms of equivalence scaled household total consumption expenditures. The assumption is that households should have some minimum consumption level for survival. Therefore, health expenditures that potentially reduce this consumption level are catastrophic as they potentially plunge households into poverty or make existing poverty worse, even if transitory. Vulnerability to shocks has several dimensions: (1) ability to cope with shocks when they happen; (2) exposure to shocks (e.g. poor households may be exposed to more shocks than rich ones); and (3) frequency and magnitude of shocks. Ability to cope may be estimated as the ability to pay for the cost of health care while exposure to shocks looks at the likelihood of tipping over into poverty or going deeper into poverty. The frequency and magnitude of shocks would include a combination of the illness incidence and the recovery rate from the costs involved. This study focuses on the ability to cope with health shocks in terms of the proportion of health care expenditures in total household consumption expenditures, in other words disposable income. Expenditures data are preferred since they tend to be more reliable than income data in the developing country context (Xu et al., 2003).

Since reported health care expenditures cover the two-week preceding interview, the measures of ability to pay are similarly scaled to the two-week (adult equivalence scale weighted) consumption expenditures of the household. The caveat is health care expenditures are random than consumption expenditures and that a smoothed-out consumption expenditures (over two weeks) are theoretically not comparable with health expenditures that randomly occur over the same period. The emphasis here is on these consumption expenditures as estimates of what a household could afford in health care assuming resources were fixed in the short term, given the real risk of a health shock. Also, in respect of ability to pay, the cases where government, employer or insurance is responsible for the greatest proportion of household health care expenditures are excluded from the analysis for want of a correct weight.

Incidence of catastrophic health expenditures is estimated as a headcount of households who fall below a calculated threshold (Wagstaff & Van Doorslaer, 2008; Xu et al., 2011). The household is the focus of analysis in this paper therefore household expenditures are an aggregate for all members of household. As noted by Wagstaff and Van Doorslaer (2008) this approach obscures the distribution of catastrophic payments experienced by individual members. This paper implicitly assumes income transfers are made across household members to absorb health expenditures. Over the long-term health expenditures coping mechanisms may be different than the short term; the household may liquidate or build wealth to cover health expenditures, or deplete resources and worsen ability to cope, for a given health shock. As such a snapshot (as in cross section data) ignores long term ability to cope but at least, transitory hardship is assumed by catastrophic measures in this study.

Following Wagstaff and van Doorslaer (2008), two measures of ability to cope are adopted for this study: first is the ratio of health care to total household consumption expenditures; second, the ratio of health care to total non-food expenditures. Two thresholds are chosen for comparison: 25% and 35% of total household consumption expenditures gross of health care payments is used as a measure for catastrophe. As a measure of ability to pay, 65% and 85% of total consumption expenditures gross of health care expenditures but net of food expenditures (as proxy for capacity to pay income) are compared. Although the thresholds are arbitrary the choice was informed by the average shares of food (60%) and non-food in total household expenditures. The average food share is 60% and 57% for GLSS4 and GLSS5 respectively. Therefore, a threshold of 35% for health expenditures is the equivalent of almost all non-food expenditures. A similar reasoning informs the choice of 85% of non-food expenditures as the ability to pay measure. One may consider also that information on indirect costs like loss of labor income, cost of special foods and lifestyle changes due to health care seeking are unspecified in the data therefore these thresholds could be an underestimation of catastrophic health costs. A measure for the extent to which catastrophic expenditures overshoot the threshold, hence a measure of the excess gap is also derived. The catastrophic overshoot, O_i, is measured as the distance by which household *i* exceeds the threshold. Further details about this calculation are provided.in the appendix.

TABLE 9
HOUSEHOLDS WITH POTENTIAL CATASTROPHIC HEALTH CARE EXPENDITURES: HEALTH CARE AS PERCENT OF TOTAL HOUSEHOLD EXPENDITURES

	1998/1999 GLSS4						2005/2006 GLSS5					
	Incidence		Excess gap		Mean positive gap		Incidence		Excess gap		Mean positive gap	
Threshold level (%)	25		35	25	35	25	25		35	25	35	25	35
Welfare quintiles	Percent of households exceeding the threshold		Health care spending more than the threshold (%)				Percent of households exceeding the threshold		Health care spending more than the threshold (%)			
1	28.4	20.7	19.0	16.6	67.1	80.1	28.9	22.7	17.8	15.3	61.7	67.2
2	18.6	14.5	7.6	6.0	40.9	41.5	20.6	14.1	8.9	7.2	43.3	51.0
3	19.7	13.1	9.8	8.2	49.7	62.6	15.5	10.8	8.2	6.9	53.2	64.3
4	16.3	11.2	5.9	4.6	36.5	40.9	13.4	7.9	4.6	3.5	34.3	44.8
5	14.1	8.5	5.2	4.1	36.9	48.4	6.8	4.4	2.7	2.1	39.4	48.2
All	18.3	12.6	8.5	7.0	46.6	55.9	16.5	11.6	8.1	6.7	49.3	58.2

Source: Calculations based on data from GLSS4 and GLSS5

Patterns in Catastrophic Health Care Payments

Poor households exhibit the least reduction in catastrophic payments incidence and excess gaps over time. Results of the catastrophic measures for both GLSS4 (1998-99) and GLSS5 (2005-06) are presented Table 9 and Table 10. The average catastrophic headcount is lower in 2005-06 (16.69%) than in 1998-99 (18.31%) at the threshold of 25% of total expenditures. The incidence rates are dismal if one considers the share of non-food expenditures. While health expenditures may be a smaller proportion of household total expenditures for higher welfare quintiles, in terms of the capacity to pay, a greater proportion do fall short. In 2005-06 the average food expenditures share was lower (55%) than in 1998-99 (60%) yet 65% to 85% of non-food expenditures was not enough to cover health expenditures for a greater proportion of households. Relative demand for health care may have increased, perhaps because health care is more accessible, or that the need or desire for health care has increased. Alternately the relative prices of health care have increased hence a greater share of the household non-food budget. The extent to which households exceed the catastrophic thresholds is observed in the gap measures. Not surprisingly the overshoot of expenditures above the threshold is steeper among poorer households. Mean positive gap estimates indicate that households that exceeded the 25% threshold did so to the extent of 147% of two-week equivalent non-food expenditures in 2005-06. The mean positive gap increases from 1998-99 to 2005-06 and for every quintile except for the poorest quintile. An explanation may be that the poorest are simply not able to afford more health care and can no longer exceed their thresholds any farther. Alternatively, the poor have fewer perceived health needs.

TABLE 10
HOUSEHOLDS WITH POTENTIAL CATASTROPHIC HEALTH CARE SPENDING: HEALTH CARE AS PERCENT OF NON-FOOD EXPENDITURES

	1998-99 (GLSS4)						2005-06 (GLSS5)					
	Incidence		Excess gap		Mean positive gap		Incidence		Excess gap		Mean positive gap	
Threshold level (%)	65	85	65	85	65	85	65	85	65	85	65	85
Welfare quintile	Percent of households exceeding threshold		Health care expenditures more than the threshold (%)				Percent of households exceeding threshold		Health care spending more than the threshold (%)			
1	30.6	25.0	17.8	15.3	198.3	232.4	32.0	24.9	63.5	57.8	184.3	204.0
2	20.6	16.4	8.9	7.2	112.6	123.5	22.6	17.4	25.4	21.5	139.9	153.3
3	16.6	13.1	8.2	6.9	157.8	181.6	20.8	16.0	32.8	29.1	133.8	148.5
4	12.7	9.1	4.6	3.5	119.5	132.3	17.7	13.7	21.2	18.1	103.5	119.7
5	6.5	4.7	2.7	2.1	115.7	130.7	14.1	10.6	16.3	13.8	130.1	157.3
All	16.8	13.1	8.1	6.7	142.8	163.0	19.9	15.3	28.5	25.0	147.6	166.1

Source: Calculations based on data from GLSS4 and GLSS5

Predicting catastrophic health care payments

What these catastrophic ratios indicate is the real risk for households that are unable to adjust to short term health care expenditures. Higher mean positive gaps imply a greater potential for catastrophic expenditures when health care needs or health care demand extend to the longer term. One would agree that such factors as recurring morbidity (as in chronic illness) and the intensity of morbidity (as in hospitalizations) for a given expenditures level would have greater risk for catastrophic expenditures. The following probit model is estimated to relate the incidence of illness (measured by proportion of household members that are ill), income and location to the probability for catastrophic payments:

$$\text{prob}(cata_i) = \text{prob}(\alpha + \beta loc2_i + \delta daysill_i + \gamma income_i + e_i > 0) \quad (12)$$

where for the ith household $cata_i$ is a categorical variable which takes on value 1 if the share of total health expenditures exceeded a threshold of 25% of total expenditures gross of food and 0 otherwise; $loc2_i$ is a categorical variable for location of household and equals 1 if rural and 0 if urban; $daysill_i$ is the number of ill days of all household members that reported illness or injury; $income_i$ is the household total nominal income reported; e_i are normally distributed errors. The results are presented in Table 11.

TABLE 11
PROBABILITY OF CATASTROPHIC HOUSEHOLD HEALTH CARE EXPENDITURES, GLSS5

	Estimated coefficient	Predicted increase in the probability	p-value
dummy_rural (base is urban)	0.107**	0.024	0.018
daysill	0.041***	0.009	0
total household income	0.000	0.000	0
Constant	-1.370***		0

Source: Calculations based on GLSS5 data
Note: Dependent binary indicator variable = 1 if household catastrophic health expenditures
N = 5, 249
**p<0.05 ***p<0.01

Being in a rural locality increases the probability that a household has catastrophic health expenditures by 2.4 percentage points over the case of the urban household when all other factors are held constant. The influence of household income is not statistically significant but an additional day of illness has a small impact. A second model is estimated to control for differences in welfare or poverty status and consequently location given that rural locations have greater proportions of households in the lower welfare quintiles and vice versa for urban locations. This model looks at the intensity of morbidity and the share of food expenditures as determinants of the probability of a household making catastrophic expenditures. The probit model is as follows:

$$\text{prob}(cata_i) = \text{prob}(\alpha + \beta ipdays_i + \delta foodexp_i + e_i > 0) \quad (13)$$

where for household i $cata_i$ is a binary variable which takes on value 1 if the share of total health expenditures exceeded a threshold of 25% of total expenditures gross of food and zero otherwise; $ipdays_i$ measures the total number of inpatient days reported for all affected household members; food is the share of food in total household expenditures. Separate estimations are here made for each quintile of welfare to account for differences in welfare. The results are summarized in Table 11.

The probability that a household incurs catastrophic health expenditures increases in the number of days of hospitalizations. The predicted increase is greatest at 11.6 percentage points for the poorest households and decreases successively for the better offs up to a low of 2 percentage points for the highest quintile. The influence of food share is significant only for the poorest and wealthiest quintiles but in opposite directions, and the effect is stronger for the poor. For the poorest, the likelihood of catastrophic health expenditures decreases with the share of food in total expenditures. For the wealthiest, the likelihood of catastrophic expenditures increases with the share of food. A possible explanation is that the poorer households have had to shift expenditures from food to health even in the short term. The better offs can meet the stipulated catastrophic payments thresholds without substituting food expenditures. Obviously, the wealthiest must reach higher food expenditure ratios than the poor before substitution for health care with food or vice versa occurs. For the middle households, food expenditure ratios are not statistically significant predictors of catastrophic health expenditures.

TABLE 12
PROBABILITY OF CATASTROPHIC HOUSEHOLD HEALTH EXPENDITURES, BY QUINTILE OF WELFARE, GLSS5

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
	Predicted change in probability				
ipdays	0.116***	0.070***	0.05***	0.05***	0.02***
food	-0.32***	-0.10	0.20	0.03	0.08**
Sample	986	978	981	1064	1240
Pseudo R^2	0.07	0.06	0.05	0.06	0.07
Log like-lihood	-552.4	-464.9	-402.9	-394.3	-287.1

Source: Calculations based on GLSS4 & GLSS5 data
**p<0.05 ***p<0.01

Some patterns are noted in the analysis of household health expenditures and the potentially catastrophic out of pocket payments. Evidently, for households in Ghana the share of food in household budget is a good indicator of ability to afford health care. Locality of residence is significant while income fails to predict catastrophic payments. The incidence of hospitalization and the consequent higher health care payments have significant influence in the likelihood that a household makes catastrophic expenditures regardless of welfare status.

CONCLUSIONS AND POLICY IMPLICATIONS

This study set out to analyze out of pocket health care expenditures and the incidence of catastrophic health care payments by households in Ghana with the objective to estimate the relative effect of income and need as determinants. The findings conclude that health care expenditures are critically responsive to health needs while income has a low degree of responsiveness. The share of food in the household budget is a good indicator of vulnerability to catastrophic spending. Health spending forces the poor to substitute health care with food or vice versa. The incidence of catastrophic health care payments has improved but at the expense of a higher concentration of catastrophic payments among the poor, based on a comparison of expenditures in GLSS5 in 2005-06 and GLSS4 in 1998.

Reforms in health care financing and delivery, even universal health coverage policies, would be regressive if vulnerable households are not effectively identified and targeted. The National Health Insurance Scheme is a policy in the right direction to reduce catastrophic out of pocket payments but its usefulness as a protection against financial risks of seeking health care depends critically on how effective it targets the vulnerable. For example, a mandatory component to NHIS enrollment such as requiring enrollments by whole households could be pursued in the hopes of improving financial viability while also increasing coverage. These efforts should be accompanied by education programs and incentives to improve healthy lifestyles and health-seeking behaviours. Also, knowledge about nature of household health care seeking, the costs and the burden that it places on them is important to any meaningful effort to reduce the financial risks of seeking health care. Longitudinal studies in this area should be pursued.

Several limitations of this study have been noted. What sums up these limitations is the identification and specification of the household health care demand function and the appropriate information needed to investigate health care expenditures in Ghana. Longitudinal studies would be useful, for example, to investigate the health behaviors, coping mechanisms to health shocks and effective ways to target the vulnerable. The results suggest important differences in the specification of health care demand for different groups of households, such as rural-urban localities, income groups and education status. Similar useful studies would concern the health care seeking behaviour of different socioeconomic, sociocultural or demographic groups, households or individuals.

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APPENDIX

A measure for the extent to which catastrophic expenditures overshoot the threshold is also derived, hence a measure of the excess gap (Wagstaff and van Doorslaer 2008). The catastrophic overshoot, O_i, is measured as the distance by which household i exceeds the threshold. Suppose S_i represents the expenditures share for household i and T represents the catastrophic threshold. Then catastrophic overshoot for household i, is as follows:

$$O_i = S_i - T > 0, and\ zero\ otherwise \quad \text{A14}$$

This is a measure of the catastrophic payment gap (analogous to the poverty gap in the poverty literature). This gap is summed up and divided over all households that demanded health care, hence to get the mean excess gap, G_e, as follows:

$$G_e = \frac{1}{N}\sum_{i=1}^{N} O_i = \mu_o \quad \text{A15}$$

where μ_o is the mean of the overshoot, hence the overall mean catastrophic gap.

Incidence of catastrophic health expenditures is calculated as the proportion of the population that fall above the threshold. The catastrophic head count, C_h, of the population is as follows:

$$C_h = \frac{1}{N}\sum_{i=1}^{N} E_i = u_e \quad \text{A16}$$

where $E_i = 1$ if $S_i > 0$, and 0 otherwise and u_e is the average of E_i across the sample.

The average catastrophic gap among only the households with a positive gap, the mean positive gap G_H is therefore:

$$G_H = \frac{\frac{1}{N}\sum_{i=1}^{N} O_i}{\frac{1}{N}\sum_{i=1}^{N} E_i} = \frac{\mu_o}{u_e} \quad \text{A4}$$

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