GRIPS Discussion Paper 11-14

The Progressivity Of Health Care Services In Ghana

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November 2011

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Abstract

This paper examines the incidence of public health subsidies in Ghana using the Ghana Living Standards Survey. Using a combination of (uniform) benefit incidence analysis and a discrete choice model, our results give a clear evidence of progressivity with consistent ordering: postnatal and prenatal services are the most progressive, followed by clinic visits, and then hospital visits. Children health care services are more progressive than adults'. Own price and income elasticities are higher for public health care than private health care and for adults than children. Poorer households are substantially more price responsive than wealthy ones, implying that fee increases for public health care will impact negatively on equity in health care. Simulations based on an estimated nested logit model show the importance of opportunity costs in healthcare decisions and suggest that reforms that focus only on out-pocket expenses will have a limited ability to extend public healthcare to all potential users..

Keywords: Ghana, public health spending, progressivity, demand for health care, nested multinomial logit, poverty.

*JEL Classification Codes***:** H22, H51, H52, H53

1 Introduction

Human capital is increasingly recognized as a potentially effective approach to poverty reduction through its effect on economic growth and redistribution to the poor. Central to this is health—improving access to quality health care and nutrition services, ensuring sustainable health financing, and ensuring efficiency in services delivery—requiring massive public investments in the health sector (GOG 2005). Recently, Ghana's public health expenditures have increased dramatically under the poverty reduction program, reaching about 6.0 percent and 22.7 percent of total government expenditures and discretionary expenditures respectively in 2005 (Osei et al, 2007). During this period, some strong gains were also made in the country's economic improvements as reflected in GDP and per capita income growth rates, stable currency, declining inflationary pressures and poverty rates. For instance, poverty levels have fallen

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consistently from 51.7 percent in 1991 to 28.5 percent in 2005, with extreme poverty even falling more (18.5 percent to 9.6 percent).

These expenditures, if well targeted, should impact on the living standards of poorer households. However, the pace of health development in the country has rather stagnated during this period, as reflected in the under-five and infant mortality rates, life expectancy, and the Human Development Index (HDI). For example, both under-five and infant mortality rates have not seen any significant changes between 1993 and 2003 while life expectancy declined from 57.42 years in 2000 to 56 years in 2005. The country's HDI also fluctuated, dropping from 0.563 in 2001 to 0.520 in 2005 (see MOH, 2007) before recently rising to 0.54 in 2010. Meanwhile, investments in the sector tended to be concentrated on the supply side such as the provision of new facilities and expansion of the existing ones, often neglecting the demand side factors such as utilization (Demery et al., 1995). Recent estimates indicate that about 40 percent of Ghanaians do not seek medical attention during illness. One issue is therefore whether these expenditures are well targeted? How have they affected access to, and the utilization of health care services? Who then are the actual beneficiaries of those spending increases and what factors determine the public's utilization of health care services.

We have three main goals in this paper. First, the published evidence on the progressivity of health care services in Ghana (e.g. Canagarajah and Ye (2001)**)** is getting dated and there is value in updating it to reflect the rapid changes in the country, using the most recently available living standards survey, the GLSS5 and employing methods used in comparable studies for other countries in sub-Saharan Africa (e.g. Glick and Razakamanantsoa (2005)). Secondly, we seek to build a model of household healthcare choice that is sufficiently flexible for use in some reasonable policy simulations. To that end we use the household level data from the GLSS to build a nested multinomial logit (NML) model in which households choose between public, private and no health care to estimate demand for health care services. We also apply the methods of Morey and Rossmann (2007) to value health services to households using the compensating variation. Our final goal is to consider the demand and distributional impacts of some options for future policy reform. We use the estimated demand model to simulate the impact of free public services, reductions in income poverty and improvements in geographical access to treatment options. In doing so we see the central role of opportunity costs rather than out-of-pocket expenses on healthcare choices. The remainder of the paper proceeds as follows:

Section 2 provides a brief overview of the health sector in Ghana. The review of previous research is considered in section 3 while section 4 introduces the data sources. Sections 5 and explain the research methodology and discuses the results. Section 7 presents the concluding remarks and policy implications.

2 A Brief Overview of the Health System

Ranking as one of the most developed in the sub-region (Canagarajah and Ye, 2001), Ghana's health sector boasts two teaching hospitals and a sizeable number of regional/district hospitals, clinics, as well as community health centres and posts. It comprises three main types of health care providers—the public sector, private religious and private non-religious. By 2007, there were 1557 public health facilities, 1225 private non-religious health facilities, and 229 private religious health institutions (MOH 2008). These formal institutions are complemented by traditional and spiritual healers that provide care for some 4.0 percent of the population that sought health care in 2005.

The economic crisis of the early 1980s severely affected budgetary resources to the sector and caused serious deteriorations in health infrastructure and the entire health delivery system, thereby undermining the primary health care strategy adopted in the late 1970s as a vehicle for achieving 'Health for All' by the year 2000 (Demery et al., 1995; Canagarajah and Ye, 2001). The health sector reform of 1985 was therefore aimed at reversing the declining standards and decentralizing health administration to local levels. The user charges introduced as a cost recovery measure under 1985 health reform did not make any significant impact on revenue but rather alienated people from the public health care system (see Asenso-Okyere, 1995). Known as the "cash and carry", it was a system of cost recovery whereby users of public health facilities have to contribute towards consultation costs, and pay the full cost of drugs, except for vaccinations and the treatment for certain diseases—introduced under the 1985 health sector reform program. Note that these user charges were not new in the health sector reforms of 1985. They were first introduced in 1971 under the Hospital Fee Act. What was new under the 1985 reform was the substantial increases in these fees—meant to cover at least 15.0 percent of the Ministry of Health recurrent expenditure (Demery et al., 1995). More recently, government spending on the health sector has expanded both in real terms and as a share of GDP (Demery et

al., 1995). As a share of total expenditures, public health grew by more than 3 percentage points between 2000 and 2005, from 2.9 percent to 6.0 percent over this period.

Unlike, say, education the private sector is the dominant player, providing treatment for more than half (55.5 percent) of the population seeking health care in 2005. In 2004, the private sector's health expenditure as a share of the GDP was 3.9 percent as compared with 2.8 percent for the public sector (HDR 2007/08). The central government (GOG) remains the main financier of public health care, providing over 70 percent of the Ministry of Health Budget. Donor funding, though significant, has been declining in recent years—it fell from 28 percent in 1992 to 14.3 percent in 2008 (Abekah-Nkrumah et al., 2009). This drastic decline on donor supports to the health sector is due to the HIPC initiative which allows savings made under the program to be channelled into the social sector such as health while direct donor supports declines.

The search for a more sustainable health financing scheme therefore lingered on until 2003 when the health insurance bill was enacted, introducing the district mutual health insurance, private health insurance, and private mutual health insurance schemes. The National Health Insurance Scheme (NHIS) became fully operational in 2005 and accounted for 31.6 percent and 32.6 percent of the health sector total resources in 2006 and 2008 respectively (Abekah-Nkrumah et al., 2009). It is funded from 2.5 percent of value added tax revenue. In addition, formal sector employees are supposed to pay their annual premium from their social security contribution while other members of the public pay a token of GH¢7.5 per year.

3 Public Spending, Health Outcome, and Poverty

Research on the impact of public spending on health outcome suggests mixed results. Bidan and Ravallion (1997), in a cross country study of 35 developing countries find that public health spending impacts positively on health outcomes such as life expectancy and infant mortality rates. Filmer and Pritchett (1999) also show that doubling spending from 3 to 6% of GDP would improve child mortality by only 9 to 13%. Gupta et al. (2001) find for a cross-section of developing and transition economies that the poor have significantly worse health status; and that although the poor are more strongly affected by public spending than the non-poor, merely increasing public spending will not guarantee improved health status. The general

consensus is that increasing public spending alone is insufficient for achieving improved health status of the poor.

Since the path-breaking work by Aaron and McGuire (1970) and twin World Bank studies—Meerman (1979) in Malaysia and Selowasky (1979) in Columbia—the (standard) benefit incidence (BIA) method has become an established approach for assessing the distribution of public expenditures for the poor in developing countries. Castro-Leal et al. (2000) have reviewed a sample of studies based on BIA of public health expenditures in Africa and find that, the poorest quintile gained only 12% of public health spending in Ghana (1992), 11% in Cote d'Ivoire (1995), 4.0% in Guinea (1994), 14% in Kenya (1992), 12% in Madagascar (1993), 17% in Tanzania (1992/93), and 16% in South Africa (1994). The poor is found to generally benefit more from basic care such as preventable health and public health services, while benefits from curative health accrue disproportionately more to the well-off.

Recent empirical evidence on household choices between health care providers in developing countries includes Gertler, et al. (1987), Dor and Van der Gaag (1992), Mwabu et al. (1993), Ellis et al. (1994), Akin et al. (1995), Glick, et al. (2000), Lindelow (2002), Sahn, et al. (2003), Kasirye, et al. (2004), Kamgnia (2008), and Amaghionyeodiwe (2008). Akin et al. (1995) estimated demand for health care in Nigeria and find that the price of health care is a significant determinant of the choice of health care provider, even after controlling for quality. However, previous studies have found that the magnitude of the price effect is very small. Specifically, they found that the low price elasticity is more pronounced among the public health care providers than the private providers. For example, Mwabu et al. (1993) find in Kenya that a 10% increase in the price of public health services reduces demand by only 1.0 percentage point while a 10% increase in the price of private health services would reduce demand in private hospitals by 15.7 percentage points and 19.4 percentage point in private clinics. This suggests that increased user fees could generate additional revenue for the public sector without any significant reduction in demand.

Historically, Asenso-Okyere (1995) has found in Ghana that the user charges introduced as a cost-sharing measure in 1985 resulted in an average of less than 10% cost recovery and a drastic drop in attendance at health facilities, especially in rural areas. A similar finding reported in Asenso-Okyere et al. (1998) shows that cost recovery measures in Ghana led to a switch towards self-medication and other behaviours aimed at cost saving. Sahn et al. (2003) estimated

demand for health care in rural Tanzania and find that a rise in the price of public health care leads to a substantial substitution into private health services. Doubling the price of public clinics or public hospitals resulted in a decline in the probability of their use by 0.10 while doubling the price of private clinics was accompanied by a large increase in the use of public clinics. In Ghana, Lavy and Quigley (1993) found that the price elasticity for inpatient visits was -1.82, while only -0.25 for outpatients. Van Den Boom et al. (2008) find that proximity to a health facility and the cost of treatment have a significant impact on health-care utilization in Ghana. Kamgnia (2008) finds that user fees and increased quality has led to an increase in the utilization of health facilities in Cameroon. Amaghionyeodiwe (2008) finds in Nigeria that distance and price significantly discourage individuals from seeking modern health care services.

Younger (1999) uses a combination of benefit incidence and the WTP methods to assess the relative progressivity of social services in Ecuador and finds that children' health consultations, are more progressive than adult health consultations. In a related study in Peru, Younger (2000) finds that, almost all of the health care services are progressive but not per capita progressive. In particular, he finds that non-hospital consultations (health centres and posts) are more progressive than hospitals consultations, irrespective of whether they are free or not. Glick and Razakamanantsoa (2005) find in Madagascar find that most public health services are progressive. Specifically, basic health care consultations, outpatients' hospital care, prenatal care, and vaccination are all more equally distributed than consumption expenditures. Outpatient hospital care however is per capita regressive. In a more recent paper, Kamgnia (2008) finds in Cameroon that public health services are generally progressive but are less so in rural areas.

4 Data

The database for this study is the GLSS5 survey a nationally representative survey of households carried out in 2005. The survey collects information on the health status of respondents; that is, whether they have fallen ill or been injured during two weeks prior to the survey and if they have sought medical attention, the place of consultation, healthcare expenditure and the type of facility (public or private). Other important information such as the respondent's age, gender, education, household income and expenditures are also covered. As the demand for healthcare is a negligible amount amongst the healthy in the GLSS dataset, we

include only those who have reported an illness/injury or both. We also exclude those whose health cost is borne by others such as employer or other relatives.

A potential issue with the dataset is the timing of its collection. As we noted above, in 2005, Ghana was at the start of a slow but significant switch to a National Insurance scheme. Using data from the 2008, Demographic and Health Survey (DHS), Agar Brugiavini and Noemi Pace, (2010), estimate that as of 2008, thirty-nine percent of women and 29.7 percent of men were covered by the NHIS, while Jehu-Appiah et al, 2011, quote official enrolment figures of 55% of the population for 2009. Enrolment in the scheme seems to have plateaued and is skewed towards those in formal occupations and those with higher incomes or better education (Jehu-Appiah et al, 2011). Access to facilities registered under the National Insurance legislation is one major factor that limits enrolment and helps explain the heterogeneous pattern of enrolment by geographical region. The DHS represents an alternative data source on health care facility use that is nationally representative, more recent and covers some of the period after the reforms. However, the usefulness of the DHS is fundamentally hampered by the lack of information on income and other economic variables. As a result it cannot be used for standard estimates of benefit incidence and it is also an imperfect basis for a model of healthcare demand. Meanwhile the dataset used by Jehu-Appiah et al, 2011, covers only two regions. Though the GLSS5 data was gathered before the introduction of the NHIS it is suited to benefit incidence and contains detailed economic information on expenditures and opportunity costs of the sort that is valuable in modelling the structure of household choices.

5 Estimation

5.1 Benefit incidence and welfare dominance

In practice, a benefit incidence analysis involves three steps:(i) valuing public services (estimating the unit cost or unit subsidies implied by the provision of public services), (ii) imputing the unit subsidy to households or individuals who use the service, and (iii) aggregating individuals or households into subgroups of the population to compare the distribution of the subsidy among different groups. The groupings are done according to some welfare measure such as household expenditure per capita or adult's equivalent. We use the commonly-employed binary indicator approach, which assigns the value of unity of if a particular service is used, zero otherwise (Younger 1999, Glick and Razakamanantsoa 2005).

The formal approach to analyzing benefit incidence (the so-called 'welfare dominance' testing) is provided by Yitzhaki and Slemrod (1991). They prove that for any social welfare function that favours an equitable distribution of income, marginally increasing subsidies on good x while reducing those on good y by just enough to keep total income unchanged will improve social welfare when x's concentration curve is everywhere above y's. The concentration curve is a normative tool similar to the Lorenz curve, and plots the cumulative shares of individuals in the population, ranked by household expenditure per capita/per equivalent adults on the x-axis and the cumulative shares of benefits on the y-axis. However, unlike the Lorenz curve, which represents the cumulative percentage of total income held by a cumulative proportion of the population (after ordering income in increasing magnitude), a concentration curve can lie above the diagonal—the poorest 40% of the population cannot earn more than 40% of total income, but they can receive more than 40% of total benefits from public spending (Hakro and Akram (2007)).

Two measures of progressivity can be defined (Younger et al., 1999; Glick and Razakamanantsoa, 2005). 'Expenditure progressivity', or simply progressivity, involves comparing the distribution of the benefit to the distribution of welfare (expenditures). If the benefit concentration curve dominates the expenditure Lorenz curve—that is, if it is at all points above the curve for household expenditures—then the benefit is said to be progressive. Such a benefit would more likely redistribute the resources even if funded by proportional taxes, and the poorer are comparatively better off when considering both their income and public spending, compared to considering only their income (Hakro and Akram (2007)).

The second measure is called 'per capita progressivity' following Sahn and Younger (2000). This compares the distribution of the benefit to the distribution of the population rather than expenditures. A benefit is said to be per capita progressive (pro-poor) if the benefit curve lies everywhere above (dominates) the 45 degree line. Benefits whose concentration curves lie everywhere above the diagonal show that poorer households receive disproportionately large shares of the benefit. This measure is stricter but insures that, for any definition of the poverty line, the poor receive a disproportionate share of the benefit. Concentration curves that lie below the Lorenz curve are classified as regressive—the benefit accrues disproportionately to the wealthy. It is also possible to rank different services according to their progressivity. For example, a given subsidy is said to dominate another if its concentration curve is everywhere

above the concentration curve for the other. The concentration coefficient, which is calculated in the same fashion as the GINI coefficient, estimates the inequalities in the distribution of government expenditures. The difference however, is that the concentration coefficient is calculated by keeping the income group the same (Hakro and Akram (2007)). The concentration coefficient can lie in range of -1 and 1 while the GINI coefficient lies between 0 and 1. If the concentration coefficient is lower than the GINI coefficient, it shows that expenditures are more evenly distributed than income and vice versa.

Decision to seek care and health seeking behaviour

Reporting illness and seeking care vary with income, education, age and area of residence, with the poorest quintile showing lower rates of reporting illness (14.0 percent) compared with the richest quintile (25.7 percent). Of those reporting illness, about 60 percent sought health care—about 53 percent for the poorest quintile compared with about 63 percent for the richest quintile; about 68 percent for urban residents compared with 55.5 percent for rural residents (Table 1). The lower rate reported for rural areas contrasts sharply with the slightly higher rate for reporting illness for rural (20.4 percent) compared with urban (19.1 percent) areas. The low rate of reporting illness among the poor should not be interpreted as lower prevalence of sickness among this group. Rather, it could mean there is high health consciousness among the rich, which of course increases with improvements in living standards and education. Besides, the poor are likely to accept illness as a normal feature of life which they do not consider worth reporting. Reporting of illness is highest among infants (30.75 percent) and elderly (30.69 percent) as compared with other age categories. These groups are more susceptible to illness due to weak immune system. Public hospitals account for about a quarter (25.77 percent) of all categories. Its utilization however increases both with income and education (Table 1). Urban residents received about 34 percent of health care from public hospitals compared with 20.5 percent for rural dwellers.

Usage of public clinics is generally common among the poorest and rural households and the uneducated, ranging between 19.76 percent and 11.20 percent for rural and urban residents respectively. Though utilization of private facilities is higher for the richest quintile compared to the poorest quintile, private facilities form just about 12 percent of all categories for the richest quintile, thus, confirming the finding that in Ghana the rich utilized more of public facilities

(Demey et al. (1995)). Traditional healers and spiritualists both accounted for just 4.36 percent of all categories, showing a low patronage of informal health care among Ghanaians who seek medical care. The utilization of traditional healers actually decreases with income and education and are also more prevalent in rural areas. The use of drug store is very common among Ghanaians, accounting for over 32.0 percent of all categories. Its utilization however, decreases with income and education and is also more common among males than females. Pharmacies form just about 7.43 percent of drugs stores and 2.4 percent of all categories (Table 1).

Progressivity of public health care services

Progressivity analysis enables us to examine the extent to which public health spending effectively reached the poor. We could also identify which public health services redistribute public subsidies disproportionately towards the poor. We measure progressivity for curative health care (hospital and clinic visits), postnatal care, and prenatal care. It is important to bear in mind that progressivity refers only to public health services. Figure 1 presents the concentration curves for publicly provided health services. These curves are supported by the statistical dominance test (Table 2) and the GINI and concentration indexes (Table 3).[1]

We first compared these services to the benchmark Lorenz curve and the 45-degree line. A casual inspection of the concentration curves shows that both public hospital and public clinic visits are progressive—they are less concentrated than the Lorenz curve of household expenditure—but are per capita regressive. Public clinics are nearly pro-poor—it appears it crosses the 45-degrees line at the 20th percentile indicating dominance over the 45-degree line. Postnatal and prenatal services are per capita progressive, indicating a clear case of pro-poor targeting for these services. The fact that basic care (clinic care in this case) is more progressive than hospital care reflects the urban location of hospitals (Glick and Razakamanantsoa, 2005). These results are not dissimilar to those in previous waves of the GLSS (Demery et al., 1995; Canagarajah and Ye, 2001) and those from other countries (Sahn and Younger, 2000; Castro-Leal et al., 2000; Glick and Razakamanantsoa, 2005; Kamgnia, 2008). The absolute progressivity of prenatal and postnatal services reflects two things: 1) there is high fertility among low-income households; and 2) the distribution of public prenatal and postnatal services

[1] Households are ranked by household expenditure per equivalent adults. The benefit incidence and the concentration curves and indices are estimated using "Distributive Analysis Stata Package (DASP)" by AbdelkrimAraar and Jean-Yves Duclos, *Université Laval* PEP, CIRPÉE and World Bank, 2009.

are well-targeted (Figure 1). Immunization services are also pro-poor. Overall, public health services are still progressive. even though the use of health services, particularly by the poor dropped drastically after the introduction of the 'Cash and Carry' system,

We can also compare the concentration curve for one health service with another health service—relative progressivity test. From Table 5, clinic consultations dominate hospital consultations, indicating that clinic care is more progressive than hospital care. There is no dominance between prenatal care and postnatal care but they all dominate clinic and hospital services. Thus, by this classification of health services, prenatal care and postnatal care are the most progressive, followed by clinic visits, and then hospital visits. Note that most prenatal and postnatal services are basically free while curative care attracts high user fees. Besides, there are more children in poorer households than in richer household. Consequently, the poor tend to participate more in these services thereby making them more progressive.

5.2 Choice of health care providers

The benefit incidence analysis presented above lacks behavioural foundation, hence cannot be used for policy simulation. Demand estimation enables us to understand the behavioural responses to public spending. Previous studies on health care demand have used various specifications including the multinomial logit (e.g. Van Den Boom et al. (2008) in Ghana), multinomial probit (e.g. Akin et al. (1995) in Nigeria), and nested logit (e.g. Mwabu et al. (1993) in Kenya, Younger (1999) in Ecuador, Sahn et al. (2003) in Tanzania, Kasirye et al. (2004) in Uganda). The multinomial logit model however suffers from the Independent of Irrelevant Alternatives (IIA) restriction, which assumes that all alternative subgroups are uncorrelated and the cross prices elasticities are constant across subgroups, hence leading to biased estimates. The nested logit model relaxes the IIA restriction by allowing for correlation among similar alternatives (such as public and private).

We formulate our model in the spirit of Gertler et al (1987), Sahn et al (2003). We assume that the individual or household has a utility function that depends on the quality of the health care option selected and on consumption of all other goods. Confronted with the decision to seek health care, the individual must first choose either to seek care or not. Consulting a care provider improves the individual's health status but improved health is achieved at the cost of medical expenses paid and reduced consumption of other goods. Second, conditional on the

decision to receive care, an individual must choose the type of provider to consult (private or public). The individual chooses the option that yields the highest utility given all alternatives even the choice of no-care. An individual will only choose the no-care option only if it yields utility higher than all other alternatives. For each option, the indirect utility associated with choosing that option depends on:

$$V_{ij} = c(Y_i - P_{ij}) + \alpha_1 H_{ij} + e_{ij} \qquad (1)$$

where, $c(Y\text{-}P_j)$ is net income, which is given as household income (proxied by household expenditure, Y) less the cost of health care at option j, (P_j). The function H_{ij}, measures the quality of option j and is a function of the characteristics of that choice, as well as individual and household characteristics of the demander; and e_j is error which can be correlated across options within a branch. For the no-care or self-treatment option, $H_{ij}$is normalized to zero based on the assumption that the individual gains no utility from not utilizing health care. Since we cannot directly observe the change in health status, we replace H_{ij} by the reduced form equation for the utility from improved health status as follows:

$$\alpha_1 H_{ij} = \lambda Q_j + \psi_j X_i + n_{ij} \qquad (2)$$

where, Q_i is a vector of quality variables and X_i is a vector of observed household and individual characteristics. Substituting (2) into (1) yields:

$$V_{ij} = c(Y_i - P_{ij}) + \lambda Q_j + \psi_j X_i + \varepsilon_{ij} \qquad (3)$$

where, $\varepsilon_{ij}=e_{ij}+n_{ij}$. ψ_j is the coefficient on household and individual characteristics which are allowed to remain constant across alternatives. Following previous authors, the function, H_j is assumed to be linear while net income $c(Y_i - P_{ij})$ is assumed to be logarithmic.[2]

The specification used in this study is a nested multinomial logit with three options for health care considered—no-care or self-treatment, public, or private. In this framework, since the

[2] Previous authors have used various specifications: linear (Akin 1985; Dor and van der Gaag 1993); quadratic (Gertler and van der Gaag 1990; logarithmic (Younger 1999).

decision to choose a particular care provider is a discrete choice problem, the determination of demand involves estimating the probability that a particular service provider—public or private—will be chosen. In our model, two of the options are in one branch; while the other option (with utility normalized to zero) is in the second branch. Thus, the probability that a person chooses provider j is given as (4):

$$\pi_j = \frac{\exp\left(V_j/\sigma\right)\left(\sum_k \exp\left(V_k/\sigma\right)\right)^{\sigma-1}}{1+\left(\sum_k \exp\left(V_k/\sigma\right)\right)^{\sigma}}, \text{ k=j,i} \qquad (4)$$

where V_j is the utility of option j, V_i is the utility of option i, and σ is the dissimilarity parameter coefficient, which lies between 0 and 1 for the nested logit to be consistent with additive random utility maximization (Cameron and Trivedi 2009).

The cost of health care (P_j) includes both the direct and the indirect (opportunity) costs. The direct cost is the sum of consultation, cost of staying at health facility, cost of drugs, and cost of travel. The opportunity cost measures the cost of time required to receive health care, and it is estimated as travel time plus waiting time multiplied by the predicted wage estimated from a simple OLS wage function (Table A.1). For children, the predicted wage is mother's predicted wage since children do not work and mothers have to forgo their daily wage in order to accompany their wards to health facilities. The opportunity cost can be high, hence dominating total cost. In our model for instance, the share of opportunity cost in total health cost was 57 percent in the entire sample, 62 percent in the adults' sample, and 39 percent in the children sample. For the options not chosen, we estimate the monetary costs using the median cost for the individual's region, area of residence (rural/urban), and type of provider (public/private), following Younger (1999). For the no-care option, the net income is just the gross income.

The GLSS5 does not contain quality information; hence the H_{ij} is simply a function of household and individual characteristics. By leaving out important quality variables that probably correlate with net income and with the probability of choosing a particular care provider, it could mean that we are overestimating elasticity estimates which could tend to underestimate the incidence of the health services (Younger, 1999). Younger (1999) argues that this omitted variable does not affect the estimated progressivity of health care services.

We considered three samples, namely, entire sample, adults and children. Each model includes similar regressors of age, gender, relationship with head of household, net income, a dummy for level of education, a dummy of health insurance, and household size while controlling for religion, area of residence, and sector of employment. For the children equation, the level of education and sector of employment are those of the head of household. Out of a total sample of 7108 individuals, 26.45 percent of them consulted a public provider, 32.87 percent consulted a private provider, whereas 40.65 percent did not consult a health practitioner.

Table A.2 gives the definition of these variables while the means and the standard deviation are provided in Table 4. Mean household expenditures are reportedly higher for users of public facilities (GH¢2,237.47) than users of private facilities (GH¢2,136.79), and lowest for no-care (GH¢1,983.46). Mean health expenditures—both individual and household—are significantly higher for users of public facilities, followed by private non-religious, and private religious; and higher for urban than rural while showing no significant gender difference except for the poorest quintile (Table 3). Total cost of care (direct and indirect/ opportunity), including imputed cost for options not chosen, averaged GH¢10.42 for the entire sample, GH¢12.93 for the adults sample, and GH¢6.11 for the children sample. The opportunity cost, which includes the earnings forgone to seek health care, constitutes the lion share of this cost—GH¢5.95 compare with direct cost of GH¢4.47 for the entire sample (Table 4).

The mean travel time to seek care is much higher for users of public facilities, followed by private non-religious and private religious institutions. It however, decreases with income for both users of public and private non-religious health facilities but increases with income for users of private religious facilities. It also masks significant variation between urban and rural areas—much lower for urban than rural dwellers—thus, showing that richer and urban households have a better access to these facilities than poorer and rural households. From Table 4, the entire sample has a mean age of 28 years (41 years for adults), 54 percent are female (58 percent for adults and 48 percent for children), 33 percent married, 15 percent has some primary education and 25 percent attains primary six or some junior high schooling. Household size averaged 5.5 with 25 percent of households being female headed. The majority of the sample (68 percent) resides in rural areas while 78 percent work in the informal sector. Only 16 percent of the sample has health insurance (18 percent for adults and 14 percent for children).

Econometrics results

This section presents the estimation results of the nested multinomial logit model based on the specification presented above. This involves estimating the individual's probability of choosing three health care options: no-care, public care or private care, with no-care being the base category. The nested multinomial logit model allows us to relax the homoscedasticity (IIA) assumption of a potential conditional logit model. The tree structure is as if, the individual first chooses to consult a health care provider or not and then chooses the type of provider (public or private). Thus our result is conditional on having been sick. The results are presented in Table 5.

For each equation, the Wald tests reject the null of all coefficients being zero and the null of equality of coefficients across the public and private options. The nested logit reduces to the conditional logit if the two dissimilarity parameters are both equal to one (Cameron and Trivedi, 2009). Due to the nature of our nested structure, we constrain the no-care option to unity; hence its dissimilarity parameter is 1. The dissimilarity parameters, σ (0.459 for the entire sample, 0.474 for the adult sample, and 0.559 for the children sample) are between zero and one, thus indicating that our model is consistent with additive random utility maximization. The LR test, τ rejects the IIA assumption and gives a strong support for the nested logit instead of a standard multinomial logit, with the exception of the children model (Table 5).[3] The fact that the dissimilarity parameter is lower for the adults sample than the children and entire sample indicates a greater substitutability between public and private care for adults.

The coefficient on net income is statistically significant, both across sample and provider, relative to no-care or self-treatment option as expected. The significance of net income implies that cost of care and income, which enters the model via the net income function are also important determinants. As for individual characteristics, no statistically significant gender differences are observed at all conventional significance levels. This is consistent with the descriptive statistics which indicates no significant difference between male and female health seeking behaviour.

Female headed households however have significantly lower probability of seeking health care relative to male headed households, except for the children sample. Age has a negative and significant effect on the probability of seeking care, relative to children under 5

[3] The children model fails to reject the IIA assumption, thus indicating that a standard multinomial logit is acceptable for the children data.

years, both across options and across samples. In the adult model, elderly people have a lower probability to seek care compare with 15 – 21 year group. Thus, the probability of seeking care decreases with age, conditional on being ill.

The level of education positively affects the probability of seeking health care, though there is no significant difference between having some primary education and no education. The size of the household generally decreases the probability of seeking health care, which is stronger for private than public care. Household size is not significant in the children model. Enrolling in health insurance program significantly increases the probability of seeking health care, both across options and across samples, except in the children model where though positive, it is insignificant. The probability of seeking health care is also positively correlated with the number of days ill. We also control for regional and religious differences as well as the relationship with head of household. The default for the regional and religious dummies is rural Savannah and all other religions respectively. Only urban residents (except Accra metropolis) have higher probability of seeking health care. With regards to the religious dummy, both Moslems and Catholic have higher chances of seeking health care while traditional religion decreases the probability of seeking health care (Table 5).

Valuation based on the compensating variation

The standard benefit incidence (unit-cost) approach is often criticised for its arbitrary valuation of public services. The alternative is to use measures benefits estimated from the school choice model. Compensating variation (CV) is that amount of money that when subtracted from the individual's income in the new state (1) makes utility in the new state, with the subtraction, equal to utility in the original state (0). That is,

$$V = c(Y_i - P_j^{\,1}) + \lambda Q_j + \psi_j X_i + \varepsilon_j = c(Y_i - P_j^{\,0} - CV) + \lambda Q_j + \psi_j X_i + \varepsilon_j \quad (5)$$

where, P^0 is price in the original state, P^1 is price in the new state etc. In the method developed by Morey and Rossman (2007), it is supposed that the household-specific epsilon terms are the same in both states and therefore cancel by assumption. We use the NMNL estimates presented above to calculate CV for public healthcare, which we then used to assess the benefits of public healthcare to households.

For a household where public healthcare is the best option and private healthcare provides the second highest level of utility, CV is defined implicitly by the following equation,

$$CV = (Y - P^0) - e^{(\frac{V_{private} - V_{public})}{\alpha}}(Y - P^1) \qquad (6)$$

where V_{public} and $V_{private}$ are the estimated utilities associated with public and private options respectively, α is the coefficient of net income. In the case where the second best option for a household is no treatment then we replace $V_{private}$ by 0. Where the best option is either no treatment or private treatment, then CV = 0. By this approach, we are able to rank the services by users—adults health and children health. The resulting concentration curves are reported in Figure 4, showing both CV-based and uniform methods. The methods yield similar results.

A casual inspection of the curves indicates that both adults and children health care are (expenditure) progressive but not per capita progressive. Note that, this part of the analysis focuses mainly on curative health and only those who have reported an illness/injury(meaning that children immunization services and adults medical check-ups are excluded). Inclusion of all sample would have altered the results, especially children's immunization would yield per capita progressivity of children's health. Children health however, dominates adult health, implying that, public spending on children health would distribute welfare more disproportionately toward poorer households than spending on adults' health. Overall, Ghana's public health system is (expenditure) progressive but per capita regressive, a finding that agrees generally with those from other developing countries (see Sahn and Younger, 2000; Castro-Leal et al., 1999; Glick and Razakamanantsoa, 2005).

The elasticity of demand

The coefficients of the NMNL estimates can be difficult to interpret, thus we explore the influence of price and income variables by the analysis of elasticities. If we let $p_j$to represent the price for provider j, which by assumption only enters utility of option j (V_j), then it follows that

$$\frac{\partial \pi_j}{\partial p_j} = \pi_j \frac{\partial V_j}{\partial p_j}\frac{1}{\sigma}\left[1 + \frac{(\sigma-1)\exp\left(V_j/\sigma\right)}{\sum_i \exp\left(V_i/\sigma\right)} - \frac{\sigma \exp\left(V_i/\sigma\right)\left(\sum_k \exp\left(V_k/\sigma\right)\right)^{\sigma-1}}{1+\left(\sum_k \exp\left(V_k/\sigma\right)\right)^{\sigma}}\right], \text{ k=j,i} \qquad (7)$$

Hence, the own elasticity,

$$\varepsilon_{jj} = \frac{\partial V_j}{\partial p_j}\frac{p_j}{\sigma}\left[1 - \sigma\pi_j + \frac{(\sigma - 1)\exp\left(V_j/\sigma\right)}{\sum_k \exp\left(V_k/\sigma\right)}\right] \quad (8)$$

Note that this equals the standard formula for multinomial logit when sigma is 1. Note also that $\left(\frac{\partial V_j}{\partial p_j}\right) = -\frac{\alpha}{y - p_j} = -\frac{\alpha}{Net\ \exp enditure_j}$ where, α is the coefficient on net household expenditure.

The cross price derivative is defined as:

$$\frac{\partial \pi_i}{\partial p_j} = \frac{\partial \pi_j}{\partial p_j}\frac{\exp\left(V_i/\sigma\right)}{\exp\left(V_j/\sigma\right)} - \pi_i \frac{\partial V_i}{\partial p_j}\frac{1}{\sigma} \quad (9)$$

Hence, the cross-price elasticity is therefore,

$$\varepsilon_{ij} = \frac{\partial V_j}{\partial p_j}\frac{p_j}{\sigma}\left[-\sigma\pi_j + \frac{(\sigma - 1)\exp\left(V_j/\sigma\right)}{\sum_k \exp\left(V_k/\sigma\right)}\right] \quad (10)$$

Since $0<\sigma<1$ we know therefore that the cross elasticity has the opposite sign to the derivative of V_j with respect to p_j.

Table 6 presents the own price, cross-price, and income elasticities calculated at mean levels for each health option by expenditure quintiles. All elasticities have their expected signs, which are higher (in absolute terms) for public care than private care, and also higher for poorest quintiles than richest quintile, suggesting that: 1) health care demand among the lowest income individuals is substantially more price and income elastic than among the richest group, 2) demand for public care is more price and income elastic than private care, and 3) income (proxied by household expenditure) and price of care are crucial determinants of choice of formal health care in Ghana.

A 10 percent increase in the price of care would decrease demand for public care by 9.0 percent compared to 4.0 percent for private care (19.2 percent and 8.0 percent decrease in poorest quintile demand for public and private care respectively), other factors being constant. For the adults' sample, a 10 percent increase in the price of care decreases demand for the public

care by 11.9 percent compared to 5.2 percent for private care. In the children sample, a 10 percent reduction in price of care would lead a 4.8 percent reduction in demand for public care and 1.6 percent for private care (Table 6).

The cross-price elasticities also have the expected positive signs, which are higher for adults sample than children sample. This means that the substitution effects are high for the adults compared with the children sample. For instance, the elasticity of demand for public care with respect to private care price rise is 0.14 for the adults sample compared to 0.01 for the children sample. On the other hand, the elasticity of demand for private care with respect to an increase in public care price is 0.025 and 0.003 for adults' and children samples respectively. Increasing the price of the private care by 10 percent for instance increases demand for the public care by 1.3 percent (3.0 percent for the poorest quintile and 0.43 percent for the richest quintile) while raising the price of the public care by 10 percent increases demand for the private care by 0.21 percent (0.33 percent for the poorest quintile and 0.12 percent for the richest quintile).

The generally low cross price elasticities between public and private care means that, a rise in the price of either of these options would drive people more into no-care/self-treatment than substitution into public and private care. The income elasticities are positive as expected as and slightly higher for public care than private care (Table 6). A 10.0 percent rise in income for example, would lead to about 2.8 percent rise in the demand for public care compared with 2.1 percent increase in demand for private care. Both the adults' and children's model follows similar pattern, though the adults demand for health care is more price and income elastic than the children and the entire sample.

6 Policy Simulation

We explore the meaning of these elasticities further by carrying out a number of policy simulations on the entire sample. We consider three ways of altering public health care accessibility: 1) making public health care free, 2) increasing the number of public facilities, especially in rural areas (simulated by cutting in half the travel cost for accessing healthcare), and 3) increasing the income of poorer households. We do not have information to calculate the relative cost of these policies so these simulations should be seen as incomplete. The first policy change is similar to health insurance where the initial premium is negligible or too small to inflict future financial obligations on households redeemable at public facilities only. It is

therefore similar to the National Health Insurance Scheme (although that scheme does place some limits on the services that are covered). The second policy reflects the high current costs of access to healthcare for many people living in (rural) areas of Ghana. The third policy considers the indirect impact on healthcare spending of a generalised reduction in poverty.

Table 7 reports the results of the simulation exercises. From the baseline model (when all variables are at their actual values), we observe that about 40.6 percent of the sample will use no-care (self-treatment), 32.9 percent private care, and 26.5 percent public care. Next, we change the price of the public option to zero. We find that, the probability of choosing no consultation and using private care declines drastically to 33.4 percent and 28.5 percent respectively, while the probability of using public care climbs to 38.1 percent, representing 11.6 percentage points rise. Thus there is a significant shift to public facilities, but in line with the DHS data for 2008 analysed by Brugiavini and Pace, (2010) it is notable that there is still a large fraction of ill individuals who do not choose the public health option. In other words, this simulations suggests that a NHIS scheme may have a limited take-up even in long-run equilibrium. The reason is primarily that for many users opportunity costs of using health care services are large. For this reason they opt to use no service or in some cases to choose nearby private alternatives.

We next consider a policy that raises out of pocket expenses but brings healthcare services closer to the populace, albeit in a simplified manner. Still keeping the cost of accessing private care unchanged we cut the travel cost to public facilities by half. To offset this, we double the price of public care. Note that travel cost includes both direct cost on transportation to and from the health facility and travel time. For many individuals travel costs dominate out of pocket expenses, thus, even with a rise in the price of public services, the total cost of public care falls for many individuals.

In table 7 we first present the effect of a doubling of the public healthcare price and then show the effect of the combined policy of higher out-of-pocket expenses plus lower travel costs. When prices are raised we find that the probability of using public care declines by 17.6 percentage points while that of private care and no-care increases by 2.7 and 14.9 percentage points respectively (Table 7). The decline in demand is more drastic for the poorest quintiles with some substitution into private care. The vast majority however, substituted into no-care/self-treatment. However, when travel costs are simultaneously halved, the result shows a rise in the use of public care from 26.5 percent to 29.3 percent while no-care drops to 37.8 percent. Private

care, remains basically unchanged, dropping only marginally (0.5 percentage point). Thus, this combined policy causes the demand for public care to increase with some moving away from private care. While the introduction of user of fees in 1985 resulted in an overall decline in health care utilization (Asenso-Okyere 1995, Asenso-Okyere et al. 1998), this finding suggests that raising price could produce desirable outcome if such price increases are accompanied by systematic reductions in travel cost. Efforts at reducing travel cost towards zero—which will result in a drastic reduction in the opportunity cost component make public care relatively cheaper and more accessible, especially to poorer households.[4]

Finally we simulate the effects of poverty alleviation in two ways: 1) by bringing all persons below the poverty line to the upper poverty line and 2) moving all persons out of the poorest quintile. In both cases, we observe only a marginal change in probabilities of receiving care, both public and private, with the probability of using no-care also declining marginally by 0.01 percentage point (Table 7). In other words, the results suggest that to raise access to healthcare services, generalised anti-poverty policies will have only weak effects.

7 Conclusion

We have examined the determinants of the choice of health care as well as the extent to which public health expenditures are reaching the poor in Ghana. Ghana's health system, particularly public health is generally progressive in that benefits accrue disproportionately towards the poor (in terms of the expenditure Lorenz). In relative terms, postnatal and prenatal care are the most progressive, followed by clinics, and then hospitals; an ordering that has become standard for developing countries. Both children and adults health are progressive relative to household expenditures but not in absolute terms. Children healthcare is more progressive than adults' health. This all suggests that the income distribution would become more equal if the government gave all households an annual income transfer rather than subsidized health care, other things being constant. We can also say that, an additional cedi spent on clinics would more likely improve equity than an additional cedi spent on hospitals, if both are spent in the same way as the current budget so that neither the beneficiaries nor their share of

[4] Implementing this policy however, could be costly since it may require building of more health facilities and training of additional health personnel.

the benefits change. In the same vein, spending on children health is more likely to improve overall equity than those on adults' health. However, while raising the income of the poor to at least the poverty line or moving all individuals from the poorest quintile increases the probability of seeking health care, the effect of income transfers on healthcare use is very small.

A large proportion of the sampled individuals (40 percent) either do not seek medical help at all or do not consult a health professional. Reporting of illness is also lower among the poor and the uneducated, suggesting that raising the health consciousness of the people through education would raise their utilization of health care services. The elasticities of demand show a high price and income elasticities for the lower income households and for public care. Thus, both prices and income are crucial determinants of health care choice. Raising the price of public care would result in a substantial reduction in demand for public care while increasing the choice of no-care/self-treatment and private care, thus causing a substitution into private care in the richest quintile. However, doubling the price of public care would not cause substantial decreases in demand if this is implemented simultaneously with at least 50 percent reduction in travel cost. This policy is costly as it requires building of new facilities and training of more health professionals.

Above all the demand model reveals the importance of opportunity costs in seeking healthcare for adults and children. As long as these costs remain high, enrolment in healthcare insurance is likely to be incomplete for low income families and those households that lack ready access to healthcare facilities.

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Table 1
Decision to seek care and health seeking behaviour

Sub groups		*Type of health facility visited by those who consulted*					
	% seeking care	*Public hospital*	*Public clinic*	*Private hospital*	*Private clinic*	*Drugs store*	*Other*
Quintile							
Bottom 20%	*52.64*	*17.91*	*24.26*	*2.12*	*6.13*	*33.57*	*16.01*
Top 20%	*65.33*	*32.02*	*11.16*	*11.61*	*11.8*	*27.72*	*5.69*
Gender							
Male	*59.91*	*24.56*	*16.24*	*5.36*	*9.27*	*35.14*	*9.43*
Female	*59.57*	*26.79*	*16.20*	*7.05*	*9.79*	*30.21*	*9.96*
Age Category							
Children<18	*59.64*	*24.67*	*20.09*	*4.98*	*9.56*	*32.52*	*8.19*
Adults	*59.78*	*26.51*	*13.60*	*7.15*	*9.54*	*32.46*	*10.74*
Location							
Urban	*68.00*	*34.13*	*11.20*	*10.30*	*9.46*	*30.66*	*4.25*
Rural	*55.46*	*20.53*	*19.36*	*3.75*	*9.61*	*33.62*	*13.13*
Education							
None	*58.10*	*23.01*	*18.14*	*5.75*	*8.19*	*37.39*	*7.52*
Primary	*56.66*	*22.76*	*13.86*	*5.10*	*9.02*	*39.61*	*9.65*
JSS/Middle	*62.86*	*30.75*	*13.12*	*8.60*	*9.34*	*30.85*	*7.34*
Secondary	*64.34*	*33.71*	*10.11*	*11.61*	*13.11*	*26.22*	*5.24*
Postsecondary	*72.15*	*33.33*	*11.04*	*14.04*	*16.67*	*21.05*	*3.51*
Poverty							
Poor	*58.98*	*24.99*	*16.98*	*5.28*	*9.34*	*33.37*	*10.04*
Non-poor	*66.96*	*32.38*	*9.69*	*14.76*	*11.45*	*24.49*	*7.23*
All Ghana	*59.72*	*25.77*	*16.22*	*6.27*	*9.55*	*32.48*	*9.71*

Note: Drug store includes pharmacy and chemical stores. Others include MCH clinic,consultants' home, patients home, others. Source: Own estimation based on GLSS 5 data.

Table 2
Dominance Table for Public Health Services

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1). Prenatal		non-D	D	D	D	D	D
2). Postnatal			D	D	D	D	D
3). 45-degree				non-D	D	D	D
4). Clinic visits					D	D	D
5). All public health						D	D
6). Hospital visits							D
7). Expenditure							

Note: D indicates that concentration curve of row dominates that of column. Non-D indicates that non-dominance between the concentration curves cannot that be rejected. Dominance is rejected if there is at least one significant difference in one direction and no significant difference in the other, with comparisons at 19 quantiles and 5percent significance level. ***Source***: Author's own estimations.

Table 3
GINI coefficient and concentration indexes for use of public health services

Variable	Estimate	Standard error	Lower bound	Upper bound
Ginicoefficient	0.4294	0.0023	0.4250	0.4339
Concentration indexes:				
Prenatal	-0.1628	0.0074	-0.1773	-0.1483
Postnatal	-0.0212	0.0276	-0.0754	0.0328
Immunization	-0.1265	0.0100	-0.1462	-0.1068
Clinic	-0.0282	0.0036	-0.0353	-0.0211
Hospital	0.1524	0.0075	0.1394	-0.1690
Public health	0.0175	0.0060	0.0057	0.02926

Source: Own estimation based on GLSS 5 survey.

Table 4
Descriptive statistics of regressors

	Entire Sample		Adults		Children	
Variable	Mean	SD	Mean	SD	Mean	SD
Gender (female=1)	0.54	0.50	0.58	0.49	0.48	0.50
Age	28.12	22.65	41.40	18.06	5.41	3.93
Age in complete years						
0 - 4	0.18	0.39			0.50	0.50
5 - 14	0.19	0.39			0.50	0.50
15 - 21	0.09	0.28	0.14	0.34		
22 - 49	0.35	0.48	0.55	0.50		
50 plus	0.20	0.40	0.31	0.46		
Married	0.33	0.47	0.52	0.50		
Relationship with head						
Child of head	0.39	0.49	0.14	0.35	0.83	0.38
Other child	0.06	0.23	0.01	0.12	0.13	0.33
Spouse of head	0.17	0.38	0.27	0.44	0.00	0.02
Education in levels						
None	0.53	0.50	0.39	0.49	0.39	0.49
Some primary	0.15	0.36	0.12	0.33	0.13	0.33
Primary or JHS	0.25	0.43	0.37	0.48	0.38	0.49
Some secondary	0.01	0.11	0.02	0.14	0.01	0.11
Secondary	0.04	0.20	0.07	0.25	0.06	0.23
Postsecondary	0.02	0.14	0.03	0.17	0.03	0.18
Female headed	0.25	0.44	0.27	0.44	0.23	0.42
Household size	5.47	3.33	4.97	3.33	6.34	3.16
Catholic	0.15	0.36	0.15	0.36	0.14	0.35
Moslem	0.20	0.40	0.19	0.39	0.23	0.42
Traditional religion	0.07	0.26	0.08	0.27	0.06	0.24
Area of residence						
Accra (GAMA)	0.06	0.24	0.07	0.26	0.05	0.21
Other Urban	0.27	0.44	0.28	0.45	0.25	0.43
Rural forest	0.29	0.46	0.29	0.45	0.31	0.46
Rural coast	0.10	0.29	0.10	0.30	0.08	0.28
Rural Savannah	0.28	0.45	0.26	0.44	0.31	0.46
Insurance	0.16	0.37	0.18	0.38	0.14	0.35
No of days ill	6.14	4.11	6.67	4.35	5.25	3.51
Formal sector	0.10	0.31	0.11	0.32	0.09	0.29
Informal sector	0.78	0.41	0.76	0.43	0.82	0.38

Notes: [1]Figures include imputed values for options not chosen.
Source: Own estimation based on GLSS 5 data

Table 5
Nested Multinomial Logit Model for Choice of Health Care, baseline

	Entire sample		Adults		Children	
VARIABLES	Private	Public	Private	Public	Private	Public
Constant	-3.366***	-3.387***	-3.589***	-3.620***	-2.717	-2.738
	(0.712)	(0.713)	(0.704)	(0.706)	(2.045)	(2.513)
Gender (female=1)	-0.012	-0.009	-0.010	-0.008	0.023	0.022
	(0.062)	(0.062)	(0.061)	(0.061)	(0.089)	(0.085)
Age in complete years						
5 – 14	-0.552***	-0.576***			-0.495	-0.522
	(0.089)	(0.089)			(0.351)	(0.409)
15 – 21	-0.729***	-0.761***				
	(0.122)	(0.123)				
22 – 49	-0.329**	-0.375***	0.112	0.085		
	(0.131)	(0.131)	(0.079)	(0.079)		
50 plus	-0.690***	-0.740***	-0.318***	-0.350***		
	(0.137)	(0.138)	(0.085)	(0.086)		
Education in levels						
Primary graduate	0.036	0.039	0.029	0.028	0.082	0.084
	(0.026)	(0.026)	(0.023)	(0.023)	(0.053)	(0.057)
Secondary grad.	0.028*	0.029*	0.045*	0.046*	0.004	0.006
	(0.016)	(0.017)	(0.024)	(0.026)	(0.089)	(0.090)
Post-secondary	0.026	0.027	0.004	0.004	0.136**	0.136**
	(0.034)	(0.034)	(0.034)	(0.034)	(0.065)	(0.065)
Female headed household	-0.133*	-0.116	-0.214***	-0.198***	-0.098	-0.081
	(0.072)	(0.072)	(0.069)	(0.069)	(0.243)	(0.273)
Household size	-0.016*	-0.015	-0.020**	-0.019**	-0.020	-0.020
	(0.010)	(0.010)	(0.009)	(0.009)	(0.017)	(0.017)
Traditional religion	-0.184*	-0.190*	-0.207*	-0.214**	-0.210	-0.212
	(0.107)	(0.107)	(0.107)	(0.107)	(0.195)	(0.195)
Urban residence	0.477***	0.464***	0.502***	0.489***	0.525**	0.511**
	(0.084)	(0.084)	(0.083)	(0.083)	(0.222)	(0.249)
Health Insurance	0.262***	0.286***	0.266***	0.290***	0.166	0.185
	(0.073)	(0.072)	(0.072)	(0.072)	(0.281)	(0.291)
Number of days ill	0.055***	0.058***	0.056***	0.059***	0.101**	0.105**
	(0.007)	(0.006)	(0.006)	(0.006)	(0.048)	(0.048)
Log(Net expenditure)	0.217**	0.217**	0.210**	0.210**	0.194*	0.194*
	(0.105)	(0.105)	(0.100)	(0.100)	(0.104	(0.104
σ	0.4628**	0. 4628**	0.4586**	0. 4586**	0.5591	0.5591
	(0.2314)	(0.2314)	(0.2271)	(0.2271)	(1.5104)	(1.5104)
τ	55.72***	55.72***	54.12***	54.12***	0.80	0.80
Log likelihood	-7388.69	-7388.69	-4593.86	-4593.86	-2716.43	-2716.43
% correctly predicted	83	83	79	79	76	76
Observations	7108	7108	4488	4488	2620	2620

Base category: No-care; Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Own Calculations based on GLSS 5

Table 6
Price and income elasticities of health care demand, by expenditure quintiles

	Own price elasticity[a]			*Cross price elasticity*[b]		
Quintile[c]	*Entire sample*	*Adults*	*Children*	*Entire sample*	*Adults*	*Children*
Public						
1	*-0.1924*	*-0.3045*	*-0.0896*	*0.3009*	*0.4249*	*0.0161*
2	*-0.0718*	*-0.1023*	*-0.0525*	*0.1150*	*0.1528*	*0.0082*
3	*-0.0829*	*-0.0965*	*-0.0421*	*0.0901*	*0.1398*	*0.0069*
4	*-0.0502*	*-0.0853*	*-0.0329*	*0.0724*	*0.1143*	*0.0057*
5	*-0.0325*	*-0.0475*	*-0.0219*	*0.0434*	*0.0595*	*0.0040*
All	*-0.0899*	*-0.1192*	*-0.0477*	*0.1311*	*0.1427*	*0.0082*
Private						
1	*-0.0795*	*-0.0833*	*-0.0334*	*0.0333*	*0.0032*	*0.0066*
2	*-0.0422*	*-0.0611*	*-0.0195*	*0.0248*	*0.0387*	*0.0036*
3	*-0.0220*	*-0.0588*	*-0.0120*	*0.0149*	*0.0344*	*0.0023*
4	*-0.0250*	*-0.0423*	*-0.0118*	*0.0175*	*0.0320*	*0.0025*
5	*-0.0171*	*-0.0224*	*-0.0057*	*0.0118*	*0.0172*	*0.0011*
All	*-0.0389*	*-0.0523*	*-0.0164*	*0.0210*	*0.0248*	*0.0032*

Notes:
Source: Estimated from the nested logit estimates reported in Table 5.8
[a]elasticity of public (private) school with respect to public (private) school price change
[b]elasticity of public (private) school with respect to private (public) school price change
[c]household expenditure per equivalent adults

Table 7
Simulated probabilities by expenditure quintiles, and type of provider

Quintile	*All*

	Poorest 20%	*2*	*3*	*4*	*Richest 20%*	
Baseline						
No-care	*0.4687*	*0.4248*	*0.4041*	*0.3766*	*0.3434*	*0.4062*
Private	*0.2983*	*0.3237*	*0.3330*	*0.3464*	*0.3498*	*0.3290*
Public	*0.2329*	*0.2515*	*0.2628*	*0.2769*	*0.3068*	*0.2648*
Price of public option is zero						
No-care	*0.3935*	*0.3522*	*0.3325*	*0.3070*	*0.2741*	*0.3344*
Private	*0.2642*	*0.2833*	*0.2889*	*0.2973*	*0.2949*	*0.2849*
Public	*0.3423*	*0.3645*	*0.3786*	*0.3957*	*0.4310*	*0.3808*
Doubling price of public option						
No-care	*0.6157*	*0.5756*	*0.5540*	*0.5261*	*0.4908*	*0.5550*
Private	*0.3304*	*0.3523*	*0.3540*	*0.3711*	*0.3709*	*0.3558*
Public	*0.0539*	*0.0720*	*0.0920*	*0.1028*	*0.1383*	*0.0892*
Doubling price and reducing travel cost of public option by half						
No-care	*0.4366*	*0.3962*	*0.3831*	*0.3519*	*0.3223*	*0.3780*
Private	*0.2947*	*0.3198*	*0.3246*	*0.3350*	*0.3507*	*0.3249*
Public	*0.2687*	*0.2840*	*0.2923*	*0.3131*	*0.3270*	*0.2970*
Moving everybody out of the poorest quintile (GH¢9,568,124)						
No-care	*0.4468*	*0.4248*	*0.4041*	*0.3766*	*0.3434*	*0.4012*
Private	*0.3109*	*0.3237*	*0.3330*	*0.3464*	*0.3498*	*0.3319*
Public	*0.2423*	*0.2515*	*0.2628*	*0.2769*	*0.3068*	*0.2670*
Bringing all poor households to the upper poverty line(GH¢3,708,900)						
No-care	*0.4667*	*0.4248*	*0.4041*	*0.3766*	*0.3434*	*0.4057*
Private	*0.2995*	*0.3237*	*0.3330*	*0.3464*	*0.3498*	*0.3293*
Public	*0.2338*	*0.2515*	*0.2628*	*0.2769*	*0.3068*	*0.2650*

Source: Own estimation based on GLSS5 data

Appendix A.1
OLS Wage model, Ghana

Variables	Coefficient	t-value
Constant	11.2327	115.78
Age	0.0198	8.22
Age square	-0.0005	-10.09

Married	0.2003	7.02
Region/area of residence		
Accra (GAMA)	0.9523	19.85
Other urban	0.6569	17.39
Rural coastal	0.3150	6.83
Rural forest	0.3058	7.93
Relationship to head		
Spouse of head	-0.3678	-12.31
Relatives	-0.4313	-6.08
Nonrelatives	-0.5935	-2.61
Household composition		
No. of relatives in household	-0.0021	-0.20
No. of non- relatives in household	0.1414	2.88
Number of men in household	0.0966	7.37
Number of women in household	-0.0079	-0.59
Number of children in household	0.0161	2.28
Years of education		
Primary graduate e	0.2837	9.86
Secondary graduate	0.6664	15.23
University/Polytechnic graduate	1.2764	13.72
Postgraduate	2.2534	11.62
Father's education		
Primary graduate	-0.0797	-1.24
Middle/Junior high graduate	0.0122	0.37
Secondary graduate	0.0983	1.32
Postsecondary graduate	0.2383	3.52
Mother's education		
Primary graduate	0.0065	0.10
Middle/Junior high graduate	-0.0616	-1.60
Secondary graduate	-0.0352	-0.36
Postsecondary graduate	0.0899	0.67
Head's sector of employment		
Formal	0.3082	5.03
Informal	0.0456	0.86

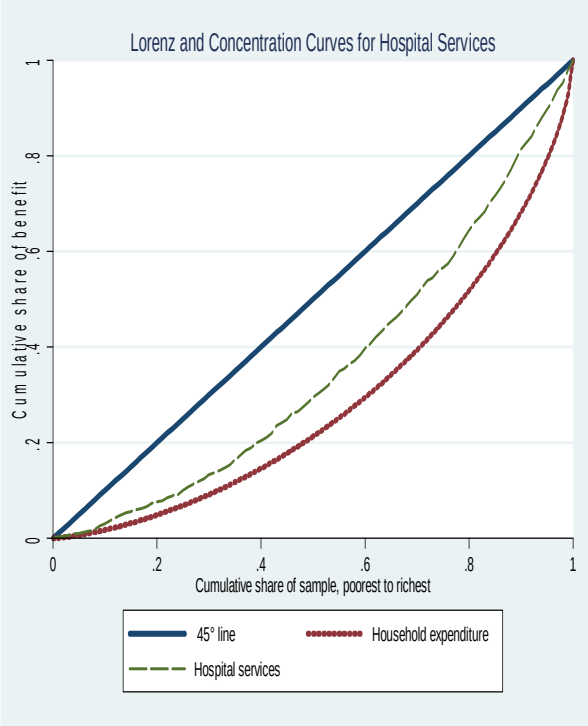
Source: Own estimations based on GLSS 5 data. Note: N=9,796 observations. R^2 = 0.235. Model estimated on all respondents older than 9 years who reported to have worked and received wages. The dependent variable is log wage.

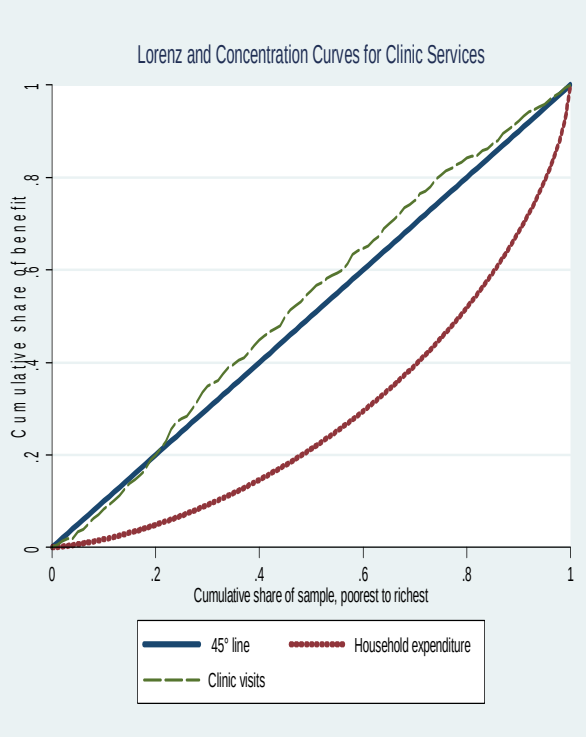
Appendix A.2
Definition of variables

NETEXPEND (in million C)	Household expenditure minus schooling cost
Female	Dummy variable (= 1 if individual is female, 0 if male)
Child of head	Dummy variable (= 1 if child of head, 0 otherwise)
Other Child	Dummy variable (= 1 if not child of, 0 other household member)
Married	Dummy variable (= 1 if married , 0 if not married)
Spouse head	Dummy variable (= 1 if spouse of household head)
Female headed	Dummy variable (= 1 household head is female, 0 if male)
No of days ill	Number of days the individual has been ill
Primary	Dummy variable (=1 if one has a private health insurance contract)
Secondary	Dummy variable (= 1 if individual is Catholic, 0 otherwise)
Postsecondary	Dummy variable (= 1 if individual is Pentecostal, 0 otherwise)
Insurance	Dummy variable (=1 if individual has a private health insurance)
Catholic	Dummy variable (= 1 if individual is a Catholic, 0 otherwise)
Pentecostal	Dummy variable (= 1 if individual is a Pentecostal, 0 otherwise)
Moslem	Dummy variable (= 1 if individual is a Moslem, 0 otherwise)
Traditional	Dummy variable (= 1 if religion is Traditional 0 otherwise)
Accra (GAMA)	Dummy variable (= 1 if ind. resides in Accra metropolis, 0 otherwise)
Other urban	Dummy variable (= 1 if ind. resides in other urban areas, 0 otherwise)
Rural coastal	Dummy variable (= 1 if ind. resides in rural coastal area, 0 otherwise)
Rural forest	Dummy variable (= 1 if ind. resides in rural forest area, 0 otherwise)
Rural Savannah	Dummy variable (= 1 if ind. resides in rural savannah area, 0 otherwise)
Head formal sector	Dummy variable (= 1 if head works in a formal area, 0 otherwise)
Head informal sector	Dummy variable (= 1 if head works in a informal area, 0 otherwise)

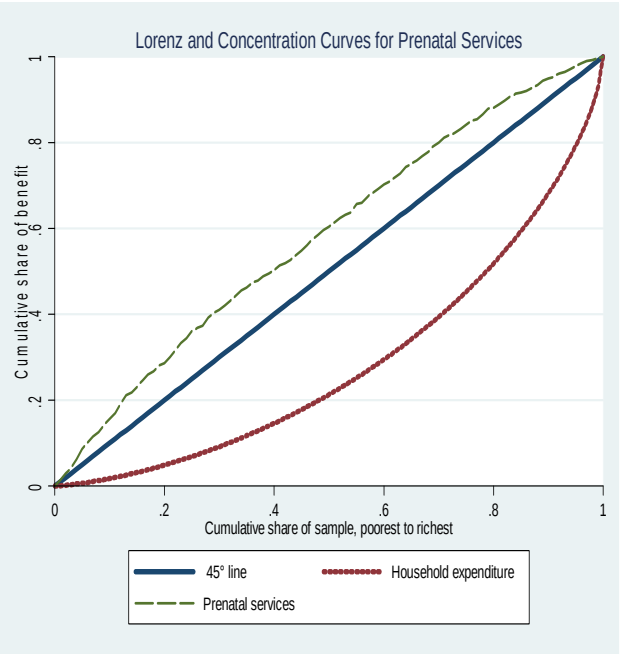
Figure 1
Concentration Curves for Public Health Services, 2005/06

(a) Hospital services, 2005/06 **(b) Clinic services, 2005/06**

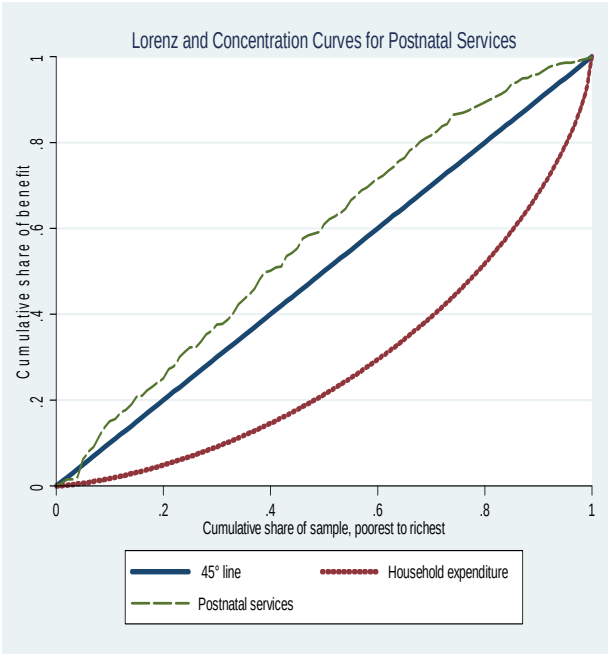




(c) Pre-natal services



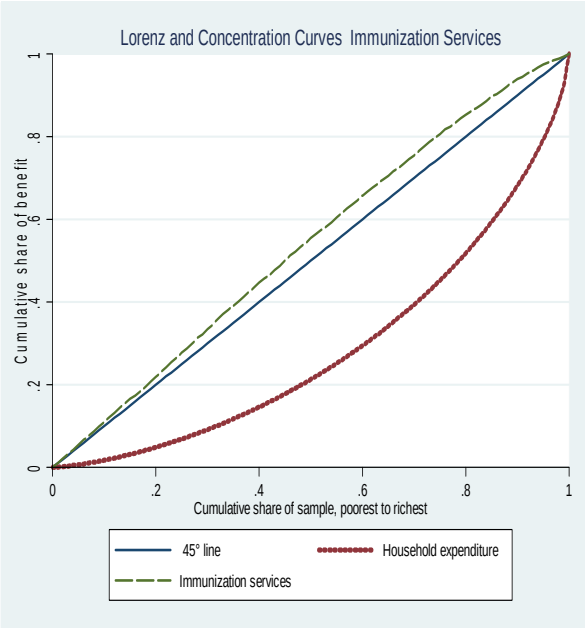
(d) Post-natal services

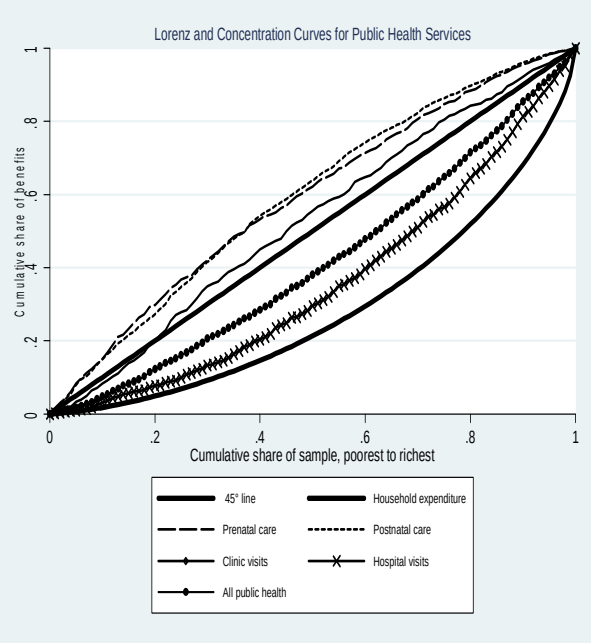


Source: Own estimations based on GLSS 5 survey

Figure 1 (continued)

(e) Immunization services, 2005/06 **(f) All Public Health Services, 2005/06**

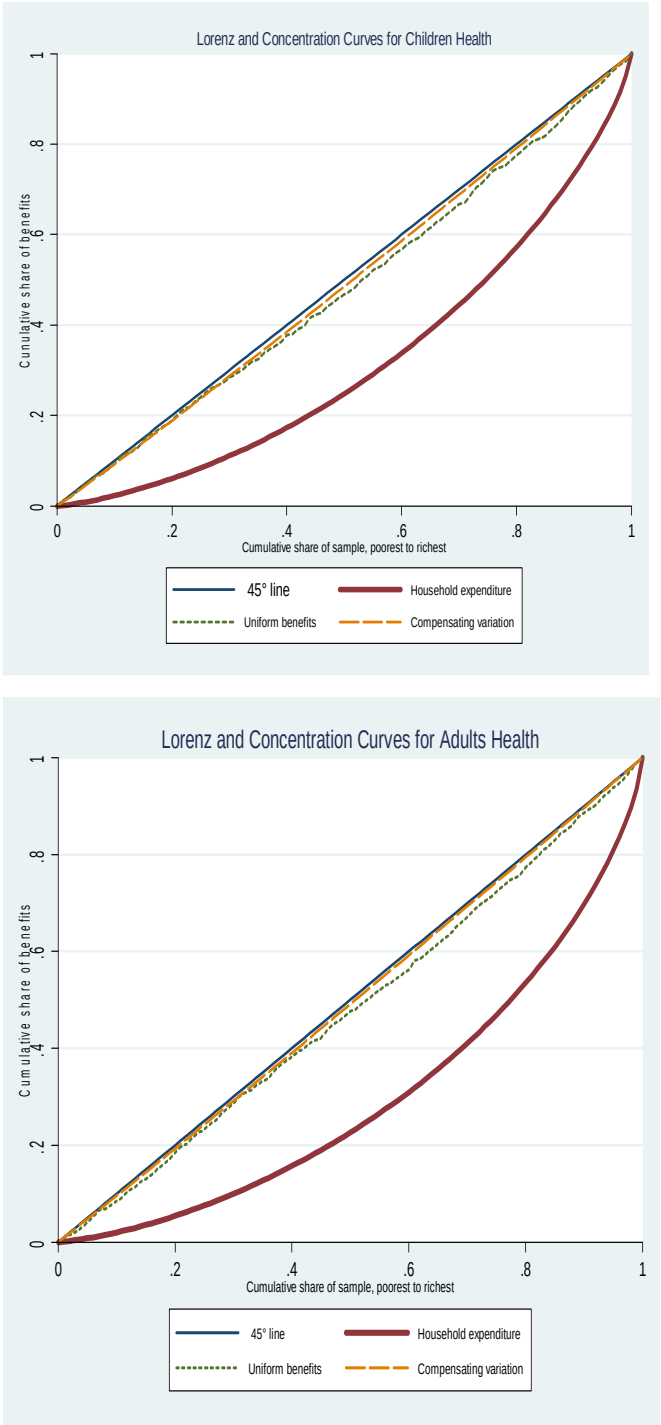




Source: Own estimation based on GLSS 5 data

Figure 2: Concentration Curves using the Compensating Variation, 2005/06

(a) Children Health, 2005/06 **(b) Adults Health, 2005/06**



Source: Own estimation based on GLSS 5 data