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The American University in Cairo

School of Business

Catastrophic Health Expenditure and Poverty in
Egypt: an Analysis of Household Survey Data

A Thesis Submitted to Economics Department

In partial fulfillment of the requirements for the degree of Master of
Arts in Economics

by Ahmed Shoukry Rashad

Under the supervision of Dr. Sherine Shawky and Dr. Samer Atallah

Fall 2011

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Catastrophic Health Expenditure and Poverty in Egypt: an Analysis of Household Survey Data

Ahmed Shoukry Rashad

Under the supervision of Dr. Sherine Shawky and Dr. Samer Atallah

ABSTRACT

Out-of-pocket health payments can cause financial hardship to households, which may push them into poverty. The purpose of this thesis is to examine the impact of out-of-pocket health payments on households' economic situation in Egypt using a national representative survey. On the other hand, the conventional poverty estimates do not take the effect of out-of-pocket health payments on households into account. Therefore, by reassessing the poverty estimates taking into account out-of-pocket health payments, this thesis provides new poverty estimates that reflect the poverty impact of out-of-pocket health payments. The thesis adopts the World Health Organization's methodology in measuring the extent of catastrophic health expenditure and impoverishment. It uses a logit model to identify the determinants of catastrophic health expenditure. The quantitative analysis yields that out-of-pocket health payments exacerbate households' living especially the poor and the near poor. The thesis suggests that 6% of households encounter catastrophic health expenditure in 2010. It estimates that the poverty line for a household composed of four members, which is the average household size, equals LE 673.8 per month. It suggests that the 19.1% of households spend below the poverty line. However, additional 7.4% of households fall below the poverty line after paying for health care. In other words, the size of poverty in Egypt including those who are impoverished by health payment is 26.5%. Additionally, out-of pocket health payments have exacerbated the normalized poverty gap by 1.4%. The econometric analysis suggests that household with chronic sick member and poor households are the most vulnerable to catastrophic health expenditure.

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*“We face a calamity when my husband gets ill. Our life comes to a halt until he
recovers and goes back to work”*

An Egyptian Woman quoted in “Voices of the Poor”

*“Poor people cannot improve their health status because they live day by day, and if
they get sick they are in trouble because they have to borrow money and pay
interest”*

A Vietnamese woman quoted in the Voices of the Poor

I. Introduction

Poverty alleviation remains a major challenge for Egypt, one that has taken on increased salience after the January 25th Revolution, which called for social justice. In 2007, the World Bank announced that poverty is affecting two in every five citizens in Egypt (The World Bank, 2007). Many studies have researched poverty in Egypt, but very few such as (Abou-Ali, 2007) and (El Gazzar, 2009) have studied the impact of out-of-pocket payments (OOP) for health care on exacerbating poverty.

OOP have become the principle mean of financing health care in Egypt. According to the National Health Accounts, in 2008, OOP accounted for 60% of health spending whereas public finance constituted 33.5%. The remainder is funded by donors, public firms and employer funds (Ministry of Health , Egypt, and Health Systems 20/20, 2010). Reliance on OOP in financing health care leaves households exposed to risk of incurring a large medical expense should a household member falls sick. Therefore, health shocks can push households into financial catastrophe resulting from health payments and lost earnings due to inability to work (Ke Xu, Kawabata, Kei, Zeramardini, & Klavus, 2003).

On the other hand, the Seventh Round of the Egyptian Family Observatory Survey provided that 80% of households have at least one member covered by public health insurance. However, the survey pointed out that only 25% of households are benefiting from it due to low quality services and excessive red tape. This suggests that health shocks may push non-poor into poverty and exacerbate the poverty of the poor (The Information and Decision Support Center, 2010).

Catastrophic health expenditure refers to health spending that drives households to reduce their basic consumption or sell assets or borrow or to cut the consumption of other goods to pay for health care to an extent that leads to disruption to living standards. There are two approaches to measure the extent of catastrophic health expenditure: Van Doorslaer's approach and Ke Xu's approach. Both share the concept that OOP on health services should not exceed a threshold. Van Doorslaer's approach suggests that OOP on health service are defined as catastrophic if they exceed a pre-specified fraction of household total expenditure. On the other hand, Ke Xu, a researcher at the World Health Organization (WHO), suggests that OOP on health service are considered to be catastrophic if they exceed 40% of non-subsistence expenditure.

Papers that have addressed OOP and catastrophic health expenditure in Egypt investigated the extent of catastrophic expenditure in Egypt using Van Doorslaer's approach. There is, to my knowledge, no study that provided the extent of catastrophic expenditure, explored the determinants of catastrophic expenditure or calculated the extent of impoverished households by health payments in Egypt based on the Xu's methodology (Xu, 2005). Thus, this study seeks to fill this gap in the literature.

Research Question and Agenda

The research question of this thesis is to investigate the relationship between OOP for health care and poverty in Egypt and to explore the implications for poverty reduction programming. To answer the above question, the thesis aims at achieving the following objectives:

- a) Provide the extent of catastrophic expenditures in Egypt using Xu's approach,
- b) Identify determinants of catastrophic health expenditure in Egypt,
- c) Provide the extent of impoverished households by OOP for health care in Egypt,
- d) Suggest policy guidance to poverty reduction programs.

II. Literature Review

In the health care financing market, government intervention is a common remedy for market failure since market forces alone do not produce the most desirable outcomes from social welfare perspective. As health shocks increase households' vulnerability and disrupt their livelihood. Therefore, government intervention is required to correct market failure and to provide health and social protection for the poor.

Xu *et al* stressed on the importance of government health financing in protecting households from financial catastrophe. They studied the relationship between the incidence of catastrophic health expenditure and the size of public health spending in 89 countries. They found a negative correlation between the extent of catastrophic expenditure and the size of public health spending (Ke Xu, Carrin, & Ana Mylena, 2007).

A. Government Health Financing

Generally, there are two schemes to finance health care: General Taxation (GT) and Social Health Insurance (SHI). Under GT, the government provides the population with free health care or at a very low price. Low and middle income countries have limited ability to raise sufficient funding from taxes to meet all health financial requirements due to the high rates of poverty and to the large size of informal economy.

In essence, SHI is a form of prepayment mechanism that collects regular financial contributions for health so that they can be used in the case of illness. It seeks to spread the financial risk associated with illness across individuals. It separates between access to health care service and the ability to pay for it, as SHI

contributions are based on the ability to pay while access to services are based on the need. In essence, SHI's funds are separate from taxes and they are managed by an autonomous institution. However, mixed financing is common in many countries, where segment of a population is covered by health insurance and the rest is covered by free health care (The World Health Organization, 2005). For example, public employees and school students in Egypt are covered by public health insurance and the remainder of the population is covered by free health care.

WHO suggested that there is no one best prepayment mechanism that fits all countries in terms of raising funds or protecting households from financial catastrophe resulting from health shocks (The World Health Organization, 2005). Since countries at different stages of development are facing different kinds of problems and they have to make decisions regarding raising funds, pooling risk and how to provide service given their political contexts, social structure, and economic system. Therefore, there is no consensus on which prepayment mechanism offers better protection. There is, however, a wide consensus in literature arguing that reducing reliance on OOP in financing health care is the key to protect households from financial catastrophe resulting from illness (Ke Xu, Carrin, & Ana Mylena, 2007). Xu *et al.* explored the determinants of catastrophic health expenditure in 59 countries. They concluded that the proportion of government health spending to total health spending (as opposed to OOP share of total health spending) is the main factor explaining the prevalence of catastrophic health expenditures across countries (Xu, Kawabata, Kei, Zeramardini, & Klavus, 2003).

B. Health Shocks, Coping Strategies and Economic Consequences

Poor households develop strategies to cope with illness. These strategies aim to sustain the economic viability of the household. There are strategies that deal with mobilizing funds to meet direct costs such as borrowing or selling assets. Other strategies deal with indirect cost such as intra-household labor substitution. The ability of households to deal with health shocks depends on their assets portfolio, in addition to the type, severity, duration of illness and the family members affected.

Leive and Xu explored how households in 15 African countries¹ coped with health shocks. They also questioned whether households coping strategies vary significantly between financing outpatient service, inpatient service and routine care. These countries are characterized by low government health spending and lack of health insurance. The average public health spending in these countries is nearly 40% of total health spending. They developed a logit model to identify the variables that are associated with selling assets, borrowing or both to finance health care. The dependant variable is a binary variable such that it equals one when a household used a coping strategy (borrowing or selling assets or both) and zero if a household relied on their income or saving to finance health care. In order to permit comparison across the 15 countries, the logit model runs separately for each country. The results suggested that in 12 countries high inpatient spending increased the likelihood of borrowing or selling assets. Moreover, it pointed out that rich quintiles were less likely to use coping strategies compared to poor quintiles. There was no significant difference in the coping behaviors among the bottom three income quintiles. Urban

¹ The 15 African countries are Burkina Faso, Chad, the Congo, Cote d'Ivoire, Ethiopia, Ghana, Kenya, Malawi, Mali, Mauritania, Namibia, Senegal, Swaziland, Zambia and Zimbabwe.

households were less likely to use coping strategies than rural households. The study reported that in 11 countries male headed households were less likely to borrow or sell assets. It suggested that households headed by senior member (above 60 years) were more likely to borrow or sell assets (Leive & Xu, 2008).

Wagstaff explored the response of household income, consumption and medical care spending to health shocks. Additionally, he explored the extent to which household consumption is protected from health shocks. He measured household health shocks by a recent death of working-age household member, a long inpatient spell, and a recent sizable drop in the Body Mass Index (BMI) of household head. The study concluded that the death of working-age household member negatively affects earned income particularly at urban areas. However, other health shocks (drop in BMI or inpatient) do not significantly reduce earned income. This suggests that households used coping strategies such as intra-household labor substitution to deal with health shocks other than a death. Moreover, hospitalization significantly increased medical spending particularly for the uninsured than insured. Results suggested that deaths and drop in BMI of household head did not significantly affect medical spending. The study suggested that health shocks reduced the per capita food consumption within households. Furthermore, it pointed out that some health shocks increased expenditure on electricity and housing for the rural sample while cutting expenditure on durable goods. Wagstaff interpreted this change in consumption pattern as a trial to provide sick household member with comfortable housing during recovery (Wagstaff, 2007).

C. Catastrophic Health Expenditure and Impoverishment

1. Catastrophic Health Expenditure

Xu *et al.* identified three preconditions for catastrophic health expenditure: expensive health care, poor population and the lack or the failure of health insurance to cover health expense (Ke Xu, Kawabata, Kei, Zeramndini, & Klavus, 2003). There are two common approaches to measure catastrophic expenditure. Van Doorslaer *et al.* (2007) argued that catastrophic health expenditure occurs when OOP on health exceed some fraction of household income or total expenditure in a given period, usually within a year. An alternative definition was offered by Xu, *et al.* (2003), which stated that catastrophic health expenditure occurs when OOP on health exceed 40% of household's capacity to pay. They defined the household's capacity to pay as remaining income after basic subsistence needs have met. These two definitions have two limitations. Firstly, they do not capture the impact of illness on households who cannot meet the treatment's expense. Though, the loss resulting from forging treatment could be severe. Secondly, they do not capture lost earnings due to inability to work or other changes in expenditure patterns that arise from illness. It is difficult to capture these impacts in Egypt, as there is to my knowledge no data could support such study.

2. Impoverishment and Poverty Estimates

Impoverishment by OOP occurs when households who are considered to be non-poor (average consumption above the national poverty line) are pushed into poverty after payment for health care (average consumption after payment for health care is below the national poverty line). Van Doorslaer *et al.* (2006) examined whether OOP on health exacerbate poverty in 11 countries in Asia. They obtained

data on OOP from nationally representative surveys, and subtracted these OOP from total household income. Thereby they calculated the poverty estimates (poverty headcount and poverty gap) after making OOP. They compared poverty estimates after making OOP to the conventional poverty estimates. They found that poverty estimates after paying for health care were much higher than the conventional estimates, ranging from an additional 1.2% in Vietnam to 3.8% in Bangladesh (Doorslaer, et al., 2006). They concluded that OOP are likely to inflate the extent of poverty. Therefore, poverty alleviation policies should take OOP into account.

III. Methodology

The adopted methodology includes two approaches. First, the thesis reviews literature on Egypt's health system financing with the intention of assessing the Government of Egypt's ability to protect households from catastrophic health expenditure. Second, the thesis uses quantitative analysis to provide the extent of catastrophic health expenditure and impoverishment. Additionally, a multi variant logit model is used to identify the determinants of catastrophic health expenditure. The description of the quantitative methodology follows.

Data Source

The raw data used in this work come from the Eighth Round of the Egyptian Family Observatory Survey conducted by the Information and Decision Support Center (IDSC) in September 2010. It provides disaggregated raw data on households' social status, educational status, economic status, health status, and demographic information. The thesis uses the Eighth Round because it is the latest national representative survey. The sample was drawn randomly from Egyptian households. It has been drawn from all governorates except the border governorates. The sample has covered rural and urban areas based on proportional representation. The sample size is 10,550 households, weighted to be nationally representative (The Information and Decision Support Center, 2010).

Data

The following variables are withdrawn from the survey to calculate the extent of catastrophic health expenditure:

- Food expenditure ($food_h$) refers to amount spent on all food and drinks.

- Food expenditure share ($foodexp_h$) is given by monthly amount spent on food and drinks divided by total household expenditure. It is reported in the survey as a percentage of total household expenditure.
- Total household expenditure (exp_h) consists of all monthly payments on all goods and services. It is reported in the survey in Egyptian pounds.
- Household size ($hhsiz_e_h$) refers to the number of members in the household.
- Household weight (w) is used to make sample representative. It is used on the survey to reflect the degree to which households with their socio-economic characteristics are under or over sampled in the survey.
- OOP on health refers to the payments made by households at the point they receive health services. It includes treatment payments and medication payments. OOP are net of any insurance reimbursement.

Analysis

A household with catastrophic health expenditure is a household that has OOP equaling or exceeding 40% of household capacity to pay (ctp). Capacity to pay is defined as the difference between total household expenditure and subsistence expenditure (se). se is calculated using Xu's methodology and is detailed below.

First, large households gain from economics of scale of household. Thus, to take into account the effect of economy of scale of household, $hhsiz_e_h$ will be adjusted using the following expression:

$$eqsiz_e_h = hhsiz_e_h^\beta$$

Such that $eqsiz_e_h$ is the equivalent household size and $hhsiz_e_h$ is the actual household size and β reflects the economy of scale. Previous studies suggest that the

value of β equals 0.56 (Xu, 2005). Second, adjusted food expenditure ($eqfood_h$) is calculated by dividing food expenditure ($food_h$) by $eqsize$:

$$eqfood_h = \frac{food_h}{eqsize_h}$$

Third, a relative poverty line is constructed by identifying $foodexp_h$ that are in the 45th ($food45$) to 55th ($food55$) percentile range across the whole sample. Then the weighted average of $foodexp$ in the 45th to 55th percentile range is calculated as:

$$poverty\ line = \frac{\sum w_h \times eqfood_h}{\sum w_h}$$

Such that $food45 < foodexp_h < food55$

Lastly, to get se_h for a household, poverty line is multiplied by its $eqsize_h$:

$$se_h = poverty\ line \times eqsize_h$$

A household is considered to be facing catastrophic health expenditures when OOP on health equal or exceed 40% of its ctp . Predictive Analytics Software Statistics 18 (PAWS 18) will be used to provide these measures.

Econometric Analysis

A logit regression model is used to investigate the determinants of catastrophic health expenditures. This model is adopted from WHO's report (Xu, 2005). A new dummy variable is created to identify households with catastrophic health expenditure in the pooled dataset.

$$y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n + \varepsilon$$

The binary dependent variable (y) equals one when a household encounters catastrophic health expenditure and zero otherwise. The logit model is applied to three different sets: the poorest quintile, the richest quintile and all households to explore the determinants of catastrophic health expenditure. Table 1 lists the suggested independent variables and their description.

Table 1- List of Independent Variables

Independent Variable	Description
X ₁	Place of Residence (1, urban household and 0, rural household)
X ₂	Sex of household head (1, male and 0, female)
X ₃	Working status of household head (1, employed and 0, unemployed)
X ₄	Household head education (1, educated 0, uneducated)
X ₅	Private Insurance (1, at least one member insured 0, none)
X ₆	Expenditure quintile (dummy variable with several categories)
X ₇	Household size
X ₈	Age Dependency Ratio (number of aged member(s) to number of working age member(s) within household)
X ₉	Number of public health insured member(s) divided by hhsz
X ₁₀	Number of chronic ill member(s) divided by hhsz
X ₁₁	Number of children less than 5 years old

In fact, interpreting β is rather difficult. The odds ratio, $\exp(\beta)$, is therefore used to describe the partial relation. In the model, y reflects the probability of a household facing catastrophic expenditure to the probability of being non-facing catastrophic expenditure. Therefore, an odds ratio of one reflects an equal probability

of occurrence. Odds greater than one suggest that facing catastrophic expenditure is more likely than not facing catastrophic expenditure. The converse is true.

Impoverishment and Poverty Gap

The conventional methodology of measuring poverty defines a poverty line expressed in monetary values. Households in poverty are those whose level of expenditure is below the poverty line (The World Bank, 2011). Additionally, the normalized poverty gap is commonly used to reflect the intensity of poverty. It estimates the amount to which households fall below the poverty line as a percentage of that line. However, this methodology does not take large OOP into account (Doorslaer, et al., 2006). The following methodology is adopted (Xu, 2005) to reflect the poverty impact of OOP on conventional poverty estimates:

A household is impoverished by OOP when its total spending falls below the poverty line after paying for health care. Therefore, the difference in the poverty headcounts before and after OOP for health reflects the poverty impact of OOP for health or what is called the impoverishment impact. A new dummy variable (*impoor*) is created to examine the impoverishment impact of health payments. It equals one when total household spending falls below *se* after paying for health care. It equals zero otherwise.

$$impoor = 1 \quad \text{if } exp_h \geq se_h \text{ and } exp_h - oop_h < se_h, \quad \text{otherwise}$$

$$impoor = 0$$

The thesis explores the impact of OOP for health on normalized poverty gap. The normalized poverty gap is calculated before and after making OOP. The difference in

the normalized poverty gap reflects the impact of OOP on poverty intensity.

Normalized poverty gap is calculated before OOP deduction as follows:

$$\text{Normalized Poverty Gap} = 1/N \sum_{h=1}^H \frac{G_h}{se_h} \quad \forall h \text{ such that } exp_h < se_h$$

Where G equals se_h less exp_h for poor households; the gap equals zero for non-poor households.

$$G_h = (se_h - exp_h).I \text{ (If } se_h > exp_h)$$

Then the normalized poverty gap is recalculated after making OOP as follows:

$$\text{Normalized Poverty Gap} = 1/N \sum_{h=1}^H \frac{Post_G_h}{se_h}$$

Where $Post_G$ equals se_h less total household expenditure after making OOP for poor households including households that spend less than se_h after making OOP.

Normalized poverty gap equals zero for non-poor households.

$$Post_G_h = [se_h - (exp_h - OOP_h)].I \text{ [if } se_h > (exp_h - OOP_h)]$$

I compare the conventional normalized poverty gap to the normalized poverty gap after paying for health care. I use the World Bank developed software ADePT to calculate these measures. It is designed to simplify the calculation of poverty measures for raw disaggregated data sets.

Thesis Hypotheses

The thesis tests the following hypotheses:

1. Public health insurance protects households in the poorest quintile from catastrophic health expenditure.
2. Poor household with chronic ill member is more likely to encounter catastrophic health expenditure compared to poor household with healthy member.
3. Public health insurance protects households in the richest quintile from catastrophic health expenditure.
4. Households with young children are more likely to encounter catastrophic health expenditure than households without young children.
5. Households with employed household head are less likely to encounter catastrophic health payments than households with unemployed household head.
6. Households with educated household head are less likely to face catastrophic health payments than uneducated household head.
7. Households with private insurance coverage are less likely to face catastrophic payments compared to household without private insurance.
8. Households with aged member are more likely to face catastrophic payments than households without aged member.
9. Urban households are less likely to face catastrophic health expenditure than rural households.
10. Male headed households are less likely to encounter catastrophic health expenditure.

IV. Health System Financing in Egypt

The economic performance of all countries is influenced by the health of its citizens. According to the Egyptian constitution, free health care is a right to all citizens. The Government of Egypt (GOE) aims to ensure that health service is accessible when needed. It raises funds through taxes to protect citizens from financial hardship that may arise from health payments. Egypt Ministry of Health (MOH) provides free health care service to the public. Additionally, the Health Insurance Organization (HIO) pools health risk across a large proportion of population. However, it aims to reach universal coverage in the long run.

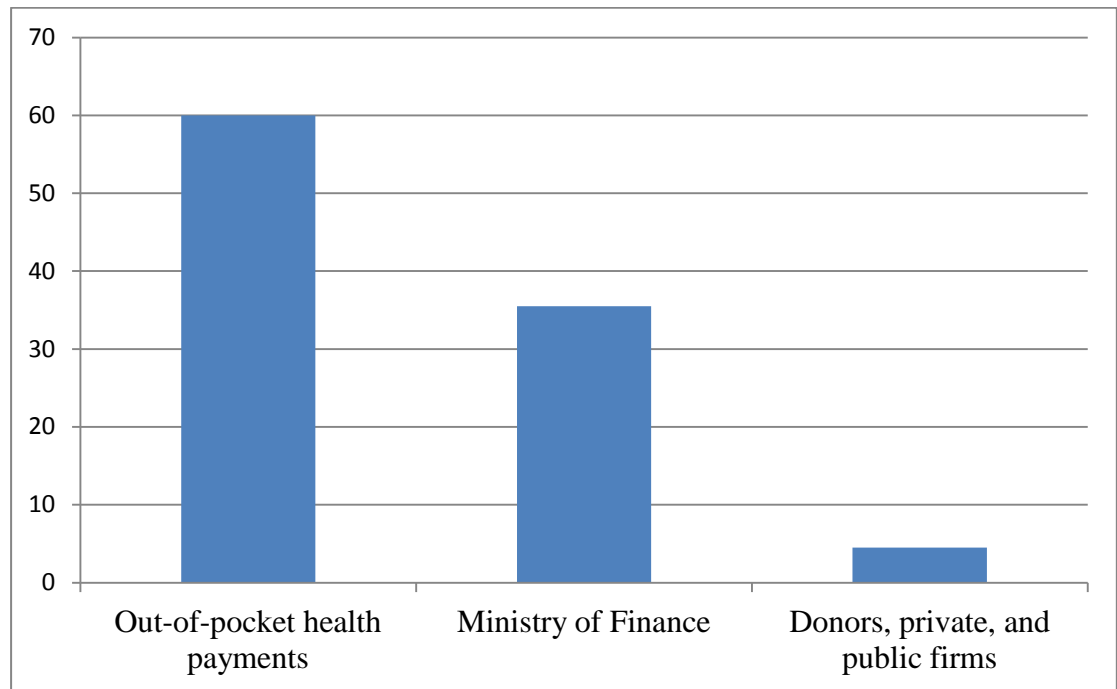
The chapter explores the structure of health system financing in Egypt using the National Health Accounts (NHA) (Ministry of Health , Egypt, and Health Systems 20/20, 2010). NHA provide a description to the monetary inflows and outflows in the health care system. The chapter assesses the commitment of GOE with respect to health care financing through a comparison between Egypt and lower middle income countries. It focuses on MOH financing system and HIO financing system, as they are the main public health providers. With the intention of designing policies that protect households from impoverishment by OOP, it is essential to explore the structure of OOP.

Structure of Health System Financing in Egypt

The health care system in Egypt provides health care service through three channels. These channels consist of government sector, private sector and civil society. The government sector refers to different ministries that provide health service such as MOH, Ministry of Higher Education, Ministry of Defense and Ministry of Interior. Along with ministries, the government sector includes HIO and

the Curative Care Organization (CCO). They are financially independent organizations under the authority of MOH. The private sector refers to for profit hospitals, clinics, and pharmacies. The civil society consists of non-profit NGOs including religious health care providers.

Figure 1-Health Financing in Egypt 2008



The Ministry of Finance (MOF) is the main funding source for health care activities at different ministries. For instance, it funds 93% of MOH activities and 72% of Ministry Higher Education health care activities. However, similar information is not available for Ministry of Defense and Ministry of Interior at NHA. MOF funds nearly one-third of total health spending. MOF distributes its funds across MOH, HIO and other public entities. In 2008, MOH spending represented 20% of total health spending while HIO spending accounted for 8% and 5% spent by other public health providers (Ministry of Health , Egypt, and Health Systems 20/20, 2010).

Public Health Spending in Egypt and Lower Middle Income Countries

Egypt has one of the biggest shares of GDP dedicated to health spending among lower middle income countries. On the other hand, the share of public health spending in total health spending is the lowest among the selected lower middle income countries. While the share of public health expenditure in total public expenditure falls at the middle range compared to lower middle income countries (Table 2).

Table 2- Health Financing in Lower Middle Income Countries 2008

Country	Public Health spending as a % GDP	Public spending as % total health spending in 2008	Public Health spending (% of public spending)	Public health spending per capita (\$)/ 2008
Sri Lanka	1.8	43.7	7.9	36.2
Philippines	1.3	34.7	6.1	23.5
Congo	1.4	49.9	5.3	40.4
Egypt	2.0	33.0	5.9	37.0
Indonesia	1.2	54.4	6.2	27.7
Iraq	2.3	70.2	3.1	76.5
Syria	1.2	38.8	4.6	27.5
Morocco	1.9	36.3	6.6	47.0

Source: World Bank and NHA

Egypt has the largest population in the MENA region. GOE is one of the lowest spenders on health care in the region. Only the Syrian government spent less than GOE at per capita level. Therefore, it is likely that the extent of catastrophic health expenditure will be greater in Egypt than most of countries at the MENA region (Table 3).

Table 3- Health Care Spending in Egypt in Comparison to MENA region 2008

Country	Population (Million)	public spending as % total health spending	Public health spending per capita (\$)/ 2008
Algeria	33.3	83.8	172.0
Egypt	80.3	33.0	37.0
Iran	65.3	45.7	134.0
Jordan	6.0	62.2	170.0
Lebanon	3.9	48.9	270.0
Libya	6.0	75.8	291.0
Morocco	33.7	34.9	47.0
Syria	19.3	45.1	34.0
Tunisia	10.2	49.5	106.0

Source: NHA, 2007-08 and CIA World Factbook

Ministry of Health

MOH provides wide range of health service to all Egyptians. It raises funds from MOF, donations and self funding (Table 4).

Table 4-Ministry of Health Funding Sources 2008

Source	In EGP (Million)	%
Ministry of Finance	8413.1	93
Self funding	337.7	4
Donations	250.8	3
Total	9001.6	100

Source: NHA, 2007/08

MOH relies mainly on MOF resources to fund its activities. On the other hand, MOF has limited ability to raise funds from tax revenue because of the large size of

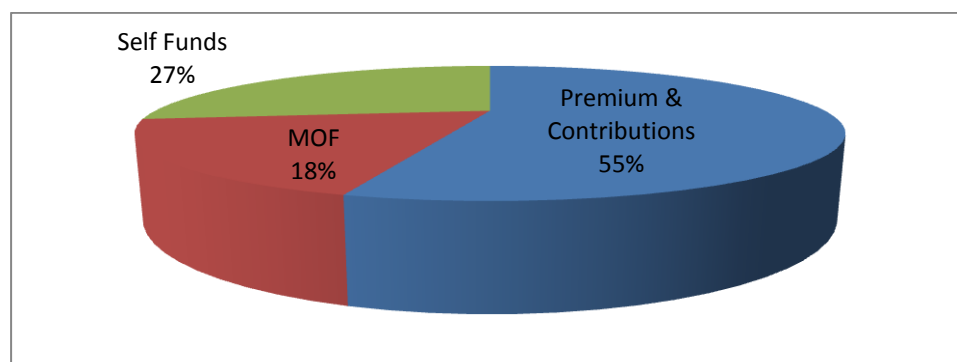
the informal economy and poverty (Schneider, 2002). In 2008, MOH spending represented 1% of GDP.

Health Insurance Organization

HIO is an autonomous public organization under the supervision of MOH. It pools health risk across large segment of the population. The percentage of population covered by HIO has increased from 35% in 1995 to 55% in 2008. It covers school students, infants, pensioners and widows. Additionally, it targets employees through employment based scheme. Shawky describes the health insurance coverage as inequitable since it is skewed toward the richest quintiles and urban regions. This is mainly due to the large size of informal economy and the large proportion of population not working in Egypt (Shawky, 2010).

HIO owns and operates an extensive infrastructure of hospitals, clinics and school clinics all over Egypt. It purchases and provides health care services simultaneously (Shawky & Mohamed, 2006). In 2008, HIO spending represented 8% of total health spending while SHI spending accounts for 15% in lower middle income countries (Gottret & Shieber, 2007). It raises funds from beneficiaries' payments, MOF and users' fees (Figure 2).

Figure 2-HIO Source of Funds 2008



Source: NHA, 2007/08

The health insurance system in Egypt does not meet beneficiaries' needs, as the majority of beneficiaries do not utilize it. This is mainly due to the low cost ceiling that falls short of the expensive health services that rely on new technology (Shawky, 2010). Also public health care providers lack the incentives to serve patients at the best of their abilities since it's more lucrative to charge them directly at market prices at their private clinics (Gabili, 2010).

Out-Of-Pocket Health Payments

The share of OOP reflects the size of financial burden on households. The size of OOP is very high in Egypt relative to other lower middle income countries. The ratio of OOP per capita to public health per capita is the highest in Egypt (Table 5). Therefore, households of Egypt are overburden with OOP than most of other lower middle income countries.

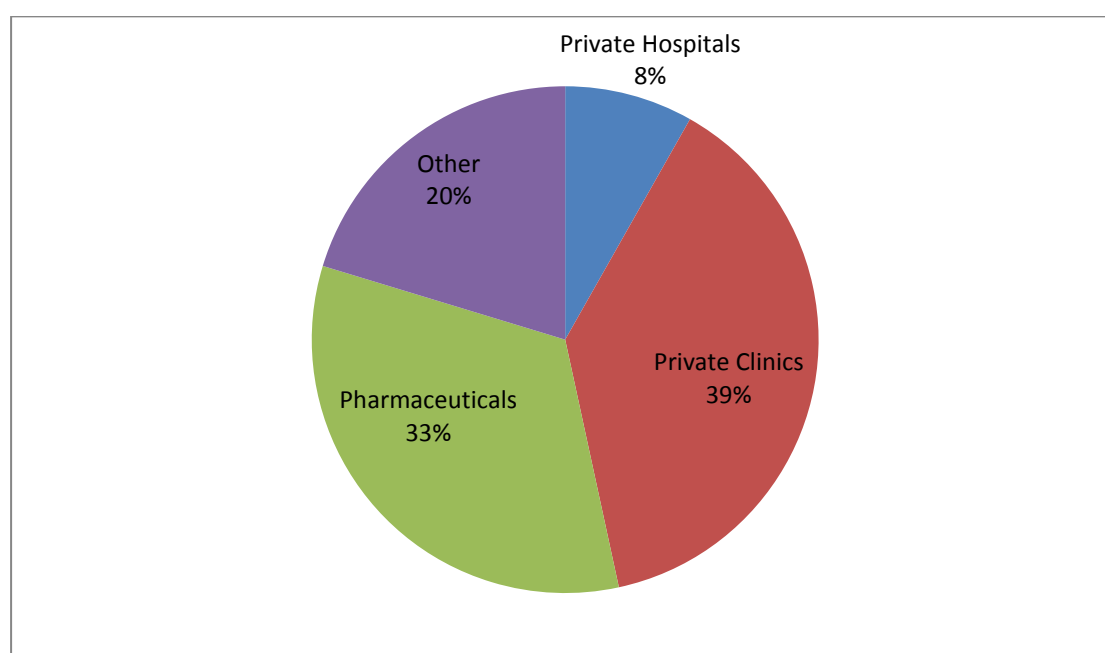
Table 5- Out-Of-Pocket Payments in Lower Middle Income Countries 2008

Country	OOP as a % of total health expenditure	OOP per capita/ public health spending per capita
Sri Lanka	48.8	1.1
Philippines	53.9	1.6
Congo	50.1	1.0
Egypt	60.0	1.8
Indonesia	32.1	0.6
Iraq	29.8	0.4
Syria	61.2	1.6
Morocco	55.0	1.5

Source: World Bank and NHA

It is vital to examine the OOP structure to design policies that protect households from impoverishment by OOP. Private sector received 80% of households' spending. Private clinics constituted the greatest share of OOP, which accounts for 22% of total health spending. Pharmaceuticals consume the second largest share of OOP followed by private hospitals (Figure 3).

Figure 3- Structure of OOP 2008



Source: NHA, 2007/08

In Egypt, data from the Eighth Round of IDSC survey suggest that average OOP per household measured in Egyptian Pounds varies significantly across expenditure quintiles. It increases significantly from quintile to another (Table 6). The reason households in the richest quintile spend around 3.5 times households' health spending in the poorest quintile is because the majority of households in the richest quintile are unsatisfied with public health facilities and they are willing to utilize and pay for private health facilities. On the other hand, poor households have to economize on their health spending and utilize free public health facilities. Forty

one percent of households are utilizing public health service either because it is free or because they cannot afford to utilize private health service. (Information and Decision Support Center, 2005). Seven percent of households in the poorest quintile do not purchase medicines because they cannot afford them while 4% of households in the second quintile do not buy their medicines (Table 7). This suggests the size of household's OOP on health is a major determinant of the health of households in Egypt

However, OOP to total household expenditure ratio does not vary significantly across quintiles, which suggests that the ratio is unrelated to the level of expenditure. On the other hand, OOP to *ctp* ratio declines rapidly across expenditure quintiles. The reason is that poor households have limited *ctp* unlike wealthy households. Even modest health payments may constitute a large portion of their *ctp* (Table 6).

Table 6- OOP by Expenditure Quintiles

Quintiles	OOP Mean (EGP)	95% CI	Average OOP to total household expenditure (%)	95% CI	OOP to <i>ctp</i> (%)	95% CI
1	39.2	38.0- 40.4	7.0	6.8-7.2	20.9	20.3-21.4
2	55.4	53.9- 56.8	7.0	6.8-7.2	19.3	18.8-19.8
3	65.3	63.5- 67.0	7.3	7.0-7.4	18.2	17.7-18.6
4	83.4	81.0- 85.7	7.8	7.5-8.0	16.7	16.2-17.2
5	140.1	135.4- 144.0	7.4	7.2-7.6	11.5	11.2-11.8
Total	78.0		7.3		17.2	

The Eighth Round of IDSC survey asked households to evaluate medicines prices. Ironically, 1.4% of households in the richest quintile get free medicines while 0.7% of households in the poorest quintile do. Moreover, 73.4% of households in the richest quintile view that medicines prices are reasonable while 54.6% of households in the poorest quintile do (Table 7).

Table 7-Evaluation of Medicines Prices on Households

Quintiles	Poorest	Second	Middle	Fourth	Richest
N	2020	2135	2065	2038	2291
Free (%)	0.7	0.6	1.2	0.8	1.4
Fair Price (%)	54.6	55.4	57.5	62.7	73.4
Expensive Price (%)	37.5	40.0	38.8	34.2	24.1
Cannot afford to buy (%)	7.2	4.0	2.5	2.2	1.0

V. Econometric Analysis

The first section of this chapter presents a socioeconomic and demographic profile of 10,550 households that were surveyed. The second section provides the extent of catastrophic health expenditure and impoverishment while the third section presents the econometric results.

A. Demographic and Socioeconomic Profile

The socioeconomic and demographic profile distinguishes between household head and other household members. It provides the Child Dependency Ratio and the Age Dependency Ratio across the sample. The Child Dependency Ratio refers to the ratio of young dependents (less than 15 years) to the working age (between 15 years to 64 years) members. The Aged Dependency Ratio refers to the number of aged (above 64 years) dependents to the working age members (The World Bank, 2011). The profile divides households into quintiles according to their total monthly expenditure. It explores households' possessions by their expenditure quintile to give a clear picture of households living conditions. Additionally, it describes the factors that are associated with high health care utilization. It examines the extent of health insurance coverage throughout the sample. The information presented in this profile will help in better understanding of the study results.

The survey suggests that slightly more than the half of households live in rural areas. The average household size is nearly 4 members. Forty percent of households have children less than five years old while 14% of households have at least one aged member. The analysis suggests that the number of working age members is twice the number of non-working age members (Table 8).

Table 8- Households Composition by Residence, Size, and Dependency Ratios

Household	Frequency	Percentage
Residence		
Urban	4752	45.0
Rural	5798	55.0
Household Size		
1	602	5.7
2	1272	12.1
3	1812	17.2
4	2487	23.6
5	2292	21.7
6+	2085	19.8
Household with children	4220	40.0
Households with aged member (more than 64)	1479	14.0
Child Dependency Ratio		50.0
Aged Dependency Ratio		6.0

The majority of households are headed by males. Quarter of household heads are unemployed while nearly quarter work on irregular basis. Nearly more than quarter of household heads is uneducated and only 16% gone to university (Table 9).

Table 9- Household Heads by Sex, Employment Status and Education

Household Headship	Frequency	Percentage
Sex		
Male	9276	88.0
Female	1274	12.0
Employment Status		
Unemployed	2568	24.3
Permanent employment	5495	52.1
Employed on irregular basis ²	2487	23.5
Education		
No education	2902	27.5
Primary	1815	17.2
Preparatory	896	8.5
Secondary	2868	27.2
University Education or Higher	2068	19.6

² Employed on irregular basis consists of seasonal, temporary employment

Expenditure Quintiles

The expenditure quintile is constructed based on the adjusted per capita monthly expenditure. The household size is adjusted to take economics of scale of household consumption. Thus, the adjusted per capita monthly expenditure equals household total expenditure divided by the adjusted household size (*eqsize*), which is identified earlier

$$\text{adjusted per capita household expenditure} = \frac{\text{Total household expenditure}}{\text{eqsize}}$$

The data indicate the average adjusted per capita monthly expenditure is 536.4 LE. The average household expenditure of the richest quintile is nearly four times of the poorest quintile. The average expenditure of the middle quintile is slightly higher than the second quintile. The average expenditure of the fourth quintile is 22% higher than the middle quintile (Table 10). On the other hand, the average adjusted per capita expenditure is nearly one half of the per capita income estimated by the World Bank for the same year (The World Bank, 2011). However, the unadjusted one would be lower, as the adjusted expenditure per capita takes the economies of scale of household consumption into account.

Table 10- Expenditure Quintiles

Quintiles	N	%	Average monthly household expenditure	95% CI	Average adjusted per capita expenditure	95% CI
Poorest	2020	19.1	583.8	576.8- 590.7	246.2	244.3-248.0
Second	2135	20.2	801.7	794.5- 808.8	348.0	347.1-348.9
Middle	2065	19.6	930.2	921.9- 938.5	431.1	430.0-432.2
Fourth	2038	19.3	1135.6	1120.4-1150.6	554.4	552.3-556.6
Richest	2291	21.7	2059.4	2007.0-2111.7	1046.8	1022.9-1070.7
Total	10550	100	1122.8	-	536.4	-

The descriptive data analysis suggests more than half of rural households are in the poorest two quintiles while only 10.8% of rural households are in the richest quintile. This suggests that urban households represent that majority of the richest quintile. The proportion of rural households declines steadily across expenditure quintiles while the proportion of urban households increases progressively across expenditure quintiles (Table 11).

Table 11- Expenditure Quintiles by Residence

Quintiles	Urban		Rural	
	N	%	N	%
Poorest	438	9.2	1582	27.3
Second	658	13.8	1477	25.5
Middle	897	18.9	1168	20.1
Fourth	1091	23.0	948	16.3
Richest	1667	35.1	624	10.8
Total	4751	100.0	5799	100

The following table is developed to reflect households' ownership of assets to give more extensive description of households' living.

Table 12- Households' Possessions by Expenditure Quintiles

Quintile	Poorest	Second	Middle	Fourth	Richest	Total
Household possessions						
Refrigerator %	80.8	91.7	95.5	94.7	98.8	9757
Color TV %	83.2	91.1	95.4	94.2	98.2	9766
Air Conditioner %	0.4	1.1	1.9	4.2	26.1	755
Stove %	62.9	74.3	81.1	84.0	93.4	8385
Water Heater %	14.1	26.9	42.2	50.3	77.9	4539
Automatic Washing Machine %	7.2	15.6	26.9	37.0	67.4	3332
Dishwasher %	0	0.2	0.1	0.3	5.2	134
Satellite Dish %	50.5	64.6	71.3	71.2	85.0	7270
Computer %	4.3	8.0	14.9	21.7	49.1	2133
Internet Connection %	0.7	1.5	4.1	7.1	27.0	894
Private Car %	0.2	1.1	2.3	4.0	27.2	780
Mobile Telephone %	64.0	74.4	79.0	78.5	89.2	8156

A large proportion of households in the poorest quintile own refrigerator, color TV, mobile telephone and stove. Half of households in the poorest quintile own satellite dish while 64.1% of households in the second quintile own it. The majority of households own basic appliances, as more than 90% of all households own them. Additionally, 77.3% and 68.9% of households own mobile telephone and satellite dish respectively. They, however, forgo other basic products like water heater. This suggests that television, satellite dish and mobile phone turn out to be necessary products for Egyptian households. On the other hand, luxury appliances ownership is related to level of expenditure. For instance, less than 1% of households in the poorest quintile own air condition while 28.0% of households in the richest quintile own it. Only 1.3% of households in the poorest and second quintiles own private car while 29.5% of households at the richest quintile own it (Table 12).

Health Utilization and Health Expenditure

This section provides a descriptive analysis of factors that are associated with high health care service utilization. Households with children under five years are likely to utilize health care service frequently (Cavagnero, Xu, & Rivera, 2006). The proportion of households with children under five years declines steeply across quintiles. The chi-square test asserts that there is a significant relation between the two variables. This suggests that poor households are likely to be larger than rich households (Table 13).

Households with aged member tend to utilize health service regularly. Based on the chi-square test of significance, the proportion of households with aged member does vary significantly across expenditure quintiles. There is a significant relation between these two variables (Table 13).

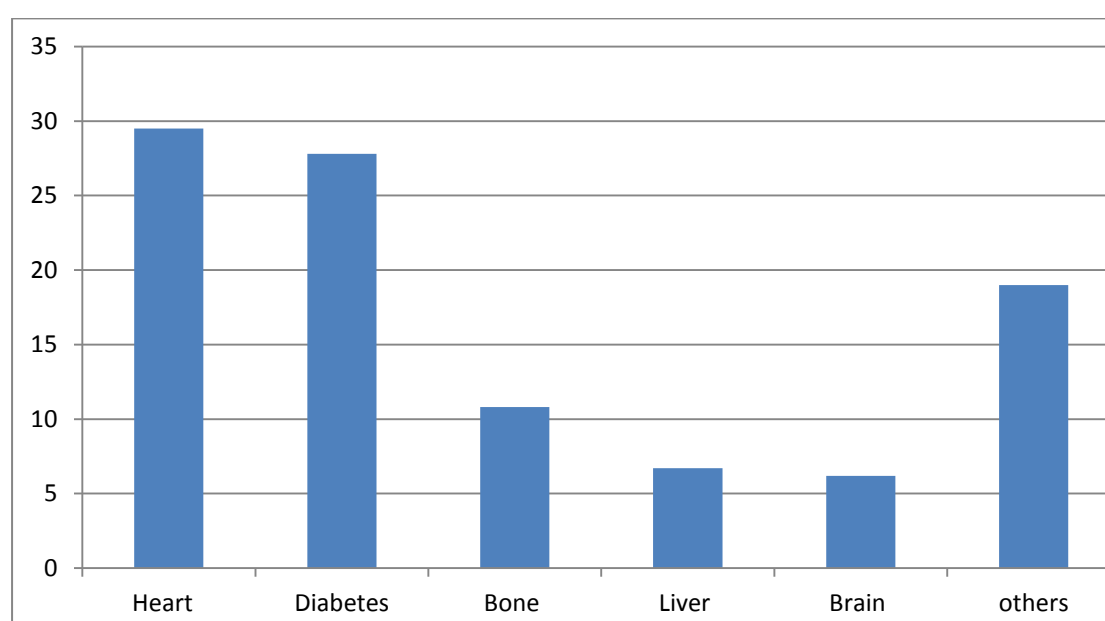
Chronic illness is one of the key determinants of health care utilization. Ironically, the descriptive analysis suggests that chronic illness is less common among poor households than rich households. The proportion of households with chronic sickness rises significantly across expenditure quintiles (Table 13).

Table 13- Household with Children, Aged, Chronic Sick member by Expenditure Quintiles

Quintiles	Poorest	Second	Middle	Fourth	Richest	Chi square	p-value
N	2020	2135	2065	2038	2291		
Households with children less than five years (%)	51.4	42.2	36.8	30.8	20.8	562.3	0.000
Households with aged member (%)	12.0	12.3	11.7	17.4	16.5	61.0	0.000
Household with chronic sick member(s) %	30.1	32.5	33.2	37.3	40.2	98.6	0.000

The data indicate that 10% of households have at least one chronic sick member. Heart diseases are the most common followed by diabetes (Figure 4).

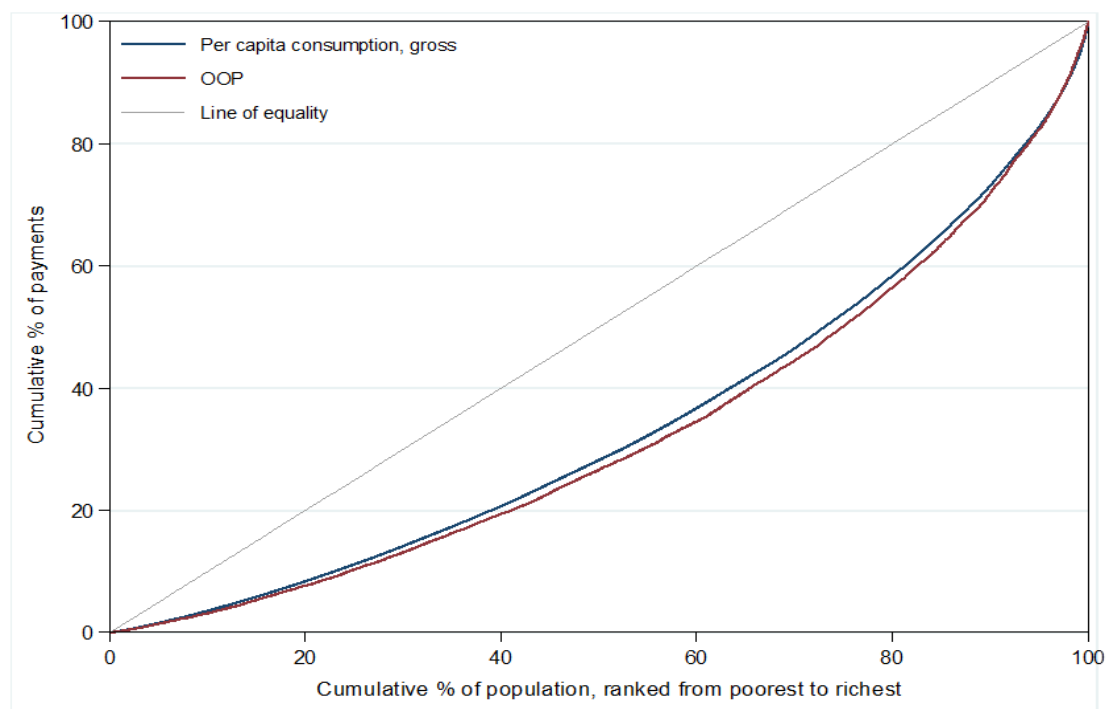
Figure 4 - Distribution of Diseases by Type



Distribution of Out-of-pocket Health Payments

The upper curve in Figure 5 depicts the distribution of total households' expenditure while the lower curve reflects the distribution of OOP on health. The graph suggests OOP do not affect the distribution of expenditure across households. OOP curve suggests that the share of the poorest two quintiles on total OOP on health is only 20% while the share of the richest quintile is 40%. Also the richest quintile spends four times the poorest quintile on health care.

Figure 5- Lorenz Curve of OOP



Health Insurance Coverage and Expenditure Quintiles

The analysis suggests that less than half of the population sample is covered by HIO. The HIO insurance coverage is pro-poor, as the proportion of households with at least one member covered by HIO declines significantly across quintiles. However, the converse is true for the private insurance coverage. Private insurance is not common in Egypt, where only 11% of households have at least one member covered by private insurance (Table 14).

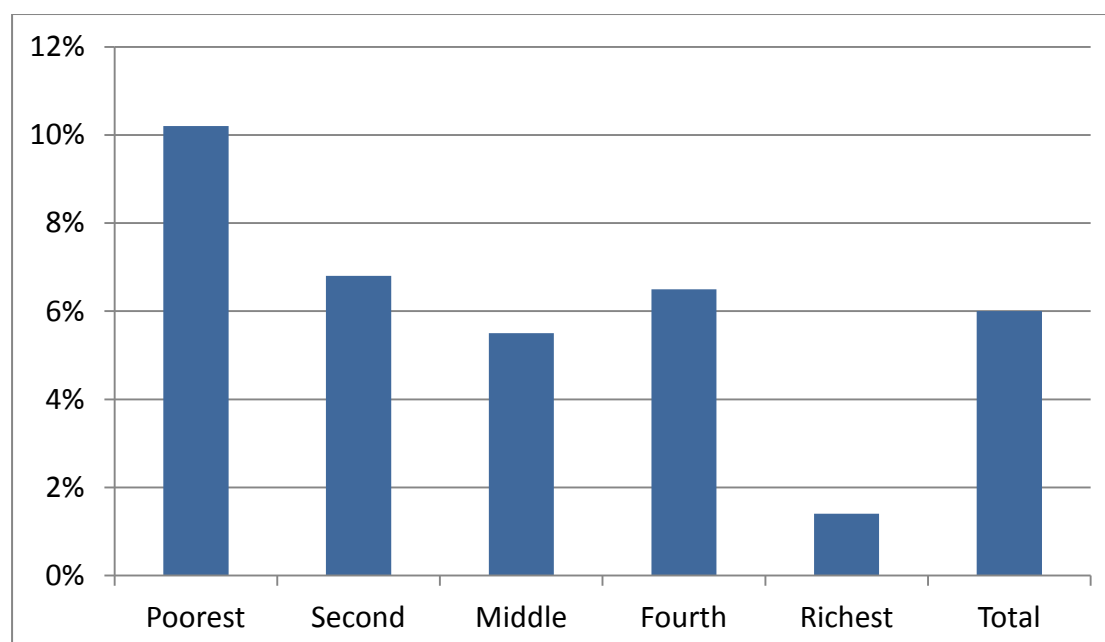
Table 14- Equity of Insurance Coverage

Quintiles	Poorest	Second	Middle	Fourth	Richest	Chi square	p-value
N	2020	2135	2065	2038	2291		
HIO Coverage (%)	85.5	82.3	80.9	73.4	74.9	133.3	0.000
Private Insurance (%)	4.1	6.2	10.0	11.6	24.1	532.6	0.000

B. Catastrophic Health Expenditure

Data analysis suggests that OOP drive 6% of households in Egypt to encounter catastrophic health expenditure. The results point out that catastrophic health expenditure influences households at all expenditure quintiles. However, the poorest quintile has the highest proportion while the richest quintile has the lowest proportion. The Chi-Square test suggests that there is a significant relation (Pearson chi-square=151, p-value=0.000) between the extents of catastrophic health expenditure within each quintile and the ranking of the quintile, as households at the poorest quintile are more likely to encounter catastrophic health expenditure compared to other quintiles. The proportion of households encountering catastrophic health expenditure within the three middle quintiles is nearly identical. This can be attributed to a close level of expenditure across the three quintiles.

Figure 6-Catastrophic Health Expenditure by Expenditure Quintiles



Pearson Chi-Square=151, p-value=0.000

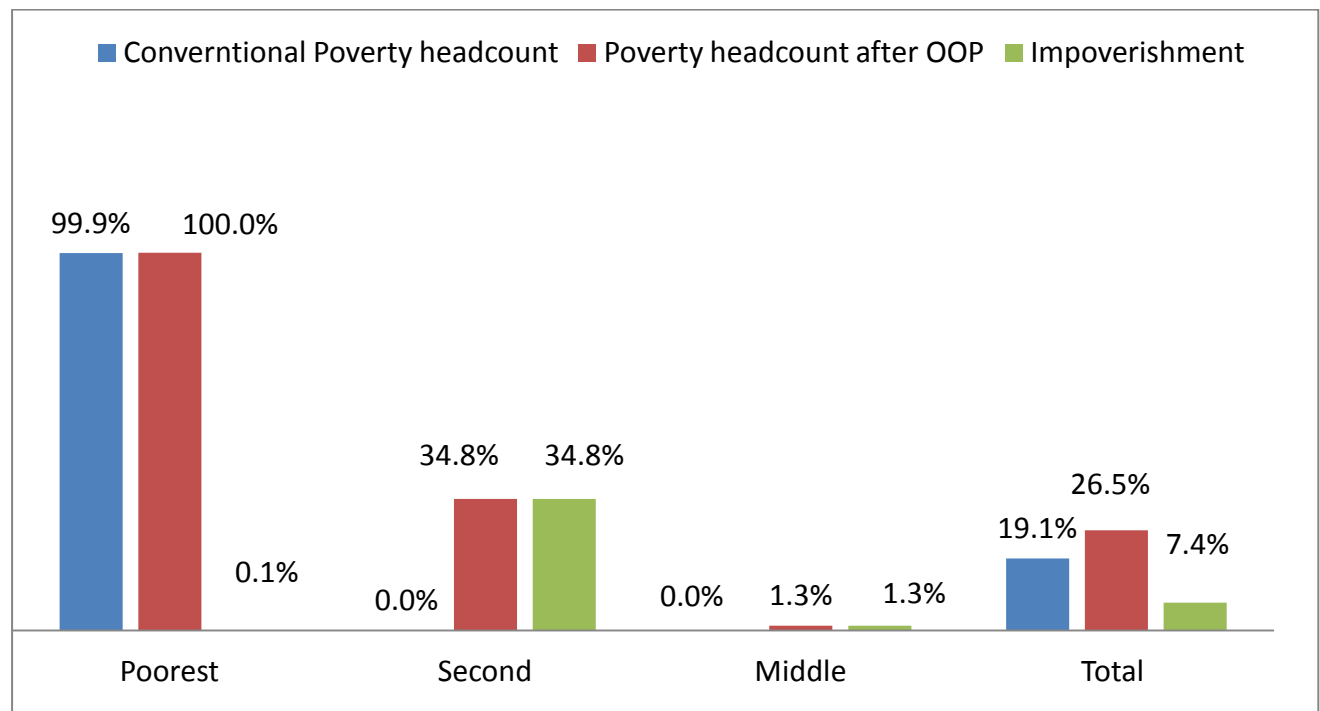
Impoverishment and Poverty Gap Results

The estimated poverty line for a household composed of a single member equals LE 310 per month. This line is almost equivalent to \$2 per day. On the other hand, the food poverty line estimation is based on the cost of obtaining 2470 calories per day per person (Ministry of Economic Development , 2007). In 2010, Egypt Human Development Report suggested that the cost obtaining 1000 calories was nearly LE 2 (United Nations Development Programme, 2010). Food poverty line for a household composed of single member is, therefore, LE 5 per day or LE 150 per month. However, for a household composed of four members, which is the average size of households in Egypt, the poverty line based on the adopted methodology would be LE 5.6 per day per household member. This reflects the reliability of the study's methodology. It also points out to the consistency of the IDSC dataset with other datasets.

The conventional methodology of measuring poverty suggests that 19.1%³ of households spend below the poverty line. However, additional 7.4% of households fell below the poverty line after paying for health care. The extent of poverty, including those who are impoverished by health payment, is 26.5%. The proportion of impoverishment at poorest quintile is very low, as households in the poorest quintile already live below the poverty line. The impoverishment impact of health payments reaches to the middle quintile. None of households at the fourth and richest quintiles are impoverished by health payments. The second quintile has the highest proportion of households being pushed into poverty (Figure 7).

³ The thesis estimate of the poverty headcount is very similar to the estimate of Egypt Ministry of Economic Development which is 19.9% (Egypt Ministry of Economic Development , 2008).

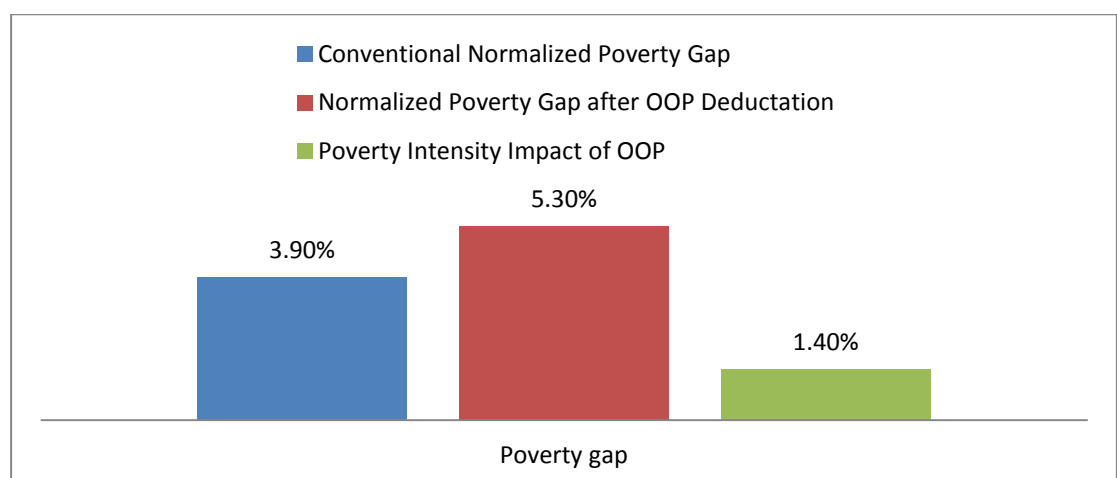
Figure 7- Impoverishment by Expenditure Quintiles



Pearson Chi-Square=2960, p-value=0.000

Furthermore, OOP on health have exacerbated the normalized poverty gap. The conventional poverty gap is estimated to be 3.9%⁴ while the poverty gap after deduction of OOP is 5.3%. (an increase by 1.4%). This indicates a percentage point change by 36% as proportion of the conventional normalized poverty gap.

Figure 8- Impact of OOP on Poverty Intensity



⁴ The thesis estimate of the poverty gap is very close to the estimate of Egypt Ministry of Economic Development which is 4.2% (Egypt Ministry of Economic Development , 2008).

Poverty Impact of Health Payments by Governorates

OOP exacerbate poverty considerably across governorates. On average, OOP increase the conventional poverty headcount by 51.5%. In two governorates, OOP nearly doubles the poverty headcount. Twenty percent of households pushed into poverty by OOP in Qena, in six governorates, the impoverishment rate exceed 10%. In twelve governorates, the impoverishment rate ranges from 5% to 10%. Only in five governorates, the impoverishment rate is below 5% (Table 15).

Table 15- Impoverishment by Governorates

Governorates	Conventional Poverty headcount (%)	Poverty headcount after OOP (%)	Impoverishment (%)	The percentage increase in poverty estimates (%)
Governorates with High Impoverishment Rates (above 10%)				
Qena	21.5	42	20.5	95.3
El Shrakia	14.6	26.2	11.6	79.5
Aswan	21.0	32.3	11.3	53.8
Beni Suef	37.0	48.1	11.1	30.0
Dakahila	20.8	31.4	10.6	51.0
Beheira	40.1	51.5	10.6	26.4
Governorates with Moderate Impoverishment Rates (between 5%-10%)				
Asyut	33.3	43.0	9.7	29.1
Suez	11.8	21.1	9.3	78.8
Minya	30.2	38.9	8.7	28.8
Faiyum	38.2	46.9	8.7	22.8
Qalyubia	8.3	16.8	8.5	102.4
Kafr El Sheikh	15.5	23.9	8.4	54.2
Damietta	13.8	20.5	6.7	48.6
Menufia	17.8	23.5	6.7	37.6
Sohag	39.9	46.4	6.5	16.3
Luxor	30.2	36.4	6.2	20.5
Alexandria	7.3	12.4	5.1	69.9
Ismailia	7.0	12.0	11.6	71.4
Governorates with low Impoverishment Rates (below 5%)				
Gharbia	5.2	9.6	4.4	84.6
Giza	11.5	15.3	3.8	33.0
Alexandria	7.3	12.4	5.1	69.9
Port Said	11.4	14.8	3.4	29.8
Cairo	2.5	4.2	1.7	68.0

C. Econometric Results

Econometric Results for Households in the Poorest Quintile

The results suggest that the place of residence does not influence the risk of encountering catastrophic health expenditure significantly. The sex of household head does not have a significant impact on the probability of facing catastrophic health expenditure. Male headed household is not a protective factor against catastrophic expenditure than female headed household. However, household with employed household head are less likely to face catastrophic payment than household with unemployed head. Educated household head does not reduce the risk of catastrophic expenditure. Households with at least one member covered by private insurance are not protected against catastrophic expenditure compared to households without private insurance. Large households are more protected against catastrophic expenditure compared to small households. Aged member(s) does not increase the probability of encountering catastrophic payments. Results suggest that public health insurance does protect poor households from facing financial hardship. Chronic illness is the highest risk factor for catastrophic health expenditure. For poor households having young children (less than five years old) is another risk factor for catastrophic health expenditure (Table 16).

Table 16- Logistic Regression of the Poorest Quintile

Independent Variable	Odds Ratio	95% CI	P-value
Place of Living (X_1)			0.19
Urban	1		
Rural	1.33	0.86-2.06	
Sex of Household Head (X_2)			0.38
Male	1		
Female	0.78	0.44-1.36	
Household Head Employment status (X_3)			0.000
Yes	1		
No	2.23	1.40-3.52	
Educated Household Head (X_4)			0.34
Yes	1		
No	1.20	0.81-1.78	
Private Insurance (X_5)			0.35
Yes	1		
No	1.79	0.52-6.15	
Household Size (X_6)	0.75	0.66-0.85	0.000
Age Dep Ratio (X_7)	1.44	0.77-2.69	0.25
Public Insurance (X_8)	0.10	0.03-0.26	0.000
Chronic Ill (X_9)	10.2	4.50-23.3	0.000
Child (X_{10})	1.62	1.20-2.18	0.000
Negelkerke R-square=0.25			
Hosmer and Lemeshow test p-value=0.521			

Econometric Results for Households in the Richest Quintile

Urban households are more protected against catastrophic payments than rural households. This suggests that the poverty effect dominates the residence effect in the poorest quintile. Sex of household head is not a determinant of catastrophic expenditure. Unlike poor households, employed household head does not decrease the risk of catastrophic health payments. This indicates that the high expenditure level in this quintile dominates the working status effect. Education status of household head does not protect rich households from catastrophic payments. Private insurance does not protect households from catastrophic health expenditure. Unlike poor households, large household size is not a protective factor against catastrophic expenditure. The reason is that it is common for large poor households to employ their young members unlike rich households (United Nations Children's Fund, 2010). Unlike poor households, having aged member or young children do not increase the likelihood of facing catastrophic payments for households in the richest quintile. This suggests that poor households are more sensitive to factors that are associated with health payments. Unlike poor households, public insurance does not protect households from catastrophic payments. This reflects the fact that many households at the richest quintile do not utilize public health facilities. The results assert that household with chronic ill member is very likely to encounter catastrophic health payments (Table 17).

Table 17- Logistic Regression of the Richest Quintile

Independent Variable	Odds Ratio	95% CI	P-value
Place of Living (X ₁)			0.008
Urban	1		
Rural	3.35	1.36-8.20	
Sex of Household Head (X ₂)			0.67
Male	1		
Female	0.78	0.24-2.50	
Household Head Employment status (X ₃)			0.100
Yes	1		
No	2.42	0.84-6.98	
Educated Household Head (X ₄)			0.34
Yes	1		
No	2.39	0.90-6.33	
Private Insurance (X ₅)			0.40
Yes	1		
No	1.92	0.41-8.84	
Household Size (X ₆)	1.14	0.77-1.70	0.49
Age Dep Ratio (X ₇)	1.31	0.44-3.38	0.623
Public Insurance (X ₈)	0.64	0.47-7.56	0.36
Chronic Ill (X ₉)	13.3	2.85-62.2	0.001
Child (X ₁₀)	0	-	0.99
Negelkerke R-square=0.22			
Hosmer and Lemeshow test p-value=0.64			

Econometric Analysis for the Complete Sample

The model results show that several variables are associated with catastrophic health expenditure. The results suggest that urban households are more protected against catastrophic health expenditure than rural households. Female headed household is more protected from catastrophic health expenditure. Results suggest that in the extreme quintiles, the expenditure level dominates the effect of the sex of household head. Working household head is a protective factor against catastrophic expenditure. The level of education of household heads is not a significant determinant of catastrophic health expenditure. Employment matters more than education in protecting households against catastrophic health expenditure.

Households that have at least one member covered by private insurance are less likely to face catastrophic payments than uninsured households. The Results suggest private insurance matters more for the middle quintiles than extreme quintiles. All expenditure quintiles are more vulnerable to face catastrophic payments compared to the richest quintile. Households at the poorest quintile are the most vulnerable to catastrophic payments. As household moves from one quintile to another, it becomes relatively more protected against catastrophic payments.

Large households are less likely to encounter catastrophic health expenditure than small households. The reason is that large households take advantage of economies of scale of household consumption. In addition, large households have more working members than small households. The model suggests that having aged member is a risk factor for catastrophic health expenditure. Public health insurance protects households from catastrophic health expenditure. As the number of insured members increase within the household, the more protected is the household. The analysis suggests that chronic illness represents a high risk factor. Households with

young children (less than five years) are more likely to face financial catastrophe than households without young children.

The variable X_{12} reflects the interaction between two variables: the number young children (X_{11}) and chronic sick ratio (X_{10}). Households with children and chronic sick member are more likely to encounter catastrophic payments than households with young children, as expressed in the difference in their odds ratios. The variable X_{13} reflects the interaction between two variables; expenditure quintiles (X_6) and chronic sick ratio (X_{10}). The model's results suggest that poor households with chronic sick member(s) face the highest risk of encountering catastrophic expenditure, as reflected by the high odds ratios (Table 18).

The above results share some similarities with a study using the same methodology that was conducted for Argentina, which is an upper middle income country. In both countries results suggest that aged member increases the likelihood of catastrophic expenditure, employed household head protects from catastrophic payments, and households in the richest quintile are the most protected relative to other quintile. However, in the Argentinean case, young children do not increase the risk of facing catastrophic payments. Unlike Egypt, education in Argentina protects households from catastrophic payments (Cavagnero, Xu, & Rivera, 2006).

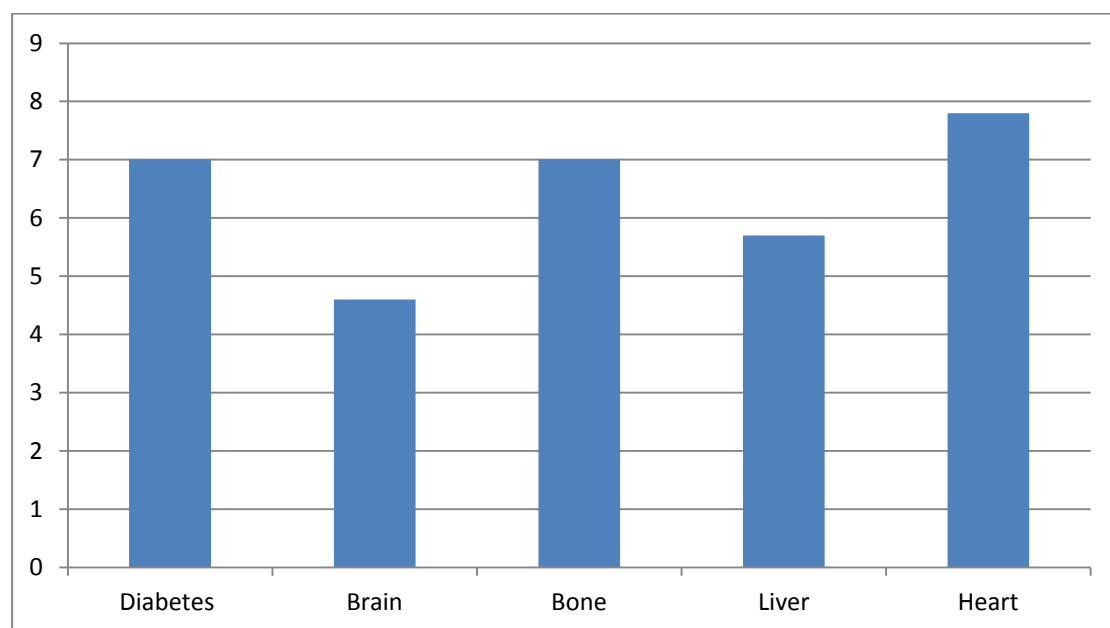
Table 18- Logistic Regression for Catastrophic Health Expenditure

Independent Variable	Coef	Odds Ratio	95% CI	P-value
Place of Living (X ₁)				0.000
Urban	1			
Rural	0.55	1.73	1.38-2.17	
Sex of Household Head (X ₂)				0.029
Male	1			
Female	-0.33	0.71	0.52-0.96	
Household Head Employment status (X ₃)				0.000
Yes	1			
No	0.83	2.307	1.80-2.95	
Educated Household Head (X ₄)				0.77
Yes	1			
No	-.033	0.96	0.77-1.20	
Private Insurance (X ₅)				0.000
Yes	1			
No	1.00	2.74	1.55-4.82	
Expenditure quintiles (X ₆)				0.000
Poorest	2.37	10.73	5.19-22.1	
Second	1.87	6.50	3.13-13.4	
Middle	1.47	4.36	2.07-9.1	
Fourth	1.36	3.93	1.86-8.3	
Household Size (X ₇)	-0.24	0.78	0.72-0.84	0.000
Age Dep Ratio (X ₈)	0.39	1.48	1.12-1.96	0.006
Public Insurance (X ₉)	-1.58	0.20	0.12-0.32	0.000
Chronic Ill (X ₁₀)	1.62	5.08	1.78-14.4	0.002
Child (X ₁₁)	0.30	1.36	1.11-1.66	0.003
Change in number of children in a household with chronic member (X ₁₂)	0.58	1.78		
Household with Chronic sick by expenditure quintiles (X ₁₃)				
Chronic by Q ₁	2.58	13.22		
Chronic by Q ₂	2.74	15.50		
Chronic by Q ₃	2.46	11.71		
Chronic by Q ₄	2.27	9.68		
Nagelkerke R-square=0.26				
Hosmer and Lemeshow test p-value=0.15				

Chronic Disease and Catastrophic Health Expenditure

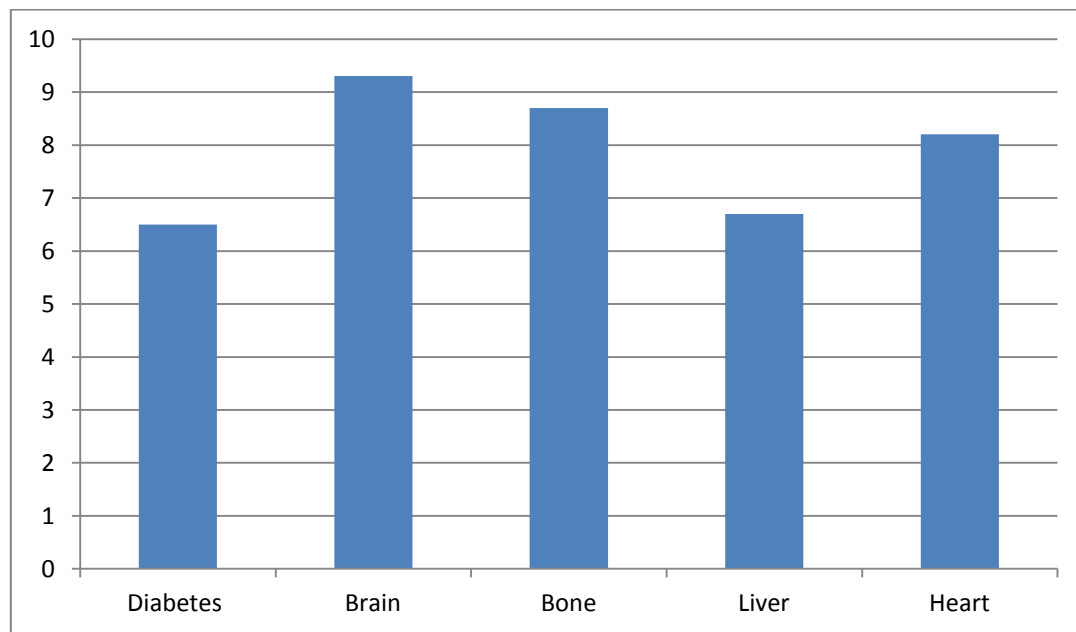
According to results, chronic disease represents an important risk factor for catastrophic health payments. Thirty one percent of households that encounter catastrophic health expenditure have at least one chronic sick member. Eight percent of households with at least one member suffering from heart disease are facing catastrophic health payments while 7% of households with at least one member suffering from diabetes are encountering catastrophic health expenditure. Moreover, 7% of households with at least one member suffering from bone illness are facing catastrophic health expenditure (Figure 9).

Figure 9- Catastrophic Health Expenditure and Chronic Disease



The analysis suggests that 30% of impoverished households have at least one member with chronic illness. Nine percent of households with at least one member suffering from brain sick member are impoverished by health payments while 8% of households with at least one member suffering heart disease are impoverished by health payments (Figure 9).

Figure 10- Impoverishment and Chronic Disease



A small percentage (6%) of households that have at least one chronic sick member are facing catastrophic payment. However, households encountering catastrophic payments are more likely to have chronic sick member.

VI. Policy Implications and Conclusion

The size of catastrophic health expenditure and impoverishment in Egypt are higher than many lower middle income countries. For instance, the size of impoverishment in some poor Asian countries like Bangladesh, India and Sri Lanka did not exceed 3.8% (Doorslaer, et al., 2006), which is a slightly higher than the half of the extent of impoverishment in Egypt. This thesis argues that reducing reliance on OOP and increasing public health investments would not only increase access to health care and subsequently improve citizens' health but also would protect households from financial risks arising from health payments. Based on the thesis's findings, I suggest some board policy areas that aim to protect households from catastrophic health payments and impoverishment (Table 19).

Table 19- Strategies for Protecting Households against Catastrophic Payments and Impoverishment in Egypt

<p>1. Developing an exemption scheme for households that are likely to face catastrophic expenditure based on the model findings. This includes:</p> <ul style="list-style-type: none"> ▪ Poor households with chronic sick member. ▪ Households with at least chronic sick member and young children. ▪ Uninsured poor households.
<p>2. Developing new public health facilities in governorates with high impoverishment rates such as Qena and El Sharkia.</p>
<p>3. Increase Pubic Investment in Health through:</p> <ul style="list-style-type: none"> ▪ Increase the health share on the government budget. ▪ Earmarked taxes on tobacco and alcohol for health. ▪ Earmarked taxes on polluting industries.

Literature suggests that the share of government spending on health as opposed to the share of OOP on health is key determinants of the size of catastrophic health payments across countries. Health financing system in Egypt is facing numerous obstacles that challenge the goal of providing free health care as suggested by the constitution. The GOE is one of the lowest spenders on health care across lower middle income countries. Additionally, the poor quality of public health care service pushes households to expensive private health providers. The national health insurance does not cope with beneficiaries' needs or protects households from financial risks associated with illness. This suggests that Egypt possesses an environment conducive to the growth of catastrophic health expenditure.

Households at different expenditure quintiles are all subject to catastrophic health expenditure with different degrees. OOP drive 6% of all households to encounter financial catastrophe. The poorest quintile is most unprotected against catastrophic payments. The analysis suggests that 7.4% of households fell below the poverty line after paying for health care. More than one third of households at the second quintile have pushed into poverty because of health payments. OOP have exacerbated the poverty gap as well. The poverty effect of OOP has exacerbated the poverty gap by 1.4%. In effect, OOP have exacerbated the poverty estimates but they have not influence the income distribution.

The econometric analysis suggests that factors such as level of household expenditure, working status of household head, insurance coverage, and chronic illness are all related to catastrophic health expenditure. Policies such as developing an exemption scheme for poor households with chronic sick member are needed to reduce the extent of catastrophic payments and impoverishment.

The thesis opens the field for future research on the optimum amount of funds that are needed for achieving universal health coverage in Egypt. Future research should assess the efficacy of untraditional health financing mechanisms on protecting households against catastrophic health expenditure and impoverishment. These untraditional mechanisms include micro banking on health, social capital and community based health insurance.

VII. References

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