AN ABSTRACT OF THE DISSERTATION OF

Azaher Ali Molla for the degree of Doctor of Philosophy in Public Health presented on March 9, 2017.

Title: Household Healthcare Expenditure in Bangladesh: Analyses of Progressivity and Impacts on Poverty

Abstract approved:

Chunhuei Chi

Health systems financing aims at providing adequate services, ensuring sufficient providers' incentives, and protecting individuals and families from financial catastrophe. Health services are financed through government funding, taxation, out-of-pocket payments, insurance, donations and voluntary aid. Low- income countries mostly rely on out-of-pocket payments. In South East Asia region, the latter accounted for 84.0% of private expenditure on health, and over 60.0% of total health expenditure. Bangladesh health systems financing are characterized by high out-of-pocket payments (63.3%) that show an increasing trend, and a lack of prepayment mechanisms. We hypothesize that an inequity prevails, and that households face high catastrophic payments and poverty. Although, a limited number of studies exists on these issues, there were studies conducted in some pocket areas making it difficult to

generalize. Thus, we aim to analyze the progressivity, incidence, and intensity of catastrophic payment and poverty using a nationally representative dataset.

We use data from Bangladesh Household Income and Expenditure Survey, 2010. This is a cross sectional survey with a sample of 12,240 households consisting of 55,580 individuals. The ethical foundation of this research is based on the "ability to pay" principle, proposed by Adam Wagstaff (2002) and of John Rawls (1971) concept of distributive justice. For quantification of progressivity, we adopted the theoretical framework developed by O'Donnell, van Doorslaer, Wagstaff, and Lindelow (2008). The Kakwani index and the Gini coefficient are used to measure progressivity and redistributive effects respectively. We use Stata 14.0 and ADePT 5.0 software for data analysis.

Our findings show that an inequality exists in health systems financing between the poor and the rich. All sources of healthcare financing are regressive in nature, meaning that health payments comprise a decreasing share of households' income/consumption as it rises. The gross household consumption for the poorest quintile is 0.22 times the richest quintile. However, the healthcare financing share for the poorest is 0.56 times the richest. The differences between Gini coefficient and Kakwani index for all sources of finance are negative, indicating regressivity. Health financing is more concentrated among the poor. For the poorest quintile, post-payment disposable income is less than the pre-payment. However, it is opposite for the rich. Thus, income inequality increases among the quintiles.

Both incidence and intensity of catastrophic payments vary from two to five times for the lowest and the highest quintiles respectively. In case of nonfood consumption, both incidence and intensity of catastrophic payments are much higher than gross consumption.

Concentration indices are negative in all thresholds indicating that the poor mostly bear the burden. Both rank-weighted headcount and overshoot are higher for all threshold levels. We found that using the conventional poverty measure, 3.0% of the population is not counted as living in extreme poverty.

Our findings substantially add evidence of health systems financing impact on inequitable financial burden of healthcare and disposable income. The heavy reliance on out-of-pocket payments affect household living standards. If the government and the people of Bangladesh are concerned about inequitable financing burden, our study suggests that Bangladesh needs to reform the health systems financing scheme. The poor households need protections from catastrophic health expenditures by reducing reliance on out-of-pocket payments. Risk protection policies including finding alternative sources of health systems financing is inevitable to overcome the present situation. We recommend longitudinal monitoring of progressivity and poverty status.

©Copyright by Azaher Ali Molla

March 9, 2017

All Right Reserved

Household Healthcare Expenditure in Bangladesh: Analyses of Progressivity and Impacts on Poverty

By

Azaher Ali Molla

A DISSERTATION

Submitted to

Oregon State University

in partial fulfilment of

the requirements for the

degree of

Doctor of Philosophy

Presented March 9, 2017

Commencement June 2017

Doctor of Philosophy dissertation of Azaher Ali Molla presented on March 9, 2017

APPROVED:

Major Professor, representing Public Health

Head of the School of Social and Behavioral Health Sciences

Dean of the Graduate School

I understand that my dissertation will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my dissertation to any reader upon request.

Azaher Ali Molla, Author

ACKNOWLEDGEMENTS

Many great people have touched my life and showered me with an irreplaceable support during my time as a doctoral student at Oregon State University. I almost feel as if this dissertation is a collaborative effort of all my colleagues, friends, and family.

My heartfelt thanks to my advisor, Dr. Chunhuei Chi, for being there for me during every hesitant step. He is the one who introduced me to the world of economics of equity and allowed me to develop my own area of research. I thank Dr. Marie Harvey for her ability to see the best in people. I am indebted to Dr. Viktor Bovbjerg, and Dr. Nancy Seifert for being my committee members despite their incredibly busy schedule and providing valuable comments and suggestions. Sincere thanks to Dr. Katherine Gunter, graduate representative for agreeing to serve in my committee. I thank Graduate School and Department of Health Policy for their timely support. My genuine thanks to Dr. Sheryl Thorburn for supporting me with a Teaching Assistantship, without which it would have been impossible for me to successfully complete this journey. My sincere thanks go to Dr. Jon Dorbolo for supporting me personally as well as providing me with Graduate Research Assistantship in my great need. I will never forget the support from my peers and cohort members. You are the best cohort that a graduate student could wish for.

Outside of OSU, my sincere gratitude to Dr. Sushil Ranjan Howlader for walking me through the field of Health Economics. Thanks to all my colleagues at the University of Dhaka for their fellow feelings. My gratitude to the Honorable Vice Chancellor of the University of Dhaka for providing me with financial support and study leave during these five years.

While in Corvallis, I have been surrounded by wonderful family and friends. They have made me pleased and happy. Without them, it could have been the most stressful time of my life. Sincere recognitions to Dr. Mahfuzur Sarker, and Mr. Mohammad Azam for their all-time friendly cooperation. Thanks to all my Bangladeshi friends at Corvallis who kept me well fed and pampered. Special appreciations to Prabhat Talukdar for his support in every moment I felt a need that someone has be beside me. I am much indebted to Nargas Oskui for formatting help, and Judy David for language edits.

My endless love to my wife Meherun Nessa for her all-time cooperation keeping me mentally and physically fit to win this journey. A big hug to my younger son Molla Nawsher who is also graduating this winter, 2017. My heartfelt congratulations for your success. My endless love to my older son Molla Nawroz and his wife Sameera Afroze. A Big-Bear hug to my granddaughter, Aayat Nawroz.

Finally, I would like to dedicate this dissertation to my granddaughter, Aayat whom I have missed the most during these long five years.

CONTRIBUTION OF AUTHORS

Azaher Ali Molla has conceptualized the study, managed data set, proposed model, conducted analysis and wrote the manuscript presented.

Dr. Chunhuei Chi guided all aspects of this research, provided editorial comments, suggestions on the analysis and interpretation of findings.

TABLE OF CONTENTS

Page

Chapter 1: Introduction…… 1

1.1 Background…… 2

1.2 Statement of the problem…….. 3

1.3 Purpose of the study…….. 4

1.4 Research questions……. 6

1.5 Significance of the study……. 8

1.6 Analytical and theoretical framework…… 8

1.7 Ethical consideration……. 11

1.8 Overview of the Bangladesh health systems management and finance 11

1.9 Overview of the data and methods……. 14

References……. 16

Chapter 2: Manuscript 1 …….. 18

Who pays for healthcare in Bangladesh? An analysis of progressivity in health systems financing

Chapter 3: Manuscript 2 …….. 50

Financial catastrophe and impoverishment in paying for healthcare: An analysis using Bangladesh Household Income and Expenditure Survey, 2010

Chapter 4: Conclusions ……. 87

Bibliography…… 96

Annex-1: IRB determination…… 103

LIST OF FIGURES

Figure Page

Chapter 1: Introduction

1.6 Conceptual framework showing causal pathway of ill health and poverty…….. 10

Chapter 2: Manuscript 1

2. 1 Trends of out-of-pocket expenditure, Bangladesh, 1997-2012…… 24

2.2 Lorenz dominance analysis of household tax, Bangladesh, 2010……. 39

2.3 Lorenz dominance for sources of health systems financing, Bangladesh, 2010. 40

2.4 Health payments shares by quintiles, Bangladesh, 2010…….. 41

Chapter 3: Manuscript 2

3.1 Total health expenditure by financing schemes, Bangladesh, 2012…….. 58

3.2 Pen's parade for household expenditure gross and net of out-of-pocket health payments, Bangladesh, 2010……. 67

3.3 Health payments share by total expenditure and nonfood expenditure, Bangladesh, 2010…… 76

3.4 Pen's Parade of the household consumptions, gross and net of healthcare payments, Bangladesh, 2010……. 77

LIST OF TABLES

Table Page

Chapter 2: Manuscript 1

2.1 A summary of the sample coverage, BHIES, 2010…… 27

2.2 Variables with definitions and source…… 30

2.3 Summary report of sample data, HIES, Bangladesh, 2010…… 31

2.4 Average per capita health finance by quintiles, Bangladesh, 2010…… 32

2.5 Household share of total healthcare financing, Bangladesh, 2010…… 34

2.6 Financing budget shares, Bangladesh, 2010 (Health financing as a share of total consumption)…… 35

2.7 Decomposition of redistributive impact of health systems financing, Bangladesh, 2010…….. 37

Chapter 3: Manuscript 2

3.1 A summary of studies conducted in Bangladesh…… 62

3.2 A summary of the sample coverage, BHIES, 2010…….. 69

3.3 Incidence and intensity of catastrophic health payments using household consumption, Bangladesh, 2010…… 70

3.4 Incidence and intensity of catastrophic health payments, using nonfood consumption, Bangladesh, 2010…… 71

3.5 Measures of distribution-sensitive catastrophic payments, Bangladesh, 2010. 72

3.6 Weighted vs unweighted incidence and intensity of catastrophic payments, Bangladesh, 2010…….. 73

3.7 Measures of poverty based on consumption gross and net of spending on healthcare…….. 74

LIST OF ABBREVIATIONS AND ACRONYMES

ATP:	Ability to pay
BBS:	Bangladesh Bureau of Statistics
BNHA:	Bangladesh National Health Accounts
GDP:	Gross domestic product
HCP:	Healthcare payment
HIES:	Household Income and Expenditure Survey
HICs:	High-income countries
HSF:	Health systems financing
IRB:	Institutional review board
ILO:	International Labor Organization
IMPS:	Integrated multipurpose sampling
LIC:	Low-income country
LMICs:	Low and middle-income countries
MoHFW:	Ministry of health and family welfare
MPO:	Mean positive overshoot
NGO:	Non-government organization
OECD:	Organization for Economic Co-operation and Development
OOP:	Out-of-pocket
PHC:	Primary health care
PPP:	Purchasing power parity
PSU:	Primary sampling unit
SDH:	Social determinants of health
SEA:	South East Asia region
SMA:	Sub-municipal area
SWAp:	Sector wide approach
THE:	Total health expenditure
WHO:	World Health Organization

CHAPTER 1

INTRODUCTION

1.1 Background

The five broad categories of revenue collections for health systems financing (HSF)[1] are tax, social insurance, private insurance, out-of-pocket (OOP) payments, and foreign donation or aid. Low- income countries are mostly relying on OOP spending (WHO, 2000). In South East Asia (SEA) region, OOP expenditure accounted for 84.0% of private expenditure on health (Wong, 2012) and over 60.0% of total health expenditure (THE) (WHO, 2009). Households' annual health spending in Bangladesh currency is Taka[2] (Tk.) 205.82 billion (U.S. $2.61 billion). Countries with such a high proportion of OOP expenditure are more likely to face financial catastrophe, and consequently impoverishment. High OOP expenditure has serious consequences. It dis-incentivizes vulnerable people from service utilization, and often, compels them to suspend or ignore healthcare utilization. It has been estimated that over one billion people have no access to services simply because they cannot afford OOP payments, while a 100 million people are pushed into poverty and/or forced into deeper poverty (Xu, Evans DB, Carrin, Aguilar-Rivera, Musgrove P, Evans T., 2007). In Kenya and Senegal, OOP payments pushed 100,000 households below the poverty line in a single year (ILO, 2007). In India, a study has shown that OOP health expenditures were responsible for an average increase of poverty by as much as 3.6% and 2.9% for rural and urban areas respectively (Gupta, 2009).

In 2010, health spending in Bangladesh accounted for 3.4% of gross domestic products (GDP), which is lower than the average (3.8%) in SEA region, below the average of low-income

---

[1] Initially, The World Health Organization used the term and now it is widely used in healthcare financing. It denotes raising funds, reducing financial burden to access, and allocating or using funds in a way that promote efficiency and equity.

[2] Bangladesh currency Taka (Tk.), 1 US $ = Tk. 70 in 2010 and 1 US $ =Tk. 80 in 2016.

countries (5.4%), and lower-middle income countries (4.3%), and far below the world (8.5%) (Majumder, 2013). A breakdown of OOP spending shows that drugs and medicine constitutes 65.0%. Other components of OOP payments are services of curative care (22.0%), ancillary services (9.0%), outpatient and homebased services (4.0%), and general government administration of health (less than 1.0%). Bangladesh National Health Accounts (BNHA, 2012) reports that out-of-pocket expenditure increases over time; from 55.9% in 1997 to 63.3% in 2012.

1.2 Statement of the problem

Health is the most important condition of human life and is considered a critically significant constituent of human capabilities (Sen, 2002). Poor families are disproportionately affected by rising healthcare costs. It is a great concern that children from poor families are more likely to die before they reach their fifth birthday. The poor are more likely to develop chronic illnesses than wealthier individuals are. When the poor, without of any fault of their own, are bound to spending a large part of their limited income on healthcare, they may well end up with little resources to feed and shelter themselves.

In Bangladesh, household OOP expenditure remains the main source of HSF, and increasing over time (BNHA, 2012). The second largest financing agent is government, making up to 23.1% of THE. The private firms' share has remained at around 1.0% over the years. The share of non-government organization (NGO) from their own source has ranged between 1.0 to 2.0% of the THE over the 1997-2012 period. Development partners contribute through NGOs or government. The rest of the expenditure through NGOs varied from five to 9.0% during the period. Household expenditure as a percentage of GDP increased from 1.6% in 1997 to around

20.0% in 2010 (BNHA, 2012). Total health expenditure by geographical area (division) shows that the highest per capita expenditure was Tk.1, 337 in Dhaka division, and the lowest was Tk.449 in Barisal division (BNHA, 2012).

The consequences of excess OOP expending are enormous with different scenarios. Some households may not utilize formal healthcare at all due to excess OOP expenditure, or they may receive partial care, and thus aggravate the disease condition that causes the disease to become a chronic status. Households may sell their movable and immoveable properties to manage the treatment costs, which in turn make them poorer. Due to health expenditures, households may need to ration their food items, and thus may become malnourished. Out-of-pocket health expenditure may affect education; children may drop out of school. Moreover, OOP payments may mislead planners and policy makers to miscalculate poverty status. The conventional calculation of poverty assesses the household overall expenditure. The latter includes all expenditure including healthcare payments, which underestimates poverty. It was estimated that 78 million people in Asia are not currently included as poor despite the fact that their per capita household expenditure net of spending on healthcare payments falls below the extreme poverty line (van Doorslaer, 2007).

1.3 Purpose of the study

This study has two main purposes. Our first aim is to analyze the progressivity of health systems financing in Bangladesh. The second purpose is to assess how far healthcare OOP payments impoverish households. Each part ends with some pertinent policy directions and recommendations.

Analyses of household healthcare expenditure are essential for creating effective health financing policy for any country, irrespective of state of development. However, this information is much more crucial for middle and low-income countries. Appropriate and adequate community and country bound health care policy cannot be devised without adequate information on healthcare expenditure at the household level. Analysis for healthcare demand and expenditure are important for all countries and especially for a poverty-stricken country like Bangladesh (Akanda & Minowa, 2011).

This study uses a nation-wide survey of Household Income and Expenditure data 2010 (BBS, 2011). The findings of the study will be useful to devise national health systems financing policy.

Part one, analysis of progressivity intends to examine if inequities in HSF exist. This analysis provides a framework that would promote equity in health systems financing. This framework may also be useful for other Southeast Asian countries with similar socioeconomic status. Reducing inequities requires more than a health point of view. It has to consider social determinants of health (SDH) like, lifestyle, social harmony, working conditions, social class, education, gender, historical contexts and political climate. In addition to numerical differences, this study employs statistical and macro-economic analysis and techniques to examine equity using Household Income and Expenditure Survey, 2010. To the best of our knowledge, this research seems to be the first of its kind of equity analysis in Bangladesh using nationwide survey data.

The second part of this research analyzes the impacts of OOP health expenditures on poverty. Bangladesh HSF is characterized by high dominance of OOP payments and lack of

prepayment mechanisms such as tax and health insurance. If healthcare expenses are large relative to the resource available to the household, this disruption to the living standards is considered catastrophic. One conception of fairness in health finance is that households should be protected against such catastrophic medical expenses (WHO, 2000). Often times, theoretical discussions to equity are far distant from the practical world of policy. This part of analysis will attempt to bridge the gap.

The conventional method of measuring poverty uses household income or consumption. A household that diverts expenditure to healthcare to a point that spending on necessities falls below the poverty threshold, will not be treated as poor. Alternatively, a household that lives below the poverty line, but borrows money to cover healthcare expenses such that its total expenditure is raised above the poverty threshold, will not be counted as poor. Van Doorslaer (2007) estimated that 78 million people in Asia are not classified as poor, despite the fact, that their per capita household expenditure net of spending on healthcare falls below the poverty line of U. S. $ 1 per day. In this study, we measure poverty based on household consumption gross and net of OOP healthcare spending, and show limitations of the conventional method.

1.4 Research questions

This study is organized in two main areas of interest involving household healthcare expenditure through analyzing progressivity and assessing the impacts of OOP payments on poverty. These two areas are organized into two manuscripts. We have submitted both the manuscripts for publication. The first manuscript, 'Who pays for healthcare in Bangladesh? An analysis of progressivity in health systems financing' was submitted to the International Journal

of Equity in Health. The second manuscript, 'Financial Catastrophe and Impoverishment in Paying for Healthcare: An Analysis using Bangladesh Household Income and Expenditure Survey, 2010' was submitted to the Health Economics Review.

We expand our research question into sub-questions in the subsequent manuscripts.

Manuscript 1: *Who pays for healthcare in Bangladesh? An analysis of progressivity in health systems financing.*

Within the general objectives of progressivity analysis, our specific questions are:

1. How are the progressivity/regressivity of different HSF sources?
2. What is the magnitude of progressivity/regressivity in HSF in Bangladesh?
3. What are the re-distributive effects of HSF on disposable income?

Manuscript 2: *Financial Catastrophe and Impoverishment in Paying for Healthcare: An Analysis using Bangladesh Household Income and Expenditure Survey, 2010*.

The general objective of this part is to measure the catastrophic payments and its impacts on poverty. The specific questions are:

1. What is the incidence[3] and intensity[4] of catastrophic healthcare payments in Bangladesh?
2. What are the relative financial burden of catastrophic payments incurred by the poor and the rich?
3. What is the contribution of OOP healthcare payments to household poverty?

---

[3] In public economics and finance, the term 'incidence' means the eventual distribution of tax burden. In epidemiology, incidence is a variable, and indicates 'new cases'. In our analysis, we used the epidemiologic concept, meaning new cases of catastrophic payments or poverty. Here incidence means "How many?"

[4] Intensity measures how much on average households above the threshold levels.

1.5 Significance of the study

Bangladesh has been overwhelmed with excessively high burden of OOP expenditure with 63.3% of THE. In addition, less than 1.0% of the population is covered by private insurance scheme (BNHA, 2012). Since the second half of 20th century, both demographic and epidemiological transitions are ongoing (Molla et al, 2004). Over the past three decades, population growth has slowed significantly, from 2.8% in 1960 to 2.2% in 2012. Fertility rate has declined from 3.4 in 1960 to 2.1 in 2012 (Malik, 2013). Elderly population will be increasing from 8 million (6.1%) in 2001 to 44 million (20.2%) in 2051 (Kabir, R., Khan, Kabir, H., and Rahman, 2013). In addition to common infectious disease, non-communicable disease is becoming a major health burden. Faced with these issues, the economically susceptible population of the country faces impoverishment, or are forced into deeper poverty. Despite significant importance for health policy formulation, we did not find any study conducted on analyzing progressivity of HSF and how does it affect poverty. The combination of these factors call for devising policy on healthcare financing focused on decreasing the burden of OOP expenditure. For successful policy revisions, there is a need for increased resources as well as finding alternative sources of finance. However, sufficient evidence bases are not available. This study serves this purpose.

We strive to answer the questions, who bears the burden of healthcare expenditure and how much it causes household financial catastrophe and poverty.

1.6 Analytical and theoretical framework

Health systems financing in Bangladesh is characterized by dominance of high OOP payments and nearly lack of pre-payment pooling mechanisms such as, earmark tax, social and

private health insurance. Bangladesh National Health Accounts (BNHA), 2012 report that 63.3% of the total health expenditure (THE) is OOP payments. In most times, healthcare payments are nondiscretionary, meaning that people cannot avoid this type of spending. Households must pay healthcare costs to get their members healthy and productive. Here, the crucial factor is – do households pay according to their ability-to-pay, or they face financial catastrophe? Contribution towards healthcare may redistribute disposable income. This redistribution could be intended or unintended. Here, arises the question of both horizontal[5] and vertical equity[6]. The former occurs when payments are proportionally related to the ATP. On the contrary, vertical redistribution occurs when payments are disproportionately related to ATP. When OOP payments crosses a level of household expenditure or consumption, it turns to catastrophic payments that contribute to poverty. To prevent catastrophic payments and impoverishment, an equitable HSF is inevitable. Equitable financing means to providing healthcare as per everyone's need without any financial burden. It is based on financial protection, progressivity, and cross subsidies. As a vicious cycle, poverty limits access and utilization, which, in turn leads to ill health and ultimately leads to poverty. The schematic presentation of the conceptual framework is shown in Figure 1.6.

For analyzing progressivity and poverty, we adopt the ATP principle developed by Adam Wagstaff (2002) under the broad umbrella of distributive justice laid out by John Rawls (1971). The principle suggests that a national health system should be based on ATP. World Bank and

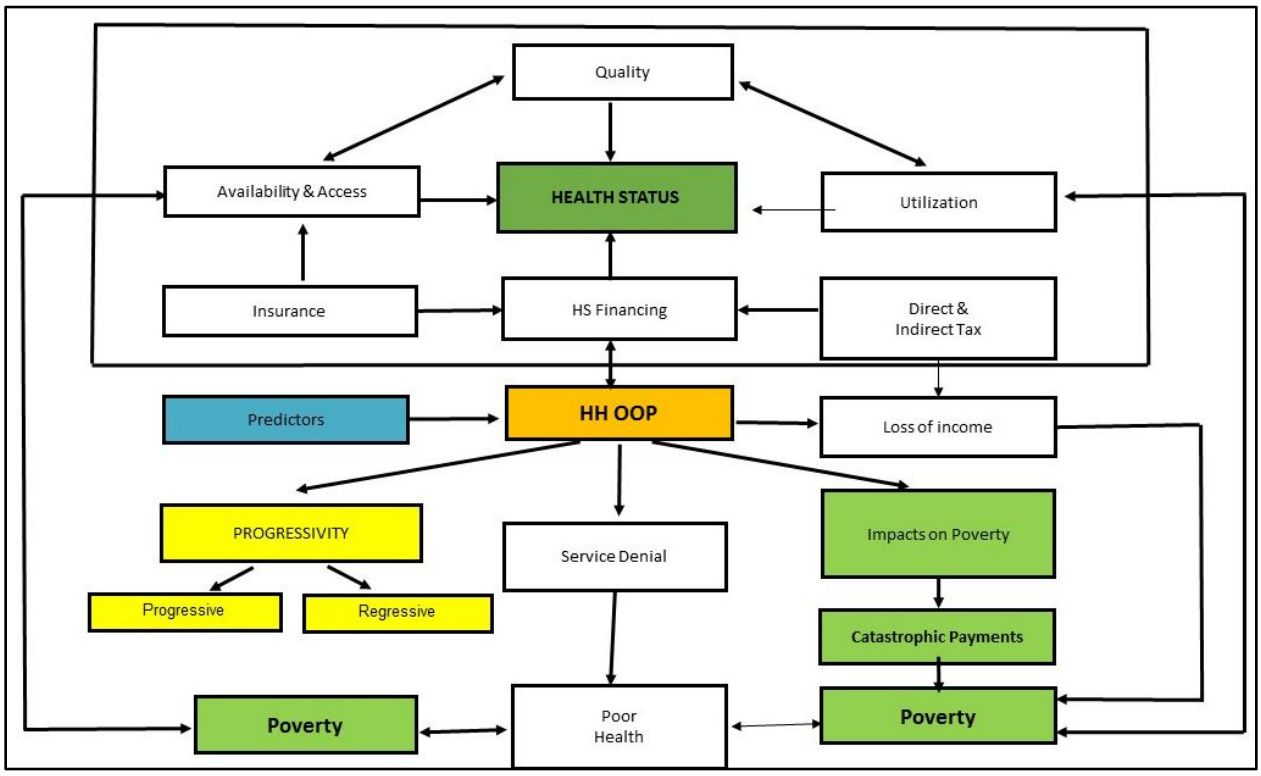
---

[5]Horizontal equity is an economic theory that states that individuals with similar income and assets should pay the same amount in taxes. In our case, it is healthcare expenditure/payments

[6]Vertical equity implies that people with higher income or wealth should pay more tax. In our case, more healthcare payments.

World Health Organization have adopted the method. These tools have been used in many empirical studies in measuring progressivity and poverty.

Figure 1.6: Conceptual framework showing causal pathway of ill health and poverty



Source: Adopted from Kutzin, 2008

The health system of Bangladesh reflects a pro-egalitarian bias among its policy makers and planners. However, the people of the country are facing an enormous hardship paying a large amount of OOP payments, which reflects a libertarian model of health finance. Under a normative assumption, a progressive health systems financing is based on universality and ATP. However, in practice, the present system seems to be inclined to regressivity, non-universality and non-ATP.

1.7 Ethical consideration

This research is based on secondary data collected by Bangladesh Bureau of Statistics (BBS). We bought this dataset from BBS. The institutional review board (IRB) of the Oregon State University (OSU) cleared the study as not dealing with human subjects. A copy of the OSU IRB is annexed (Annex 1).

1.8 Overview of Bangladesh health systems management and financing

Bangladesh has a mixed health system both in financing and in delivery of services. Despite a significant economic improvement, health systems financing does not meet the greater needs of the population. Total expenditure on health as a percentage of GDP was 3.4% in 2012 (The World Factbook, 2012).

Since its independence, Bangladesh has made significant progress in health outcomes. Most of the health indicators show steady gains, and the health status of the population has improved substantially. Healthcare services are provided through public, private for-profit and private not-for-profit organizations. The public sector provides curative, preventive, promotive and rehabilitative services, whereas the private for-profit organizations provide only curative care. NGOs are mostly not-for-profit; they provide outpatient, promotive and preventive services. The Ministry of health and family welfare (MoHFW) is responsible for planning and management of services throughout the country. The government has been pursuing a sector-wide approach (SWAp) since 1998. Developed by the World Bank in 1990, the SWAp was intended to provide a more coherent way to manage government-led sectoral policies and expenditure frameworks, and build local institutional capacities. Under the umbrella of SWAp, two of the programs, Health and Population Sector Program (HPSP, 1998-2003) and Health,

Nutrition and Population Sector Program (HNPSP, 2003-2011) have been implemented. The current program, Health, Population and Nutrition Sector Development Program (HPNSDP, 2011-2016) is at the final stage. At present, the fourth SWAp is underway to be finalized.

The present government has taken steps to revitalize primary healthcare (PHC) services by establishing one community clinic for every 6,000 populations in the rural areas (Mercer, Khan, Daulatuzzaman and Reid, 2004). The country has managed to develop a nation-wide network of health services infrastructure.

Per capita total expenditure on health expenditure was US $67 in 2011, and total expenditure on health as percentage of gross domestic product (GDP) was 3.4%. The main source of finance for total health expenditure (THE) was out-of-pocket (OOP) spending (63.3%) followed by government spending (23.1%) and external resource (8.4%). Being one of the low-income countries located in SEA with a population of more than 160 million (July 2012 est.) and 70 years of life expectancy at birth in 2013 (BBS, 2013), Bangladesh is striving to improve its population's health.

The healthcare services in Bangladesh are highly centralized, and controlled by the Ministry of health and family welfare (MoHFW) and its two directorates; Health and Family Planning. Total health expenditure (THE) as estimated by BNHA (2012) was Tk. 325.1 billion (US $4.1 billion) in 2012, Tk.153.9 billion (US $2.2 billion), Tk. 81.5 billion (US $1.4 billion) in 2002, and Tk. 46.4 billion (US $1.1 billion) in 1997. THE has increased by around 14.0% in 2012 in nominal terms and 8.0% in real terms whereas, the THE as a percentage of gross domestic product (GDP) has remained stable in 2012 at around 3.4%. Per capita spending on health was

Tk. 2,144 (US $27) in 2012, Tk. 1,576 (US $16) in 2007 and Tk.825 (US $9) in 1997 at 2012 constant price.

According to the system of health accounts developed by Organization of Economic Cooperation and Development (OECD) 2011, disaggregated financing schemes encompass major types of financing arrangements including households' OOP expenditure, and third party payments like social insurance and voluntary insurance. The largest financing scheme for Bangladesh healthcare is the household OOP expenditure. The share of household in the THE was 55.9% in 1997, and has risen to 63.3% in 2012. Government financing through MoHFW has increased significantly in absolute terms, but as a share of THE public spending has declined from 37.0% in 1997 to 23.0% in 2012 (BNHA, 2012). Voluntary health insurance schemes are primarily in the form of spending to provide or reimburse medical care for employees in formal sectors, and some business entities. The contribution of NGOs' serving households accounts for 2.0% of THE approximately. Development partners' contribution to NGOs is accounted for 8.4% of THE (BNHA, 2012).

Households spend over Tk.250 million annually on drugs and health related goods and services. This component has increased from 55.9% in 1997 to 59.9% in 2005 to 63.3% in 2012. Spending on medical goods comprises the largest share of OOP expenditure. Households spent Tk.134 billion on pharmaceutical drugs, which accounted for 65.0% of OOP in 2012.

Community financing mechanisms and risk-pooling systems are nearly non-existent except in some pockets of NGOs innovation. A few NGOs have started some kind of health insurance component within their package of micro-credit programs. As time passes,

Bangladesh has acquired experience in implementing activities under demand-side financing mechanisms, through piloting maternal health voucher schemes in 33 *upazilas*[7] in the country.

The overall percentage distribution of healthcare spending by seven administrative divisions remained nearly unchanged during 1997- 2012 period with exception of Dhaka (41.0%) and Chittagong (18.0%) division. In Dhaka division, the percentage increased from 28.0% in 1997 to 41.0% in 2012. On the contrary, in Chittagong division, the percentage decreased from 27.0% in 1997 to 18.0% in 2012. Expenditure remained the same in other divisions. In respect to per capita spending, Dhaka division had the highest (41.0%), and Barisal and Sylhet divisions had the lowest (8.0%) (BNHA, 2012).

1.9 Overview of the data and methods

We use data from Bangladesh Household Income and Expenditure Survey, 2010. This is a national representative cross sectional survey on 12,240 households consisting of 55,580 populations. A two-stage stratified random sampling technique was followed in drawing sample.

This study focuses on the empirical relationship between household healthcare expenditure and ability to pay. Under the distributive justice, we follow the ability-to-pay principle developed by Adam Wagstaff (2002). For quantification of progressivity, we adopted the theoretical framework developed by O'Donnell, van Doorslaer, Wagstaff, and Lindelow (2008). For data analysis, we have used Stata 14.0 (Stata Corporation, 2015), and the Automated Development Economics and Poverty Tables (ADePT) software, version 5.0

[7]Subunits of districts serve for administrative or other purposes. Previously known as *Thana* or police station.

developed by World Bank's experts (Wagstaff et al., 2007). Many researchers have adopted this method to study HSF in LMICs and HICs.

We present the results both in quantitative estimation, and in graphics. We use Kakwani index to measure the magnitude of progressivity, and Gini coefficient to assess the redistributive effects of healthcare payments on disposable income. Both total and nonfood consumption were used to measure incidence and intensity of catastrophic payments and its impacts on poverty. Assuming that marginal utility of income is different for the rich and the poor, we assess distribution sensitive measure of catastrophic payments. A threshold level of 5% to 40% was used for both catastrophic payments and poverty status. Poverty differences are shown among the quintiles, and between gross and net of health payments.

References

Akanda, M., Monowa, M. (2011). Household demands for health care expenditure by controlling endogeneity bias in Bangladesh. *Dhaka Univ. J. Sci*. 59(1): 137-46.

Bangladesh Bureau of Statistics, Statistical Division, Ministry of Planning, Government of the People's Republic of Bangladesh. Report of the Household Income and Expenditure Survey 2010. Dhaka, Bangladesh, 2011.

Bangladesh Bureau of Statistics, Statistical Division, Ministry of Planning, Government of the People's Republic of Bangladesh. Statistical Pocket Book, 2013. Dhaka, Bangladesh, 2014.

Bangladesh National Health Account 2007-2012. Health Economics Unit (HEU), Ministry of Health and Family Welfare. Government of the People's Republic of Bangladesh. Dhaka, 2012.

Gupta I. Out-of-pocket expenditures and poverty: Estimates from NSS 61st round. Draft paper. Institute of Economic Growth, New Delhi. 2009 May 12.

International Labor Organization Social health protection: An ILO strategy towards universal access to health care. Geneva: International Labor Organization, 2007.

Kabir R, TAKhan H, Kabir M, Rahman MT. Population ageing in Bangladesh and its implication on health care. European Scientific Journal. 2013 Nov 1;9(33).

Kutzin J. Health financing policy: a guide for decision-makers. Health financing policy paper. Copenhagen, WHO Regional Office for Europe. 2008;24.

Majumder MA. World Health Statistics 2011: How does Bangladesh compare with other South-East Asian countries? South East Asia Journal of Public Health. 2013 Jan 8;1(1):4-11.

Malik K. Human development report 2013. The rise of the South: Human progress in a diverse world.

Mercer A, Khan MH, Daulatuzzaman M, Reid J. Effectiveness of an NGO primary health care programme in rural Bangladesh: evidence from the management information system. Health Policy and Planning. 2004 Jul 1;19(4):187-98.

Molla AA, Anwar KS, Hamid SA, Hoque ME, Haq AK. Analysis of Disability Adjusted Life Years (DALYs) among arsenic victims: a cross-sectional study on health economics perspective. Bangladesh Medical Research Council bulletin. 2004 Aug;30(2):43-50.

O' Donnell, O., van Doorslaer, E., Rannan-Eliya, R. F., et al. (2008). Who pays for health care in Asia? Journal of Health Economics 27(2008) 460-475.

Organization for Economic Co-operation and Development. A System of Health Accounts 2011. Organization for Economic Co-operation and Development; 2011.

Pearce, DW. In The Dictionary of Modern Economics. MIT Press. Cambridge, MA, 1981; p. 197.

Rawls J. Distributive justice. Perspectives In Bus Ethics Sie 3E. 1967:48.

StataCorp. 2015. *Stata Statistical Software: Release 14*. College Station, TX: StataCorp LP.

Sen, A. (2002). Why health equity? Health Economics;11(8): 659-66.

The World Factbook, 2012. Source: https://www.cia.gov/library/publications/the-world-factbook/ Retrieved on 01/17/2015.

Van Doorslaer E, O'Donnell O, Rannan-Eliya RP, Somanathan A, Adhikari SR, Garg CC, Harbianto D, Herrin AN, Huq MN, Ibragimova S, Karan A. Catastrophic payments for health care in Asia. Health economics. 2007 Nov 1;16(11):1159-84.

Wagstaff, A., & Doorslaer, E. van. (2002). Equity in the finance of health care: Some international comparisons. 1992, 11(4), 361–387.

Wagstaff A, O'Donnell O, Van Doorslaer E, Lindelow M. Analyzing health equity using household survey data: a guide to techniques and their implementation. World Bank Publications; 2007 Nov 2.

Wong YN. World Development Report 2012: Gender equality and development. InForum for Development Studies 2012 Nov 1 (Vol. 39, No. 3, pp. 435-444). Routledge.

World Health Organization. Health financing strategy for the Asia Pacific Region (2010-2015). Manila: WHO Regional Office for the Western Pacific; 2009.

World Health Organization. The World health report, 2000. Health systems: improving performance. Geneva: World Health Organization. 2000. URL: http://www. who. int/whr/2000/en/index. html. 2005.

Xu K, Evans DB, Carrin G, Aguilar-Rivera AM, Musgrove P, Evans T. Protecting households from catastrophic health spending. Health affairs. 2007 Jul 1;26(4):972-83.

CHAPTER 2

MANUSCRIPT 1

Who pays for healthcare in Bangladesh? An analysis of progressivity in health systems financing

Submitted to

International Journal for Equity in Health

Editors-in-Chief

Dr. Efrat Shadmi and Dr. Prof Leiyu Shi

Email: equityhealthj@biomedcentral.com

Abstract

The relationship between payments towards healthcare and ability to pay is a measure of financial fairness. Analysis of progressivity is important not only from an equity perspective, but also for macroeconomic and political analysis of healthcare system. Sen (2002) argued that inequalities in health are more worrisome than inequalities in other sectors. Access to healthcare in low-income-countries is associated with availability, quality and affordability. Without well-functioning healthcare financing system, access to and use of health services cannot be achieved for a majority of the population. Bangladesh health system finance is characterized by high out-of-pocket payments (63.3%), which is increasing in trends. This paper analyzes the progressivity of Bangladesh's different health system financing sources, its magnitudes, and redistributive effects.

We use data from Bangladesh Household Income and Expenditure Survey, 2010. This is a cross sectional and nationally representative sample of 12,240 households consisting of 55,580 individuals. For quantification of progressivity, we adopted 'ability-to-pay' theoretical framework developed by O'Donnell, van Doorslaer, Wagstaff, and Lindelow (2010). We present the results both in quantitative estimation and in graphics. We use Kakwani index to measure the magnitude of progressivity, and Gini coefficient to assess the redistributive effects of healthcare payments on disposable income.

The major sources of healthcare finance in Bangladesh are tax, social insurance, private insurance, and out-of-pocket payments. All sources of healthcare financing were found to be regressive, meaning that health payments comprised of a decreasing share of ability to pay as the latter rises. A visible inequality exists in health system financing between the poor and the

rich. The overall household consumption of the poorest quintile is 0.22 times the richest quintile. However, financing share for the poorest quintile is 0.56 times the richest quintile. The differences between Gini coefficient and Kakwani index for all sources of finance are negative, which indicates regressivity, and that financing is more concentrated among the poor. The total redistributive effects on income are negative for all sources of finance. This means, after paying for healthcare the poorest quintile has less of disposable income than the richest. In the absence of horizontal inequity, all the financing sources are regressive. As a result, the income inequality increases due to high out-of-pocket payments. Finally, the analysis shows that Bangladesh healthcare financing has both horizontal and vertical inequity. The increase in income inequality caused by out-of-pocket payments is 89.0% due to negative vertical effect, and 11.0% is due to horizontal inequity.

Our findings substantially add evidence of health systems financing impact on inequitable financial burden of healthcare and income. The heavy reliance on out-of-pocket payments affects household living standards. If the government and people of Bangladesh are concerned about inequitable financing burden, our study suggests that Bangladesh needs to reform health systems financing. Launching of health insurance scheme with a subsidy premium for the poor and vulnerable may reduce this reliance. Introduction of a health card have some positive effect on OOP payments.

Key words: Household healthcare expenditure, Progressivity, Ability-to-pay, Health equity, Redistributive effects, Magnitude of progressivity, Out-of-pocket payments, Horizontal equity, Vertical equity.

Background

The relationship between payments toward healthcare and ability to pay (ATP) is regarded as a common measure of equity (Wagstaff et al., 2007). Who pays how much share for healthcare - is a question of financial fairness. If healthcare payments (HCPs) account for increasing proportion of ATP as the latter rises, it is a progressive system of financing. On the contrary, when HCPs comprise a decreasing share of ATP, it is termed as regressive. This is an ethical issue, and closely related to human rights. The ethical foundation of this research is based on the "ability-to-pay" principle under the concept of distributive justice, and follows the principles laid out by Adam Wagstaff (2002). ATP principle is the most widely used framework to provide moral foundation for the political process and structures that affect the distribution of economic benefits and burdens in societies. This principle is being accepted, and applied by the World Bank, World Health Organization, and many other international funders and actors in health development programs (O'Donnell, 2008; Wagstaff, 2002; Munge and Briggs, 2014). Research work has been done in high, middle and low-income countries. The measurement of progressivity or regressivity is important not only for a wide range of equity perspective, but also for macroeconomic and political analysis of healthcare systems (O'Donnell and Wagstaff, 2008). Analysis of progressivity has long been considered an important study in the health sector. In Bangladesh, there exists an inequality between the rich and the poor in almost all sectors. However, inequalities in the health sector have a more negative impact than inequalities in other sectors (Tobin, 1970 and Sen, 2002).

The poor use less health services despite having higher levels of need. Nobel laureate Amartya Sen (2002) argued that inequalities in health are more worrisome than inequalities in other sectors.

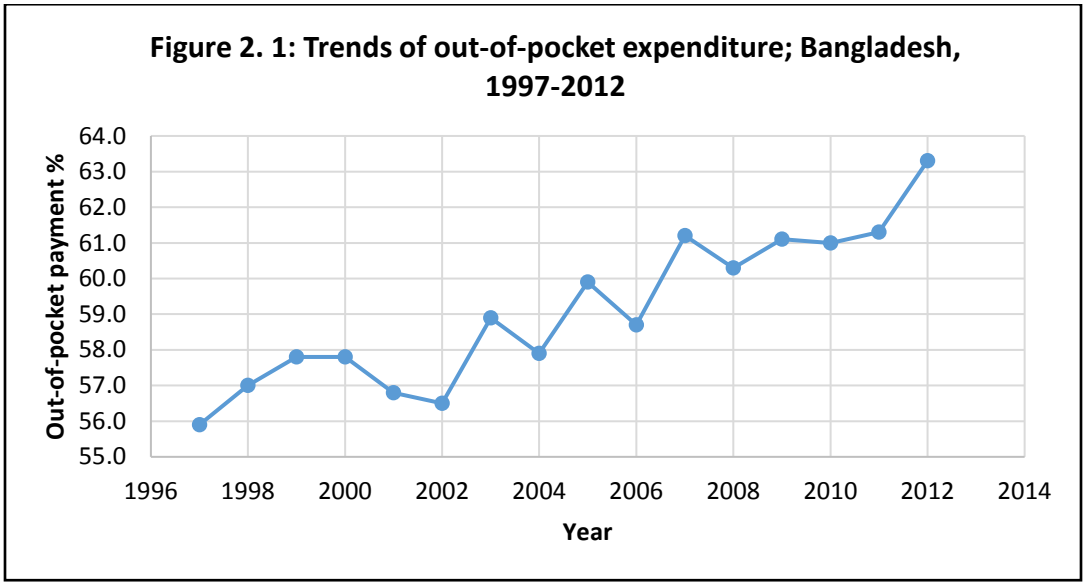
The signatories of Alma-Ata Declaration (WHO, 1978) recognized that promoting and protecting health is essential to human welfare and sustained economic and social development. Without a well-functioning healthcare financing system, timely access to health services cannot be achieved, except for a minority of the population who can afford it. The system itself determines whether people can afford to use health services when they need them. Thus, recognizing the importance of an equitable health systems financing (HSF), the WHO committed and recommended that countries should develop a financing system so that all people have access to services and do not suffer financial hardship paying them (WHO, 2013).

Health equity is a multidimensional concept (Sen, 2002). The violation of health equity cannot be judged only by looking at inequality in health. Some of the most important policy issues in the promotion of healthcare are dependent on the overall allocation of resources to health. The sixty-fourth World Health Assembly (WHO, 2011) urged member states to avoid significant direct payments at the point of delivery, and to include a method for prepayment of financial contributions for healthcare and services. It also urged members to devise a mechanism to pool risks among the population in order to avoid catastrophic healthcare expenditure, and impoverishment of individuals and households, which is a result of seeking the care as and when needed.

The issue of equity is widely acknowledged by health economists and health policy researchers as an important policy objective in the healthcare field (Culyer & Wagstaff, 1993). Its importance was recognized not only in low and middle-income countries (LMICs), but also in high-income countries (HICs). In Organization of Economic Cooperation and Development (OECD) countries, equity appears to be a prominent issue in the continuing debate on healthcare financing and delivery (Normand, 1993; Balarajan, Selvaraj and Subramanian, 2011). In the same way, there was a strong agreement among the policy makers in low-income countries that equity should feature prominently in health policy decisions (Gilson, 1988). The WHO has placed health equity as the second of its thirty-eight targets within the new 'Policy for Health for All'. The policy says that by the year 2020 the health gap between socioeconomic groups within countries should be reduced by at least one fourth in all member states.

Bangladesh HSF is characterized by high out-of-pocket (OOP) payments with an increasing trend, and, at the same time, absence of active prepayment system (NHA, 2012). In Bangladesh, OOP payments as percent of private expenditure on health (92.9%) is higher than India (89.2%) and Nepal (79.9%) (Majumder, 2013). The Bangladesh National Health Accounts (NHA, 2012), reports that household OOP expenditure remains the main source of HSF, and increasing from 56.9% in 1997 to 63.3% in 2012 in total health expenditure (THE) (Figure 2.1). The second largest financing agent is government, making up 23.1% of THE. The private firms' share has remained at around 1.0% over the years. The share of non-government organization (NGO) from their own sources have ranged between 1.0 to 2.0% of the THE over the 1997-2012 period. Development partners contribute through NGOs or government. The rest of the expenditure through NGOs varied from five to 9% during the period.

The health spending in Bangladesh accounted for 3.4% of gross domestic products (GDP), which is lower than the average (3.8%) in South East Asia (SEA) region, below the average of low-income countries (5.4%), lower-middle income countries (4.3%), and far below the world (8.5%) (Majumder, 2013). A breakdown of OOP expenditure shows that drugs and medicine constitute 65.0% of OOP spending. Other components of OOP are services of curative care (22.0%), ancillary services (9.0%), outpatient and home-based services (4.0%), and general government administration of health (less than 1.0%).



Data source: Bangladesh National Health Accounts (BNHA, 2012)

The consequences of excess OOP expending are enormous with different scenarios. Some households may not utilize formal healthcare at all due to excess OOP payments, or they may receive partial care, and thus aggravate the disease condition causing the disease to become a chronic condition. Households may sell their movable and immoveable properties to manage the treatment costs, which in turn make them poorer. Due to excess health expenditures, households may need to ration their food items, and thus may become

malnourished. OOP health expenditure may affect education, causing children to drop out of school. Moreover, OOP payments may mislead planners and policy makers to miscalculate poverty status.

Analysis of progressivity intends to examine if inequities in HSF exist. This will provide an evidence base for health planners and policy makers who want to promote equity in HSF. In addition to numerical differences, this study will employ statistical and macro-economic analysis and techniques to examine equity using Bangladesh Household Income and Expenditure Surveys (BBS, 2010). This research seems to be the first of its kind of analysis of progressivity of HSF in Bangladesh using nationwide survey dataset.

Within the general objective of progressivity analysis, our specific research questions are:

1) How is the progressivity or regressivity of HSF in Bangladesh?

2) What is the magnitude of progressivity/regressivity in HSF in Bangladesh?

3) What are the re-distributive effects of HSF on disposable income?

Bangladesh has been overwhelmed with excessively high burden of OOP expenditure with 63.3% of THE. Over the past three decades, population growth has slowed significantly, from 2.8% in 1960 to 2.2% in 2012. Fertility rate has declined from 3.4 in 1960 to 2.1 in 2012 (Malik, 2013). Elderly population will be increasing from 8 million (6.1%) in 2001 to 44 million (20.2%) in 2051 (Kabir, R., Khan, Kabir, H., and Rahman, 2013). In addition to common infectious disease, non-communicable disease is becoming a major health burden. Despite high OOP payments, absence of an active pooling system, speedy increase of healthcare expenditure, demographic and epidemiological transition, to our knowledge, no published

studies are available on analyzing progressivity of HSF. On top of that, the current health spending is very low with 3.4% of GDP (NHA, 2012). All these factors call for devising policy for health systems focused on decreasing the burden of OOP expenditure. Due to acute shortage of health policy research in Bangladesh, policy makers and planners are not aware of the current situation, and hence not motivated to reform the system. The study findings will be a strong evidence for restructuring the current HSF. For successful policy revisions, there is need for increased resources and alternative sources of finance. Thus, the findings of this study will answer urgent questions pertaining to HSF in Bangladesh.

Methods

Data source

This study uses Bangladesh Household Income and Expenditure Survey (HIES) 2010 dataset conducted by Bangladesh Bureau of Statistics (BBS, 2011). This is the source of data for estimating household income, expenditure, consumption, income inequality and incidence of poverty. This data is a cross sectional and nationally representative sample of 12,240 households. HIES is conducted by the Bangladesh government every five years and HIES 2010 is the 15th round of survey. Data pertaining to daily consumption of food items were collected on day-to-day basis by the same enumerators of the respective primary sampling units (PSU) sites. For this round, data collection was started on February 1, 2010 and continued up to January 331, 2011. To capture the seasonal variations, the entire period of one year has been divided into 18 terms.

Sample design

A two-stage stratified random sampling technique was followed in drawing sample for this survey under the framework of Integrated Multipurpose Sampling (IMPS) design which was developed based on Bangladesh population and housing census 2001. In IMPS design, the whole country was divided into 16 strata, which included six from rural, six from urban, and four from sub-municipal areas (SMAs). The design consists of 1000 PSUs throughout the country systematically drawn from the 16 strata. Out of 1000 PSUs, 640 were from rural and 360 were from urban areas. Each PSU was comprised of approximately 200 households. In the first stage, 612 PSUs were drawn from 1000 PSUs. In the second stage, 20 households were randomly selected from each PSU. Thus, PSUs selected for HIES 2010 are actually a subset of PSUs of the IMPS design. The total sample size stands at 12,240 households consisting of a population of 55,580 (Table 2.1).

Table 2.1. A summary of the sample coverage, BHIES, 2010

Items	Total (%)	Rural (%)	Urban (%)
Number of PSUs	612 (100%)	392 (64%)	220 (36%)
Number of households	12,240 (100%)	7,840 (64%)	4,400 (36%)
Number of population	55,580 (100%)	35,894 (64.58%)	19,686 (35.42%)

Quantitative analysis

This study focuses on the empirical relationship and quantification of progressivity or regressivity of HSF. For this part of analysis, we have used the Automated Development Economics and Poverty Tables (ADePT) software, version 5.0 developed by World Bank's experts (Bilger, Saijia and Lokshin, 2011) that have been adopted by many researchers to study HSF in LMICs and HICs.

Progressivity can be assessed using a direct and a less direct method (O'Donnell, van Doorslaer, Wagstaff and Lindelow, 2008). A direct method is a percentage of OOP payments for healthcare as a percentage of total household expenditure by quintile/decile groups of equivalent household expenditure. A less direct method of assessing progressivity is defined in relation to departure from proportionality. This method compares the share of health payments contributed by proportions of the populations ranked by ATP with their share of ATP. It compares the concentration curve of health payments ($LH_{(p)}$) with Lorenz curve for ATP, ($L_{(P)}$). A Lorenz curve is a graphical representation of the distribution of income or wealth, developed by Max O Lorenz in 1905 (Gastwirth, 1971). The merit of this curve is that it provides a visual representation of the distribution information. However, it does not show the distribution exact, and it is difficult to compare this curve between the countries. When a household pays for healthcare the same proportion of ATP, then the concentration curve lies on the top of the Lorenz curve. Under the progressive system, the share of the payments contributed by the poor is less than their share of ATP. Here, the Lorenz curve lies over the concentration curve. The opposite is true for a regressive system.

Because the Lorenz dominance analysis alone does not provide a measure of magnitude of proportionality, Kakwani index (Kakwani, 1977) was used to measure the progressivity. Kakwani index is twice the area between a payment concentration curve and a Lorenz curve. It is calculated as

$$\pi_k = C - G \tag{1}$$

Where, C is the concentration curve and G is the Gini coefficient of the ATP variable. The Gini coefficient (G) is a measure of inequality of a distribution. The value of G varies from 0 to 1. The

Gini coefficient is regarded as the gold standard in economic analysis in assessing inequality. It allows direct comparison between units with different sized populations. It is readily used for intuitive interpretation. The major limitations of Gini coefficient are that it requires comprehensive individual level data, and more sophisticated computation; and it cannot tell us what is happening in different quintiles. The numerator is the area between Lorenz curve of the distribution and uniform distribution line. The denominator is the whole area under the uniform distribution line/ line of equality. The value of π_k varies from -2 to +1. A negative number indicates regressivity, where ($LH_{(p)}$) lies above ($L_{(P)}$). On the opposite, a positive number indicates progressivity where ($LH_{(p)}$) lies below ($L_{(P)}$). In case of proportionality, a concentration curve lies on the top of the Lorenz curve and the index is zero. In some cases, proportionality could also be zero if the curve was to cross, then positive and negative differences between them cancel out.

Redistributive effects on disposable income

Finally, in this part of analysis, we have measured the redistributive effect on income before and after OOP payments. When healthcare payments are regressive, the distribution of income before OOP payments is more equal than after payments. It means that prepayment Gini coefficient is smaller than the post payment Gini coefficient. Contrary to this, if payments are progressive, prepayment Gini coefficient is larger than post payment Gini coefficient. Here, healthcare finance exerts an equalizing effect minimizing inequality. The size of equalizing or dis-equalizing effect on income is measured by the difference between prepayment and post payment Gini coefficients. The redistributive effect depends on progressivity, share of income absorbed by healthcare payments, the degree of horizontal inequity, and the degree of re-

ranking. The larger the share of income absorbed by the health payment, the greater the effect on income inequality. The degree of horizontal inequity is the degree to which households with a similar ability to pay end up spending similar amount on healthcare. The degree of re-ranking is the extent to which households go up and down the distribution of discretionary income because of their payments for healthcare.

Key variables of analysis

The variables for this part of analysis are ability to pay (ATP) (Table 2.2), food consumption, non-food consumption, and amount of healthcare payments. Ability to pay for each household was calculated by adding all consumptions such as food consumption and non-food consumption. Amount of healthcare payments were calculated by adding all the related costs of healthcare including direct and indirect costs.

Table 2.2: Variables with definitions and sources

Variables	Definitions	Source
Ability to pay (ATP)	Households' yearly consumptions of food, non-food and payments towards healthcare*	HIES, 2010
Food consumption	Market price of food items consumed in one year*	HIES, 2010
Nonfood consumption	Market price of nonfood items in one year*	HIES, 2010
Healthcare payments	Gross of all payments towards healthcare, including direct tax, indirect tax, social insurance and private insurance*	HIES, 2010

*Measured in Bangladesh currency Taka (Tk.). 1 US $ = Tk. 80.0 (2016)

Findings

The summary statistics (Table 2.3) shows that out of 12,240 households, total of 11,638 (95%) households were included as final sample. The mean household size is 4.5 persons, ranging from one to 17 members per family. The mean households' aggregate annual

consumption is Tk. 132,510 (US$ 1,656) with a range from a minimum of Tk. 15,327 (US$191.6) to a maximum of Tk. 1,843,160 (US$23,039). Nonfood consumption varies from Tk. 4, 827 to Tk.1, 712,261. There are more observations below the mean (right skewed) for both total consumption and nonfood consumption. Sampling weights supplied by BBS were employed to adjust the geographical variations. The average contribution of tax is Tk.754, social health insurance is Tk. 142, and private health insurance is Tk.8. Total OOP payments range from zero to Tk.1, 369, 000 with an average of Tk.5, 339 and a median of Tk.2, 200. Majority of observations are below the mean.

Table 2.3: Summary report of the sample data, Bangladesh, 2010

	N	mean	min	max	p1	p50	p99	N_unique
Household size (person)	11,638	4.5	1.0	17.0	1.0	4.0	10.0	17
Total HH consumption (Tk.)	11,638	132,510	15,327	1,843,160	40,001	110,443	474,890	11,632
Total NF consumption (Tk.)	11,638	62,071	4,827	1,712,261	10,387	42,050	354,297	10,654
Household sampling weights	11,638	2,739	897.1	6,882.3	897.1	2,946	6,882.3	16
Household tax (Tk.)	11,638	754	0.0	200,000	0.0	0.0	20,000	184
Social health insurance (Tk.)	11,638	142	0.0	120,000	0.0	0.0	3,000	76
Private health insurance (Tk.)	11,638	8	0.0	50,000	0.0	0.0	0.0	9
Total OOP expenditure (Tk.)	11,638	5,339	0.0	1,369,000	0.0	2,200	50,000	1,594

Note: p1= 1st percentile, p50 = 50th percentile, p99 = 99th percentile

Health systems financing

The average per capita consumption for lowest, second and third quintile is lower than the total average (Tk.29, 907), which indicates that majority of populations consume less than the average (Table 2.4). Total consumption in the poorest quintile (Tk. 13,529) is less than half (Tk. 29,908) of the total average consumption. Direct tax appears to be born significantly higher by the richest quintile. It is also important to note that the amount of social insurance is very

small. Contribution to private health insurance for each quintile is very negligible and insignificant. Out-of-pocket expenditure constitutes a major portion of health finance. The poorest quintile contributes Tk.842, which is half of the richest quintile (Tk.1, 594). Per capita consumption gross for the poorest quintile is Tk.13, 529 and per capita consumption net of healthcare payments is Tk.12, 635. Households in the poorest quintile consume 0.22 times the richest quintile in respect of gross consumption and 0.55 times in respect of net consumption. This clearly shows an inequity in healthcare payments between the poorest and the richest quintiles.

Table 2.4: Average per capita health finance by quintiles, Bangladesh, 2010

	Per capita consumption, gross (Tk.)	Household yearly tax in (Tk.)	Household yearly social health insurance in (Tk.)	Household yearly private health insurance in (Tk.)	Household yearly out-of-pocket health expenditure in (Tk.)	Total payments in (Tk.)	Per capita consumption, net of payments in (Tk.)
Lowest quintile	13,529	49	36	0.0	842	927	12,635
Standard error	62	9	9	0.0	43	47	73
2nd quintile	19,076	75	36	2	1,114	1,226	17,940
Standard error	34	15	8	1	89	92	63
3rd quintile	24,032	91	52	7	1,378	1,528	22,705
Standard error	40	15	16	5	171	173	69
4th quintile	31,690	107	63	0.0	1,331	1,500	30,271
Standard error	73	20	19	0.0	95	100	97
Highest quintile	61,204	192	58	0.2	1,594	1,844	59,424
Standard error	759	36	22	0.25	81	93	760
Total	29,907	103	49	1.8	1,252	1,405	28,596
standard error	238	9	7	0.93	47	49	238

Note: 1 Bangladesh Taka (TK) equals 0.08 dollars (1 US $ = Tk. 80)

Progressivity or regressivity?

Table 2.5 and Table 2.6 analyze the progressivity of HSF. Table 2.5 gives the average consumption and financing share by quintile, with households ranked in ascending order of gross consumption. Information related to gross consumption gives an idea about income inequality; the greater of the richest quintiles, the greater the inequality.

The poorest quintile consumes, on average, 9.0% of total (general) consumption, whereas this amounts to 41.0% for the richest quintile (Table 2.5). Taxes appear to be borne mostly by the upper three quintiles, 17.7, 20.9 and 37.4%. The lowest two quintiles make up 9.5 and 14.6% of the total. The financing share increases by quintile for taxes. In case of social health insurance, the fourth quintile paid the most (25.5%) followed by the highest quintile (23.7%). The lowest and the second quintile made up nearly the same percent for social insurance (14.8 and 14.7%). In both per capita gross consumption and household yearly tax, the richest quintile bears the greater share, 40.9 and 37.4% respectively, which are 4.5 and 4.0 times respectively higher than the lowest quintile. In respect of social health insurance, the poorest quintile bears 14.8% share, whereas the richest quintile bears 23.7%.

Private health insurance is either absent, or if present only in some pocket areas. The middle class or third quintile possesses the highest share of private health insurance (79.4%). Whereas, the poorest and the fourth quintiles have no private insurance and the richest quintile has only 2.8% share.

Financing share for household yearly OOP expenditure for the poorest quintile is half (13.4%) of the richest quintile (25.5%). Per capita consumption net of health payments again

shows that the poorest quintile's consumption share is 0.22 times the richest quintile (Table 2.5, last column for both the lowest and the highest quintiles).

Table 2.5: Household share of total healthcare financing, Bangladesh, 2010

	Per capita consumption, gross (%)	Household yearly tax (%)	Household yearly social health insurance (%)	Household yearly private health insurance (%)	Household yearly out-of-pocket health expenditure (%)	Total payments %	Per capita consumption, net of payments (%)
Quintiles of per capita consumption, gross							
Lowest quintile	9.0	9.5	14.8	0.0	13.4	13.2	8.8
standard error	0.25	1.83	3.72	0.00	0.83	0.79	0.24
2nd quintile	12.8	14.6	14.7	17.8	17.8	17.5	12.5
standard error	0.32	2.78	3.38	13.19	1.37	1.27	0.32
3rd quintile	16.1	17.7	21.3	79.4	22.0	21.8	15.9
standard error	0.39	2.91	5.95	14.19	2.23	2.04	0.39
4th quintile	21.2	20.9	25.5	0.0	21.3	21.4	21.2
standard error	0.48	3.52	6.55	0.00	1.45	1.37	0.49
Highest quintile	40.9	37.4	23.7	2.8	25.5	26.2	41.6
standard error	0.72	4.96	7.43	3.11	1.37	1.35	0.73
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
standard error	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gini coefficient	0.3134						0.3276
standard error	0.00						0.00
Concentration Index		0.2419	0.1040	-0.1208	0.1128	0.1217	
standard error		0.05	0.07	0.06	0.02	0.02	
Kakwani index		-0.0714	-0.2094	-0.4342	-0.2005	-0.1917	
standard error		0.05	0.07	0.06	0.02	0.02	

The discrepancies between the share of gross consumption and OOP payments are clearly visible. The comparison between per capita gross consumption and per capita consumption net of health payments shows that share decreases among the poor (9.0% vs 8.8%) and increases among the rich (40.9% vs. 41.6%), which indicates that post healthcare payments consumption decreases among the poor and increases among the rich. This finding supports figures in Gini coefficient; prepayment Gini or income inequality is less than the post payment Gini or income inequality (0.3134 vs. 0.3276). The concentration indexes are positive

except households' private health insurance. It indicates, the wealthier contribute more in absolute amount to the financing of healthcare than the poor do. For the private health insurance, the concentration index is negative, which is an indication of regressive mode of financing. The concentration index is largest for household yearly taxes (0.2419) suggesting that taxes are relatively progressive, whereas all other financing sources for healthcare are regressive. The differences between Gini coefficient of per capita gross consumption and concentration index or Kakwani Index for all sources of healthcare financing are negative indicating regressivity, meaning that OOP payment is more concentrated among the poor (Table 2.6).

Table 2.6: Financing budget shares, Bangladesh, 2010 (Health financing as a share of total gross consumption)

	Per capita consumption, gross	Household yearly tax	Household yearly social health insurance	Household yearly private health insurance	Household yearly out-of-pocket health expenditure	Total payments	Per capita consumption, net of payments
Quintiles of per capita consumption, gross							
Lowest quintile (%)	100.0	0.4	0.3	0.0	6.2	6.8	93.4
standard error	0.00	0.07	0.07	0.00	0.32	0.34	0.29
2nd quintile (%)	100.0	0.4	0.2	0.0	5.8	6.4	94.0
standard error	0.00	0.08	0.04	0.01	0.47	0.48	0.28
3rd quintile (%)	100.0	0.4	0.2	0.0	5.7	6.4	94.5
standard error	0.00	0.06	0.07	0.02	0.71	0.72	0.24
4th quintile (%)	100.0	0.3	0.2	0.0	4.2	4.7	95.5
standard error	0.00	0.06	0.06	0.00	0.30	0.31	0.20
Highest quintile (%)	100.0	0.3	0.1	0.0	2.6	3.0	97.1
standard error	0.00	0.06	0.04	0.00	0.14	0.16	0.12
Total (%)	100.0	0.3	0.2	0.0	4.2	4.7	95.6
standard error	0.00	0.03	0.02	0.00	0.16	0.17	0.09
Gini coefficient	0.3134						0.3276
standard error	0.00						0.00
Concentration Index		0.2419	0.1040	-0.1208	0.1128	0.1217	
standard error		0.05	0.07	0.06	0.02	0.02	
Kakwani index		-0.0714	-0.2094	-0.4342	-0.2005	-0.1917	
standard error		0.05	0.07	0.06	0.02	0.02	

Table 2.6 presents health financing as a share of total gross consumption. Household OOP healthcare expenditure remains the highest share (4.2%) of all healthcare financing (tax, social insurance and private insurance). The lowest quintile shares 6.8% of their total gross consumption for healthcare compared to 3.0% for the highest quintile. The contribution of household yearly private insurance tends to zero for nearly all the quintiles. Household yearly tax and social insurance are minimal, consisting of 0.3 and 0.2% respectively.

Decomposition of redistributive effects of health systems financing

The average financing budget share or payments as a fraction of consumption indicates that OOP health expenditure is the largest source of financing and represents, on average, 4.2% of household budget, with 0.3% household yearly tax as the second largest financing source. Social and private insurance contribute a minimum share (0.2 and 0.0% respectively). In the absence of horizontal inequity, all the financing sources are regressive. The total redistributive effects are negative for all financing sources (Table 2.7), which show an increase in income inequity.

In the absence of horizontal inequity, social insurance, private insurance, and OOP payments would have Kakwani indexes -0.2052, -0.5118, and -0.2033 respectively. All these indicate regressivity of financing. Household yearly tax is also regressive, but less so (-0.0644) compared to other sources. The total redistributive effect of household tax, social insurance and OOP payments are all negatives, and show an increase in income inequality. For private insurance, the impact is zero due to its small share of total health system finance.

When decomposing the total redistributive effects, the increase in income inequality due to household tax, social insurance, and OOP payments are mostly horizontal as the ratio

V/RE is farther from 1 (-0.0008, -0.0007, and -0.0100 respectively). Inequality increases because the rich pay proportionately less of their income to healthcare. The negative redistributive effect or increase in income inequality caused by household OOP health expenditure at 89% is due to a negative vertical effect (V/RE = 0.8900) and 11% is due to horizontal inequity. It is more surprising to note that V/RE is much farther from 100 percent in case of household tax (0.2625) and social health insurance (0.4679). These indicate that for these sources there are considerable variations in the amount paid at a given level of income.

Table 2.7: Decomposition of redistributive impact of health systems financing Bangladesh, 2010

	Per capita consumption, gross	Household yearly tax	Household yearly social health insurance	Household yearly private health insurance	Household yearly out-of-pocket health expenditure	Total payments
Quintiles of per capita consumption, gross						
Lowest quintile	9.0	9.5	14.8	0.0	13.4	13.2
2nd quintile	12.8	14.6	14.7	17.8	17.8	17.5
3rd quintile	16.1	17.7	21.3	79.4	22.0	21.8
4th quintile	21.2	20.9	25.5	0.0	21.3	21.4
Highest quintile	40.9	37.4	23.7	2.8	25.5	26.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
Payments as fraction of Income (g)	1.0000	0.0034	0.0016	0.0001	0.0418	0.0470
Kakwani index assuming horizontal equity (Ke)	0.0000	-0.0644	-0.2052	-0.5118	-0.2033	-0.1936
Vertical effect (V)	0.3077	-0.0002	-0.0003	0.0000	-0.0089	-0.0095
Horizontal inequality (H)	-0.0056	0.0003	0.0002	0.0000	0.0027	0.0032
Reranking (R)	0.0000	0.0004	0.0002	0.0000	-0.0016	-0.0010
Total redistributive effect (RE = V - H - R)	0.3134	-0.0008	-0.0007	0.0000	-0.0100	-0.0117
V / RE	0.9821	0.2625	0.4679	0.6908	0.8900	0.8157
H / RE	-0.0179	-0.3031	-0.2200	-0.1121	-0.2674	-0.2707
R / RE	0.0000	-0.4344	-0.3121	-0.1971	0.1574	0.0864

Finally, our analysis of the corresponding absolute values shows that Bangladesh HSF has a strong horizontal inequity and positive vertical effect. This means that the rich contribute proportionally less than the poor, despite their greater healthcare utilization. The strong horizontal inequity we observed, though small, is likely to come from the health heterogeneity in the population.

Lorenz dominance analysis

Lorenz dominance analysis is the most general way of detecting departure from proportionality and identifying their location in the ATP distribution (Wagstaff, 2002). Health systems in Bangladesh are financed from a number of sources. As is common in most LMIC countries, OOP payments contribute the greatest share of revenue, 63.3% in the case of Bangladesh. Lorenz dominance analysis curve provides us with a visual representation of household inequality (Figure 2.2). The farther the curve is from the line of equality, i.e. 45^0 line, the greater is the inequality. Furthermore, it offers a powerful means of representing the effect of health financing on the distribution of household living standards. Indeed, whenever a concentration curve lies outside the Lorenz curve, this indicates progressivity. However, a formal test of statistical dominance is also required to conclude this definitively.

Figure 2.2: Lorenz dominance analysis of household tax, Bangladesh, 2010

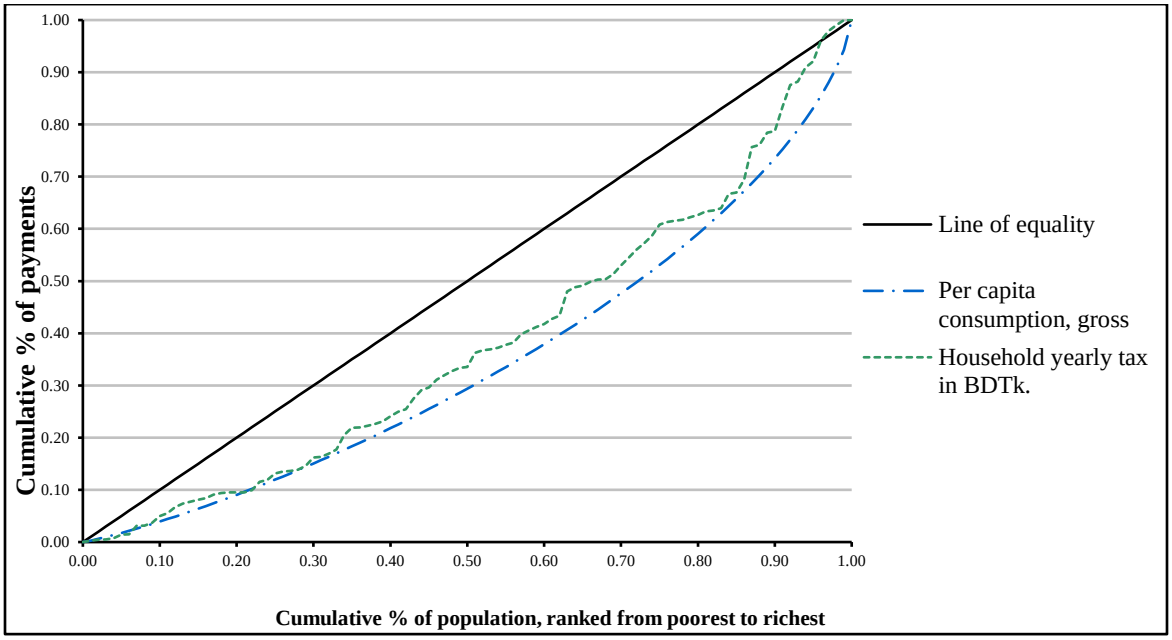
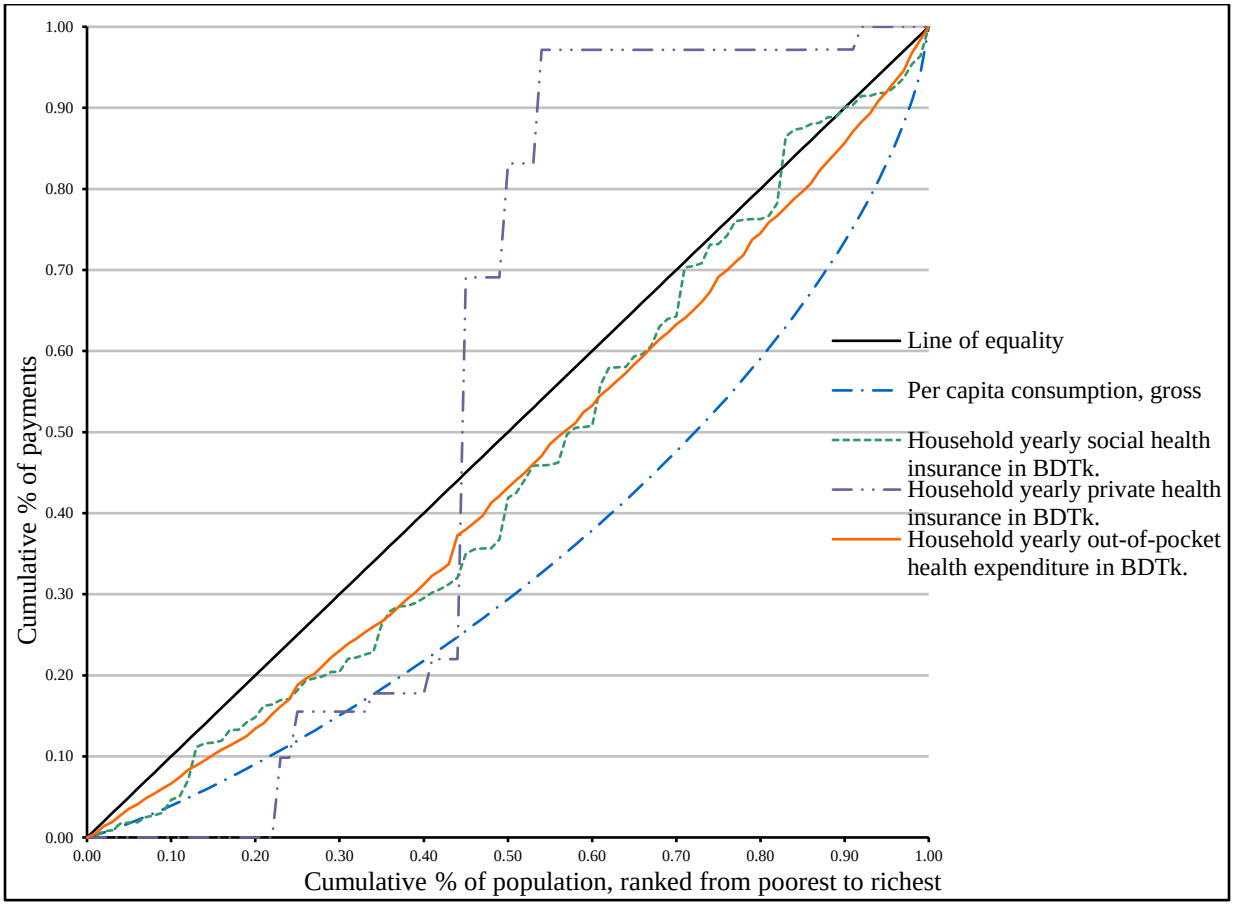
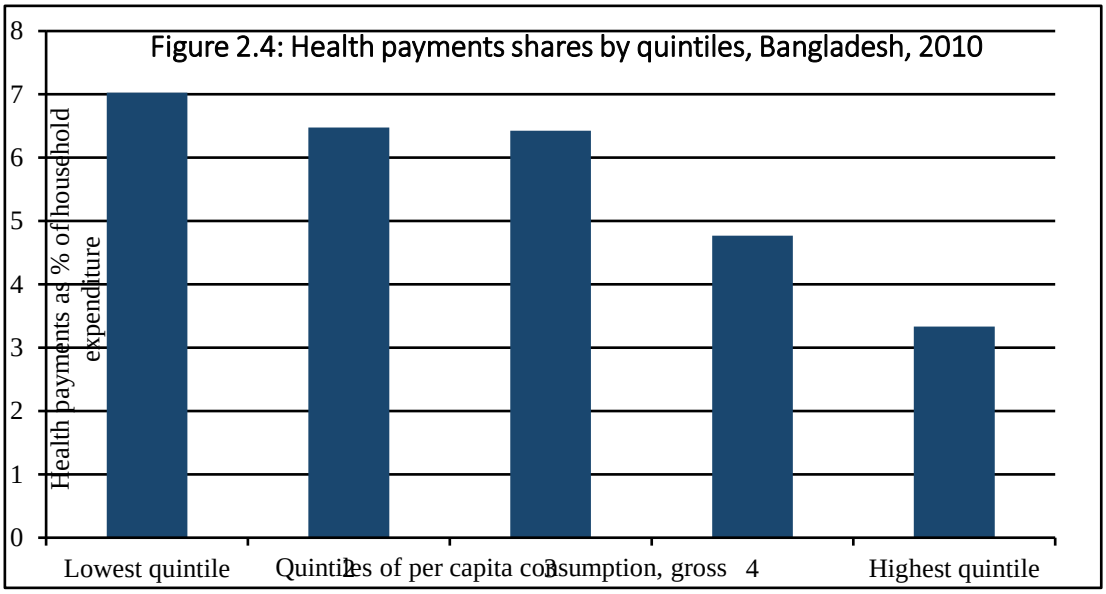


Figure 2.2 shows the concentration curve for household taxes. The concentration curve of household tax lies inside the Lorenz curve at all levels of consumption. This suggests regressivity, which means that the poor pay proportionately more of their total household consumption for healthcare than the rich. In Figure 2.3, both OOP expenditure and social insurance lie inside the per capita consumption gross (Lorenz curve), which indicates regressivity. Again, private insurance shows an abnormal peak just after the 20% mark of the population ranked from poorest to richest. As we discussed earlier, private insurance in Bangladesh is either non-existence or, if exist, in pocket areas of the country (Figure 2.3).

Figure 2.3: Lorenz dominance for sources of health systems financing, Bangladesh, 2010



Finally, using the direct method, we analyzed the overall progressivity (figure 2.4). It is the direct representation of the progressivity of health payments. It shows the health payments share by quintile. In Bangladesh, the share of health payments to household economic status, in our case consumption, decreases from lowest quintile to highest quintile. As is visible, the lowest quintile households pay 7.0% of their total consumption for healthcare. Whereas, the highest quintile households pay about 3.3%. The bars show a sharp decreasing trend from lowest to highest quintile. We conclude that the HSF in Bangladesh is definitely regressive.



Discussions

Our findings show that health system financing in Bangladesh is regressive in nature. Payments toward healthcare are not related to ability to pay. Healthcare payments account for decreasing proportion of ability to pay. As shown by the negative Kakwani indices, health systems financing is concentrated among the poor. Redistributive effects of disposable income is negative among the poor and positive among the rich, indicating inequality in the system.

The findings, although strong with both statistical and policy significance, should be interpreted in view of several limitations. Firstly, estimates of OOP payments from survey data are potentially subjected to both recall bias and small sample bias owing to the infrequency with which some healthcare payments are made. In addition, earmarked tax has not been included in our analysis, since no information is available from the dataset. Secondly, our conventional measures of progressivity provide no information on those citizens who cannot afford to use health services and have incurred no health expenditures. Thirdly, the present study does not examine the obvious impact of OOP payments on the quantity and quality of

care consumed. Our interpretations, therefore, need to be complemented by studies of health care utilization (Somanathan, O'Donnell et al. 2005) and the incidence of public finance (O'Donnell, van Doorslaer et al. 2005). This includes both burden of tax and distribution of expenditure benefits. Finally, our analysis does not capture all potentially catastrophic effects of illness or disability, such as lost earnings, and does not investigate whether health shocks are absorbed by incurring debt or expending savings to smooth consumption (Gertler and Gruber 2002).

In our analysis, the wide range of OOP expenditure indicates a large gap between households in the lowest and the highest quintiles. Mean household yearly social insurance is minimal (Tk. 142) with mean and median zero indicating that although social insurance exists; it is limited within a group of household. Social insurance exists in formal sectors of Bangladesh. This explains the results why third, fourth and fifth quintiles bear 70.5% (Table 2.5, column 4) of financing altogether. Private health insurance is nearly absent, or if exists only in some pocket areas. Traditional insurance markets are almost entirely absent in the rural areas of Bangladesh (Hamid et al., 2011). However, the findings show that the third quintile bears the most financial burden of private insurance (79.4%). The poor cannot afford private insurance and the rich do not bother at all. Some NGOs initiated certain kind of health insurance for the rural population. Grameen Bank also started to provide micro health insurance scheme in the late 1990s. Similarly, Gonoshasthaya Kendra (GK) initiated some kind of health insurance in limited areas for the rural poor and middle class (Desmet et al. 1999).

An inequality exists in per capita gross consumption in Bangladesh. On average, the lowest quintile consumes 0.22 times the highest quintile. Contrary to this, the rate of tax borne

by the lowest quintile is 0.25 times the highest quintile. In respect to social health insurance, the lowest quintile bears 0.62 times the highest quintile does.

The greater share of healthcare financial burden in household is OOP payments. The poor bears 0.55 times of the rich's burden, whereas their consumption or ATP is 0.22 of the rich. Proportionately, the poor pay more in OOP expenditures than the rich do. This makes the payments regressive or pro-rich, and not pro-poor.

We evaluated progressivity of HSF from all sources of available financing; tax, social insurance, private insurance, and OOP payments. We did not consider foreign aid, as it is not relevant because our purpose is to evaluate the distributional impact of domestic source of health systems financing on the domestic population. Assuming tax parameters have been set for foreign loan repayment, the distributional burden on the current generation of foreign debt financing will be captured through the evaluation of the tax distribution.

It is evident that the rich consume more than their poor counterparts do, but at the same time, the rich pay proportionately less in taxes, social insurance, private insurance and OOP payments. For the poor, per capita net consumption decreases (9.0 vs. 8.8%) after OOP payments, whereas for the rich per capita net consumption increases (40.9 vs. 41.6%) after OOP payments (Table 2.5). This is related to the transfer payments and/or redistribution of disposable income, as we have seen in decomposition of redistributive effects. These findings are concordant with the Gini coefficients we estimated; prepayment Gini is less than the post payment Gini (0.3134 vs 0.3276). The positive concentration indexes indicate that the rich pay more in total but proportionately less. The concentration index is the largest for household yearly tax, suggesting that in terms of progressivity, taxes are relatively better than all other

financing sources. Similarly, the Gini coefficient of per capita gross consumption and concentration index or Kakwani index for all sources of financing are negative indicating regressivity.

In Bangladesh, like other low-income countries, OOP payments contribute the greatest share of revenue (63.3%). The Lorenz dominance analysis indicates that the inequality exists in all sources of health systems financing. The graph offers a powerful means of representing the effect of health systems financing on the distribution of household living standards. It should be noted, that this kind of analysis does not consider utilization of healthcare. Progressivity should not be interpreted as the rich paying more for the same amount of healthcare, as this is most often not the case and not accounted for the measure presented here.

The overall progressivity/regressivity analysis we performed used a direct measure. The results indicate, with little ambiguity, that it is regressive, as the lower income quintiles' share of household consumption decreases with healthcare consumption. This clearly indicates that the health systems financing in Bangladesh is regressive.

Conclusions

Our findings substantially add to the evidence on the incidence, magnitude, and the consequences (redistribution of disposable income) of HSF in Bangladesh. This macro-level data analysis shows that there is heavy reliance on OOP payments, which exceed 63.0% of the total health expenditure. Further, this heavy reliance on OOP payments resulted in reducing household living standards, that lead to poverty and/or ultimately pushes to deeper poverty.

Regressivity of Bangladesh HSF is mostly related to the high OOP and the absence of a functional collective prepayment system. Social insurance is very negligible, and Private health

insurance is either absent or present only in some pocket areas run by NGOs. The system urgently needs to introduce health insurance schemes for the poor, elderly, disabled and disadvantaged. Measureable country specific milestones in monitoring progressivity need to be adopted. The findings of this study can guide policy decisions in this aspect.

In order to reverse regressivity to progressivity, it is essential to devise and introduce an innovative financing system. This may include launching a national health insurance program. The premiums should be adjusted according to households' ATP and not by health status. The premiums for the ultra-poor should be covered by the state. The system may be introduced as a small-scale pilot project, for example, for maternal and child health under the present financing strategy, "Expanding Social Protection towards Universal Coverage" (Adam et al. 2014).

Routine monitoring of progressivity should be initiated and findings translated into policy. It is well accepted by the global players that OOP payments are mostly regressive sources of healthcare finance (WHO, 2010; O'Donnell, Van Doorslaer, Wagstaff, & Lindelow (2010). Therefore, there is no other alternative but to move to a prepayment funding mechanism (WHO, 2010). How progressive the HSF is a normative question, and depends on value judgments. If Bangladesh wants to have a more progressive system, it needs a strong emphasis on direct taxes, particularly on personal income tax, indirect taxes, social insurance, and private insurance. OOP payment, as always the case, is regressive. Alternative health finance, like earmark tax on cigarette smoking or alcohol consumption may be a good source. Healthcare tax on mobile airtime may also be a good source of finance to minimize the burden of OOP payments.

The economy of Bangladesh is growing fast, from low-income to lower middle-income. As the economy grows, social insurance is typically established, and OOP financing falls. However, for Bangladesh, the opposite scenario is true. Introduction of social insurance is very slow and OOP payments are growing fast. Introduction of health insurance with a subsidy premium for the poor and vulnerable may reduce this reliance. Health cards have some positive effect on OOP payments (Pradhan and Prescot, 2002). Thailand introduced an identity card named “Health Card” in 1983 to protect the poor in the community (Pannarunothai, Srithamrongsawat, Kongpan, & Thumvanna, 2000). Australian Health Care Card (Correa-Valez, Gilfford and Bice, 2005) and Indonesian Health Card Program (Johar, 2009) were introduced for the same purpose. Development of such type of health card may be an option for financial protection of the poor in Bangladesh.

The study findings may contribute to policy making, particularly in relation to the proposed financial risk protection, social protection, and universal coverage. Our findings provide empirical evidence for future healthcare reforms. We are hoping this research will stimulate more studies along this subject, with improved method and analysis.

References

Adams AM, Ahmed T, El Arifeen S, Evans TG, Huda T, Reichenbach L. Innovation for universal health coverage in Bangladesh: a call to action. The Lancet. 2014 Jan 3;382(9910):2104-11.

Bangladesh Bureau of Statistics. Bangladesh Household Income and Expenditure Survey. (2010). Statistics Division, Ministry of Planning. Government of Bangladesh; 2011. Available at: http://www.bbs.gov.bd/WebtestApplication/userfiles/image/Latest Reports/HIES-10.pdf. Accessed Jan 2016.

Bangladesh National Health Account 2007-2012. Health Economics Unit (HEU), Ministry of Health and Family Welfare. Government of the People's Republic of Bangladesh. Dhaka, 2012.

Balarajan Y, Selvaraj S, Subramanian SV. Health care and equity in India. The Lancet. 2011 Feb 11;377(9764):505-15.

Bilger M, Sajaia Z, Lokshin M. Health equity and financial protection: streamlined analysis with ADePT software. World Bank Publications; 2011.

Correa-Velez, I., Gifford, S. M., & Bice, S. J. (2005). Australian health policy on access to medical care for refugees and asylum seekers. Australia and New Zealand health policy, 2(1), 23.

Culyer, A. J., & Wagstaff, A. (1993). Equity and equality in health and healthcare. Journal of Health Economics 12, 431-457.

Desmet, M., Chowdhury, A. Q., & Islam, M. K. (1999). The potential for social mobilisation in Bangladesh: the organisation and functioning of two health insurance schemes. Social Science & Medicine, 48(7), 925-938.

Gastwirth, J. L. (1971). A general definition of the Lorenz curve. Econometrica: Journal of the Econometric Society, 1037-1039.

Gertler, P. and J. Gruber (2002). "Insuring consumption against illness." American Economic Review 92(1): 51-70.

Gilson L. Government health care charges: is equity being abandoned? A discussion paper, 1988.

Johar, M. (2009). The impact of the Indonesian health card program: A matching estimator approach. Journal of health economics, 28(1), 35-53.

Kabir R, TAKhan H, Kabir M, Rahman MT. Population ageing in Bangladesh and its implication on health care. European Scientific Journal. 2013 Nov 1;9(33).

Kakwani, N. C. (1977). Measurement of tax progressivity: an international comparison. The Economic Journal, 87(345), 71-80.

Majumder MA. World Health Statistics 2011: How does Bangladesh compare with other South-East Asian countries?. South East Asia Journal of Public Health. 2013 Jan 8;1(1):4-11.

Malik K. Human development report 2013. The rise of the South: Human progress in a diverse world.

Ministry of Health and Family Welfare. Expanding social protection for health towards universal health coverage. Healthcare financing strategy 2012–2032. Dhaka: Health Economics Unit, Ministry of Health and Family Welfare, Government of the People's Republic of Bangladesh. 2012.

Munge K, Briggs AH. The progressivity of health-care financing in Kenya. Health policy and planning. 2014 Oct 1;29(7):912-20.

Normand C. Equity in the Finance and Delivery of Health Care: An International Perspective. British Medical Journal. 1993 Jul 10;307(6896):140-1.

O' Donnell, O., van Doorslaer, E., Rannan-Eliya, R. F., et al. (2008). Who pays for health care in Asia? Journal of Health Economics 27(2008) 460-475.

O'Donnell O, Van Doorslaer E, Wagstaff A, Lindelow M. Analyzing health equity using household survey data: a guide to techniques and their implementation. 2008. Washington, DC: The World Bank Google Scholar. 2010.

O'Donnell, O., E. van Doorslaer, et al. (2005). Explaining the incidence of catastrophic expenditures on health care: Comparative evidence from Asia. EQUITAP Working Paper #5, Eramsus University, Rotterdam and IPS, Colombo.

Pannarunothai, S., Srithamrongsawat, S., Kongpan, M., & Thumvanna, P. (2000). Financing reforms for the Thai health card scheme. Health Policy and Planning, 15(3), 303-311.

Pradhan, M. and N. Prescott (2002). "Social risk management options for medical care in Indonesia." Health Economics 11: 431-446.

Sen, A. (2002). Why health equity? Health Economics 11(8): 659-66.

Tobin J. On limiting the domain of inequality. The Journal of Law and Economics. 1970 Oct 1;13(2):263-77.

Somanathan, A., O. O'Donnell, et al. (2005). Who gets health care in Asia? EQUITAP Working Paper # 4, Erasmus University, Rotterdam and IPS, Colombo.

Wagstaff A, O'Donnell O, Van Doorslaer E, Lindelow M. Analyzing health equity using household survey data: a guide to techniques and their implementation. World Bank Publications; 2007 Nov 2.

Wagstaff, A., & Doorslaer, E. van. (2002). Equity in the finance of health care: Some international comparisons. 1992, 11(4), 361–387.

World Health Organization (2010). The World Health Report 2010: Health systems financing: the path to universal coverage, Geneva: World Health Organization.

World Health Organization. Declaration of Alma-Ata: International Conference on Primary Health Care, Alma-Ata, USSR, 6–12 September 1978. Retrieved February. 1978;14:2006.

World Health Organization. Global action plan for the prevention and control of noncommunicable diseases 2013-2020.

World Health Organization. Sixty-fourth World Health Assembly. Youth and health risks. WHA64. 28. 24 May, 2011.

CHAPTER 3

MANUSCRIPT 2

Financial catastrophe and impoverishment in paying for healthcare: An analysis using Bangladesh Household Income and Expenditure Survey, 2010

Submitted to

Health Economics Review

Editor-in-Chief

J.-Matthias Graf von der Schulenburg

Editorial email: editorial@healtheconomicsreview.com

Abstract

Financial catastrophe and impoverishment due to high healthcare spending is a much talked, but less acted issue in global health. Worldwide, 44 million households face financial catastrophe and fall below the poverty line or push into deeper poverty. Bangladesh health systems financing is characterized by high (63.3%) out-of-pocket payments and, at the same time, lack of a functional prepayment mechanism. Therefore, we aim to analyze the incidence and intensity of catastrophic healthcare payments and its impacts on poverty status.

Under the distributive justice, we follow the ability-to-pay principle developed by Adam Wagstaff. We use data from Bangladesh Household Income and Expenditure Survey, 2010. Both total and nonfood consumption were used to measure incidence and intensity of catastrophic payments and its impacts on poverty. Stata version 14.0 and ADePT version 5.0 were used as analytical tools. Accepting the fact that marginal utility of income is different for the rich and the poor, we assess distribution sensitive measure of catastrophic payments. A threshold level of 5- 40% was used for both catastrophic payments and poverty status. Poverty differences are shown among the quintiles, and between gross and net of health payments.

Both incidence and intensity of catastrophic payments varied from 2-5 times for the lowest and the highest quintiles respectively. In case of nonfood consumption, the estimates are much higher than gross consumption. Concentration indices are negative at all thresholds indicating that the poor mostly bear the burden. Both rank-weighted headcount and overshoot are higher for all threshold levels. Using the conventional poverty measure 3.0% of the population is not counted as living in extreme poverty.

Poor households can be protected from catastrophic health expenditures by reducing reliance on out-of-pocket payments. Risk protection policies including finding alternative sources of health finance is inevitable to overcome the present situation. For this, more researches are highly warranted.

Key words: Health systems financing, Incidence of catastrophic payment, Intensity of catastrophic payment, Poverty, Health-payment-adjusted poverty

Introduction

Globally, more than 150 million individuals in 44 million households face financial catastrophe annually because of direct healthcare payments (World Health Organization, 2005). Health systems financing (HSF) has three pertinent goals; good health, responsiveness, and fairness in financial contribution (Xu, 2005). The latter means that households should pay a fair share of HSF. However, fair share depends on peoples' normative expectations. Risk pooling and risk sharing are two crucial components of financial contribution to protect individuals and households from health related catastrophic payments. One of the most popular normative values in assessing "fairness" of healthcare financial burden is the ability-to-pay (ATP) principle. (Wagstaff, 2002). Based on this principle, peoples contribute as per their ATP, and receive healthcare as per their need.

Household healthcare expenditure, in general, and out-of-pocket (OOP) payments, in particular, are posing threats to living standards (World Health Organization, 2005). OOP payment is the principal source of HSF in most of the Asian countries. The proportion of households facing catastrophic payments from OOP payments varied widely among and between countries. Bangladesh, China, India, Nepal and Vietnam heavily depend on OOP financing, and have the highest incidence of catastrophic payments (O'Donnell et al, 2008). In majority of the low and middle-income countries (LMICs), the poor are more likely to incur a large proportion of their total household resources on health care. As a result, they have to cut back their other necessities to meet up this expense.

Three key preconditions for catastrophic payments are availability of health services requiring payment, low capacity to pay, and the lack of prepayment or health insurance (Xu et

al., 2003). In Thailand 35.8% of inpatients who used private hospitals faced catastrophic payments, and the impoverishment were mostly among the poor (Limwattananon et al., 2007). In India, around 63.22 million people or 11.88 million households were pushed below the poverty line in 2004 (Berman, Ahuja and Bhandari, 2010). The incidence of catastrophic payments increased from 13.1% in 1993-1994 to 15.4% during 2004 in India (Ghosh, 2010). In Kenya, the poorest household spent a third of their resources on health payments, and about 1.8 million Kenyans are pushed below the national poverty line (Chuma and Maina, 2012). Researchers confirmed that without deducting health payments from household total expenditure/consumption leads to an underestimation of poverty by 7- 8% among hospitalized patients (Flores, Krishnakumar, O'Donnell, and Van Doorslaer, 2008).

In most of the low-income countries, HSF is characterized by large OOP expenditure and lack of prepayment mechanisms. Illness is uncertain and households without insurance coverage face a risk of large OOP health expenditures. When a household member falls ill, the OOP expenditure may disrupt the material standards of the household. If the households' expenditures are large relative to available resources, it may disrupt living standards and may be considered catastrophic. The notion that a household should be protected from catastrophic medical expenses is treated as fairness in healthcare finance (WHO, 2000). A popular approach is to treat medical expenditure as catastrophic if it exceeds some proportion of household's income or total expenditure in one year (Berki, 1986; Russel, 2004; Wagstaff and van Doorslaer, 2003; Wyszewianski, 1986; Xu et al., 2003). However, when households trade off healthcare expenditure with consumption of other goods and services, it reduces overall welfare. The

additional healthcare costs may intersect, leading to cutting back current consumption, financed through savings, sale of assets and/or making credits.

Bangladesh HSF is characterized by high dominance of OOP payments and lack of prepayment mechanisms such as tax and health insurance. If healthcare expenses are large relative to the resource available to the household, often times, this disrupts living standards, and considered catastrophic. One conception of fairness in health finance is that households should be protected against such catastrophic medical expenses (WHO, 2000).

The conventional method of poverty measurement is to assess household income or total expenditure/consumption. A household that diverts money to healthcare up to a point that spending on necessities falls below the poverty threshold will not be treated as poor. Alternatively, a household that lives below the poverty line but borrows money to cover healthcare expenses such that its total expenditure is raised above the poverty threshold will not be counted as poor. Van Doorslaer (2006) estimated that 78 million people in Asia are not currently counted as poor despite the fact that their per capita household expenditure net of spending on healthcare falls below the poverty line of USD$ 1.0 per day. When somebody is sick in the household, it is a moral compulsion to go for treatment by any means. Basic healthcare spending is as compulsory as obligatory tax, if not more. Thus, it is an important health economics issue to measure household health expenditure in general, and incidence and intensity of catastrophic payments and its impacts on poverty, in particular.

This study is organized in three main areas of interest involving household healthcare expenditure through analyzing incidence and intensity, distribution sensitivity of catastrophic payments, and assessing the impacts of OOP payments on poverty. Our research questions are:

1. What is the incidence and intensity of catastrophic healthcare payments in Bangladesh?
2. What are the relative financial burden of catastrophic payments incurred by the poor and the rich?
3. What is the contribution of OOP healthcare payments to household poverty?

Significance of the study

Bangladesh has been overwhelmed with excessively high burden of OOP expenditure measuring 63.3% of the total health expenditure (BNHA, 2012). In addition, less than one percent of the population is covered by private health insurance scheme. Bangladesh is facing both demographic and epidemiological transitions (Molla et al., 2004). Over the past three decades, population growth has slowed significantly, from 2.8% in 1960 to 2.2% in 2012. Fertility rate has declined from 3.4 in 1960 to 2.1 in 2012 (Malik, 2013). Elderly population will be increasing from 8 million (6.1%) in 2001 to 44 million (20.2%) in 2051 (Kabir, R., Khan, Kabir, H., and Rahman, 2013). In addition to common infectious diseases, non-communicable diseases are becoming a major health burden. Faced with these issues, the economically susceptible populations of the country face financial catastrophe, and/or get into poverty or force into deeper poverty. In Bangladesh, total health expenditure (THE) is 3.4% of gross domestic product (GDP), which is lower than average (3.8%) in South East Asia (SEA) region, below average (5.4%) of low-income-countries (LIC), and far below (8.5%) the world (Majumder, 2011). Despite these facts, a limited number of studies have been conducted on assessing incidence and intensity of catastrophic payments, and how does it affect poverty in Bangladesh (Table 3.1). These studies have some limitations. Khan (2010) and Park (2006) conducted studies in a specified geographical area and it is hard to generalize their findings to

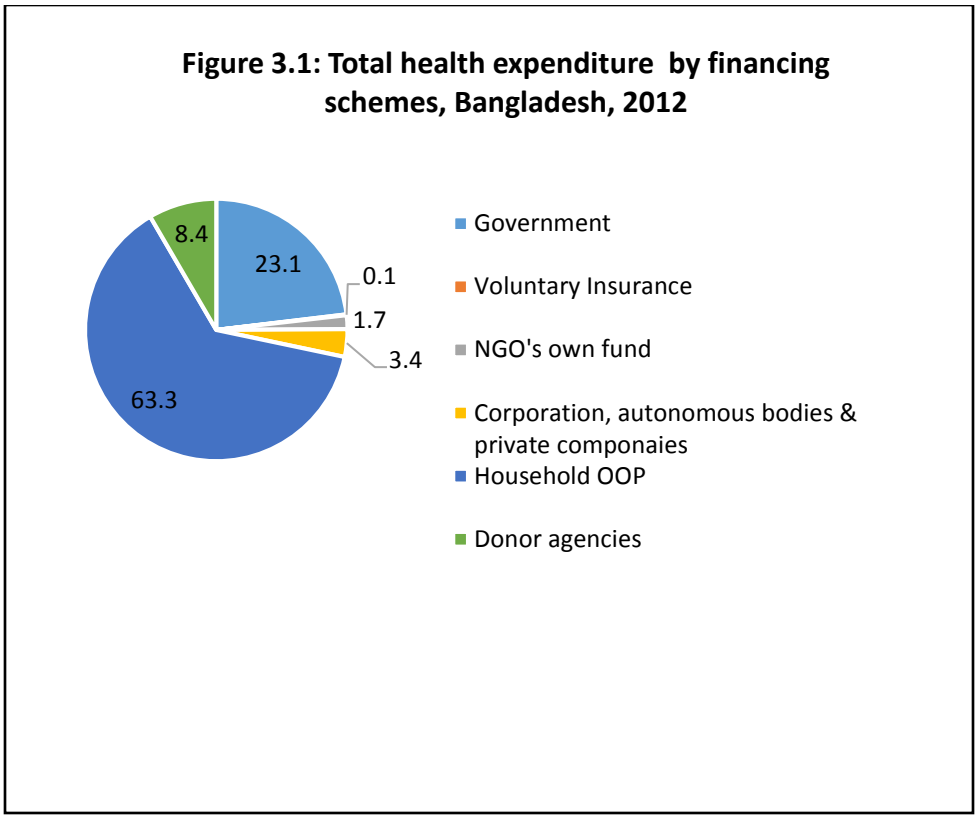
other regions or countries. The other two studies, Islam and Mitra (2012) measured the health shocks by expenditure and/or income loss due to illness/ death of main family earners. Powel-Jackson and Hoque (2012) measured health shocks as severe maternal conditions. The combination of these factors call for devising policy on HSF focused on decreasing the burden of OOP expenditure. We aim to analyze both catastrophic payments and poverty status using a nationally representative data set, Bangladesh Income and Expenditure Survey (HIES), 2010.

An overview of health systems financing in Bangladesh

The healthcare service in Bangladesh are highly centralized, controlled by the Ministry of Health and Family Welfare (MoHFW) and the two directorates, Health and Family Planning. Health systems are mainly financed from OOP expenditure accounting for 63.3%, followed by public sector (23.1%) and developed partners (8.4%) (BNHA, 2012) (Figure 3.1).

The total health expenditure as estimated by Bangladesh National Health Accounts (BNHA, 2012) was Taka[8] (Tk.) 325.10 billion (US $ 4.1 billion) in 2012 whereas, in 2007 it was Tk. 153.9 billion (US $2.2 billion), Tk. 81.5 billion (US $1.4 billion) in 2002 and Tk. 46.4 billion (US $1.1 billion) in 1997. The THE was increased by around 14.0% in 2012 in nominal terms and 8.0% in real terms whereas, as a percentage of gross domestic product (GDP), THE has remained stable in 2012 at around three percent. Per capita spending on health was Tk.2, 144 (US $ 27) in 2012, Tk.1, 576 (US $ 16) in 2007, and Tk.825 (US $ 9) in 1997 at 2012 constant price. Purchasing power parity (PPP) adjusted for per capita expenditure on health in nominal terms was TK.5, 384 (US$ 67) in 2012, whereas in real terms it was TK.2, 144 (US$ 27) for the same year.

[8] Bangladesh currency Taka; one US $ equivalent to Tk. 80.00 (2016).



`

Data Source: BNHA, 2012

According to the system of health accounts (OECD, Eurostat, WHO (2011) disaggregated financing schemes encompass major types of financing arrangements including households' OOP expenditures and third party payments, like social insurance and voluntary insurance. The largest financing scheme for Bangladesh healthcare is the household expenditure. The share of household in the THE was 55.9% in 1997; it has risen to 63.3% in 2012. Government financing through Ministry of Health and Family Welfare (MoHFW) has increased significantly in absolute terms, but as a share of THE, public spending has declined from 37.0% in 1997 to 23.0% in 2012 (BNHA, 2012). Voluntary health insurance schemes are primarily in the form of spending to provide or reimburse medical care for employees of formal sector and some business entities. As a financing scheme, voluntary health insurance payment was 5.3% of THE in 2012. The

contribution of NGOs' serving households accounts for approximately 2.0% of THE. The contribution of development partners to NGOs was accounted for 8.4% of THE (BNHA, 2012).

Healthcare expenditures by category showed that retail drugs and medical goods and services, and curative care account for a major share of the THE. The share of drugs and medical goods and services varies from 43.0% in 1998 to 38.0% in 2004 to 41.0% in 2012. The share of curative care services showed a significant increase measuring 22.0% in 1997 and 26.0% in 2012. Preventive care and public health services including maternal, child health and family planning constituted 13.0% of the THE in 2012. Whereas, expenditure relating to maternal, child health and family planning and counseling activities collectively constituted approximately 83.0% of preventive care. The share of health education, training and research remained steady around two percent throughout the 1997 and 2012 period. Wide ranges of providers are available in Bangladesh. Three types of providers: drug outlets and medical goods retailers (41.0%), hospitals (30.0%) and ambulatory services (15.0%) account for most health expenditures. The increase in expenditures at hospitals was mainly due to increase in expenditures in private hospitals (BNHA, 2012).

As stated above, OOP expenditure by households remains the major component of healthcare spending in Bangladesh. Households spend OOP over TK. 250 million annually on drugs and health related goods and services. This component has increased from 55.9 % in 1997 to 59.9 % in 2005 to 63.3 % in 2012. Spending on medical goods comprised the largest share of OOP expenditure. Households spent TK.134 billion on pharmaceutical drugs, which accounted for 65.0% of OOP in 2012.

Community financing mechanisms and risk-pooling systems are nearly non-existent except in some pockets of NGOs innovation. A few NGOs have started some limited version of health insurance component within their package of micro-credit programs. Bangladesh has acquired an experience in implementing activities under demand-side financing mechanisms, through piloting maternal health voucher schemes in 33 *upazilas* (sub-districts) in the country.

The percentage distribution of healthcare spending by seven administrative divisions remained nearly unchanged during 1997- 2012 period with exception of Dhaka (41.0%) and Chittagong (18.0%) division. In Dhaka division, the percentage increased from 28.0% in 1997 to 41.0% in 2012. On the contrary, in Chittagong division, the percentage decreased from 27.0% in 1997 to 18.0% in 2012. Expenditure remained the same in other divisions. In respect to per capita spending, Dhaka division had the highest (41.0%), and Barisal and Sylhet had the lowest (8.0%) (BNHA, 2012).

Incidence and intensity of catastrophic payments in Bangladesh

A limited number of published studies on household healthcare catastrophic payments are found in existing literature. In a self-reported study in Rajshahi city, Rahman, Gilmour, Saito, Sultana & Shibuya (2013) reported that distress financing were related with heart and liver diseases, asthma and tumors. In a study in rural areas of Bangladesh, Ahmed (2006) identified variables liable for catastrophic payments. Age, employment status of household head, size of household, per-capita expenditure, proportion of under-five children and number of reproductive women on the household were important determinants of incidence and intensity of catastrophic payments. Similarly, Molla et al (2017) found that presence of chronic illness is highly significant for high OOP expenditure. Alam and Mahal (2014) reported that presence of

any serious illness increases healthcare spending by 62.0%. Death of a household member in the preceding two years lowered work participation of household members by an average of 8.6 hours in the preceding week (Khan, 2010).

In an EQUITAP project, van Doorslaer et al. (2007) found that the percentage of household exceeding catastrophic threshold is more than 15.0% in Bangladesh. A higher level of total expenditure is associated with a higher probability of incurring catastrophic payment for healthcare. A one percent increase in total expenditure is associated with 1.4% rise in the probability that the OOP budget share will exceed the 10.0% threshold.

Table 3.1: Summary of studies conducted in Bangladesh

Study/ Author	Data Source	Statistical Model	Measures of health shocks	Non-medical consumption	Food consumption	Non-food consumption	Coping strategies
Khan, 2010	Dinajpur SHAHAR household survey 3 panels (2002-2003)	Fixed effect regression	Death of any household member in past two years	…….	(−)15.30% log per capita in last 3 days	(+)45.50%** log per capita in last month	…….
Islam & Maitra, 2012	Bangladesh Panel household survey (1998, 2000, 2005)	Fixed effect regression	Big expenditure/income loss due to illness; death of main family earner	……	(+)0.02/100 Taka monthly	(+)1.05 per 1000 Taka yearly	*Access to microcredit helps to insure consumption
Powell-Jackson & Hoque, 2012	Bangladesh Household survey 2 panels (2007–2008)	OLS	Severe maternal complications (dystocia, hemorrhage, hypertensive disorders of pregnancy, septic shock or septicemia, severe anemia)	(−)5.30% monthly per capita	(−)7.50% monthly per capita	…….	** US$17 borrow per month, **US$4 asset sale and ***US$4.4 transfer per month compared to normal delivery to fully smooth consumption
Park, 2006	Bangladesh Matlab Health and Socioeconomic Survey, 1996	Two-stage least squares & Instrumental Variable	Income shocks out of death or illness of household member				*Relationship between neighbors and relatives helps in pooling risks to smooth food consumption

* Conducted in a localized area; ** Measured health shocks by expenditure and income loss

Methods

For assessment of household catastrophic payment, two key variables, OOP payments, and measure of household's resources are needed. OOP payment is straightforward, whereas

household's resources can be measured by income, expenditure, or consumption. A common approach adopted by the researchers is to use household's expenditure net of food spending as an indicator of living standards. In our analysis, we have used both household gross consumption and nonfood consumption.

According to non-discretionary expenditure framework, a healthcare payment is said to be catastrophic if the ratio of OOP expenditure (T) and total households' expenditure (x) minus food expenditure $[\mathrm{f}(\mathrm{x})]$ exceeds a defined threshold (z). The value of z represents the point at which the absorption of households' resources by spending on healthcare is considered to impose a severe disruption to living standards. The value of z depends on whether the denominator is total expenditure including food expenditure, or non-discretionary expenditure, excluding food expenditure.

Measurement of incidence and intensity of catastrophic payments

We used the method developed by Wagstaff and van Doorslaer (2003). Both Incidence and intensity of catastrophic payments are similar to poverty measure. The incidence is estimated from the proportion of a sample with healthcare costs as a share of total household and non-food expenditure exceeding the defined threshold. This is the catastrophic payment of head count (H). The ratio is $\frac{Ti}{xi} > z$ or zero otherwise. The estimated head count is given by the following equation (1):

$$H = 1/\mathrm{N} \sum_{i=1}^{N} Ei \qquad (1)$$

Where N= sample size and E=1 if $T_i/x_i>z$ or zero otherwise.

This measure (head count) has some limitations. It does not reflect the amount by which households exceed the threshold. To overcome this, there is another measure called catastrophic payments overshoot (O). It captures the average degree by which payments as a proportion of total expenditure exceeds the threshold z. Overshoot measures how intense the catastrophic payment is. Does it exceed a little bit or large enough to cause poverty? The formula for measuring catastrophic overshoot is shown by Equation (2).

$$O_i = Ei\left(\frac{Ti}{Xi}\right) - z \tag{2}$$

Thus, head count (H) captures only the incidence on any catastrophic occurring, whereas overshoot (O) captures intensity. Both head count and overshoot are related through the mean positive overshoot (MPO), which is shown by Equation (3).

$$MPO = \frac{O}{H} \tag{3}$$

Therefore, O=H × MPO. This means that the catastrophic overshoot equals the fraction with catastrophic payments times the mean positive overshoot, i.e. incidence times the intensity.

Both headcount (H) and overshoot (O) measures are insensitive to the distribution of catastrophic payments among the rich and the poor. In headcount, all households exceeding the threshold are counted equally. The overshoot counts all dollars spent on health care in excess of the threshold equally, irrespective of whether they are made by the poor or by the rich. Health spending is income elastic and there is diminishing marginal utility of income; the opportunity cost of health spending by the poor will be greater than that by the rich. Thus, it is important to argue that both the measures should be weighted to place a social welfare

interpretation. Wagstaff and van Doorslaer (2003 recommended adjustment by multiplying each measure by the compliment of the respective concentration index.

The computations are as follows in Equations (4) and (5):

$$H^W = H.(1 - C_E) \quad (4)$$

$$O^W = O.(1 - C_O) \quad (5)$$

These measures are normative and imply valuing the catastrophic payments heavier on the poor than the rich imply. Households with lowest income receive a weight of two and the weight declines linearly with rank in the income distributions so that the richest household receives a weight of zero. When the poorest incur catastrophic payments, it is counted twice in the construction of H^W; whereas if the richest household incurs catastrophic payments, it is not counted at all. A similar interpretation holds for weighted overshoot (O^w) (O'Donnell, van Doorslaer, Wagstaff and Lindelow, 2008).

Impacts of out-of-pocket healthcare payments on poverty

A common practice of defining poverty line involves calculating expenditure required to meet subsistence nutrition requirements (2,122 kcal/person/day) and the addition of allowances for nonfood needs (Deaton, 1997).

The conventional method of measuring household poverty is to compare household total consumption or nonfood consumption with a poverty line. This measure is not sensitive to household health expenditure. As total household resources are fixed and healthcare payments are largely nondiscretionary, measurement of household total expenditure gross of OOP may be misleading. The reason is that, during illness, households tend to manage money by any means, and it adds up to the total expenditure. As a result, household that divert money from

other sources spending it on the necessities of healthcare, resulted in falling below the poverty line and would not be counted as poor. Similarly, when a household lives below the poverty line, but borrows money to cover healthcare expenses, it is not treated as poor. The above scenarios underestimate poverty. Therefore, to estimate poverty in real term, researchers suggested counting household expenditure net of OOP healthcare spending. Thus, the impoverishing effects of household OOP expenditure is measured by the differences between poverty estimates derived from household consumption gross and net of OOP payments (Wagstaff and van Doorslaer, 2003).

Measurement of poverty adjusted with health payments

When we consider gross household expenditure, OOP payments included in expenditure shown in the following figure (Figure 3.2). The number of household exceeding the poverty line is the poverty headcount (H), which is the proportion of household that is poor. It is measured by using equation (6),

$$H^{gross} = \frac{\sum_{i=1}^{N} S_i Pi^{gross}}{\sum_{i=1}^{N} S_i} \quad (6)$$

Where, H^{gross} is the headcount household gross expenditure, S_i is the size of the household, and P_i^{gross} = 1 if x_i < PL and 0 otherwise, and N is the number of household in the sample.

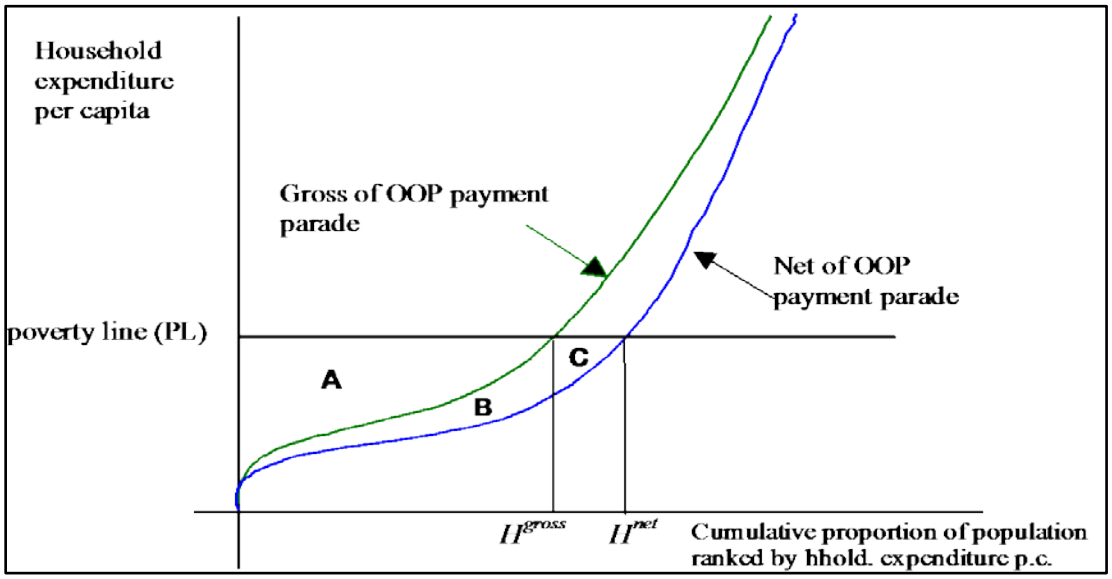
The poverty gap is calculated using equation (7).

$$G^{gross} = \frac{\sum_{i=1}^{N} s_i g_i{}^{gross}}{\sum_{i=1}^{N} s_i} \quad (7)$$

The net of health payments headcount is given by replacing P_i^{gross} with $P_i^{net} = 1\ if\ (xi - Ti) < PL$, and zero otherwise, in equation (6). In equation (7), the poverty gap is given by replacing g_i^{gross} with $g_i^{net} = P_i^{net}(PL - (x_i - T_i))$.

This measure does not say anything about how much the household fall below the poverty line. This is poverty gap (G). When we consider household expenditure net of OOP payments, then the Pen's parade[9] shifts to right adding more households to head count as well as adding more poverty gap.

Figure 3.2: Pen's parade for households' gross and net of out-of-pocket health payments



Source: Owen O'Donnell, Eddy van Doorslaer, Adam Wagstaff and Magnus Lindelow, 2008

In Figure 3.2, poverty headcount (H^{gross}) is the number of household exceeding the threshold, and the poverty gap is equal to the area A. When OOP payments are subtracted from the household expenditure before poverty is assessed, then the headcount (H) rises to (H^{net}),

[9] Jan Pen, a Dutch economist described pen's parade or the income parade in 1971. The parade is defined as a succession of people in the economy, with their height proportional to their income, and ordered from the lowest to the greatest.

and the gap is A+B+C. Therefore, the difference between OOP gross and OOP net is H^{net} - H^{gross}. The difference between poverty gaps is represented by the area B+C. The poverty gap increases both because those already counted before as the poor become poorer once health payments are netted out of household resources (area B). There are additional number of households who were not counted as poor based on gross expenditures, but become poor after netted out OOP expenditures (area C) and considered it.

Data source

This study uses Bangladesh Household Income and Expenditure Survey (HIES) 2010, conducted by Bangladesh Bureau of Statistics (BBS). This is a cross sectional and nationally representative sample of 12,240 households. HIES is being conducted for every five years and HIES 2010 is the 15th round of survey. Data pertaining to daily consumption of food items were collected on day-to-day basis by the same enumerators of the respective primary sampling units (PSU) sites. The survey captured the seasonal variations. For this round, data collection was started on February 1, 2010 and continued up to January 31, 2011. The entire period of one year has been divided into 18 terms. In each term, 34 PSUs were covered to collect data from all 680-sample households.

Sample design

A two-stage stratified random sampling technique was used to collect data. The design consists of 1000 PSUs throughout the country systematically drawn from the 16 strata. Of 1000 PSUs, 640 were from the rural and 360 were from the urban areas. Each PSU comprises around 200 households. In the first stage, out of 1000, 612 PSUs were drawn. In the second stage, 20 households were randomly selected from each PSU. Thus, PSUs selected for HIES 2010 are

actually a subset of PSUs of the IMPS design. The total sample size stands at 12,240 households consisting of a population of 55,580 (Table 3.2).

Table 3.2: A summary of the sample coverage, BHIES, 2010

Items	Total	Rural	Urban
Number of PSUs	612 (100%)	392 (64%)	220 (36%)
Number of households	12,240 (100%)	7,840 (64%)	4,400 (36%)
Number of population	55,580 (100%)	35,894 (64.58%)	19,686 (35.42%)

Findings

Incidence and intensity of catastrophic payments

A threshold of 5 to 40% was used to measure the incidence and intensity of catastrophic payments. When threshold is raised from five to 10% of total expenditure, the incidence of catastrophic payments in the lowest quintile falls by half (30.2 vs. 15.0%), and the mean overshoot drops from 3.6% to 2.5%. When we consider 40.0% threshold, the incidence of catastrophic payments is two percent. Incidence and intensity of catastrophic payments decrease by threshold. Unlike the incidence/headcount, the mean positive overshoot among those exceeding the thresholds increases as the threshold raised. Those in the lowest quintile at 10.0% threshold level spent, on average, 26.9% (threshold level 10.0% plus MPO 16.9%) of their total consumption in healthcare. While those spending at 25.0% threshold level spent on average, 53.3% (threshold level 25.0% plus MPO 28.3%) of their total consumption in healthcare. The main equity concern here is that the incidence, intensity, and mean positive overshoot are prevalent in all threshold (Table 3.3).

Table 3.3: Incidence and intensity of catastrophic health payments using household consumption, Bangladesh, 2010

	Threshold budget share					
	5%	10%	15%	25%	30%	40%
Headcount (H)						
Lowest quintile	30.2	15.0	8.9	4.6	3.6	2.0
standard error	1.17	0.91	0.72	0.51	0.46	0.34
2nd quintile	25.0	11.7	6.8	4.0	2.9	2.1
standard error	1.06	0.75	0.59	0.47	0.40	0.33
3rd quintile	24.4	10.6	6.3	3.0	2.5	1.4
standard error	1.04	0.71	0.55	0.37	0.34	0.23
4th quintile	20.5	8.2	4.8	2.0	1.2	0.6
standard error	0.92	0.60	0.47	0.30	0.23	0.17
Highest quintile	12.3	5.4	2.9	1.0	0.7	0.4
standard error	0.71	0.47	0.33	0.18	0.15	0.12
Total	22.5	10.2	5.9	2.9	2.2	1.3
standard error	0.45	0.32	0.25	0.17	0.15	0.11
Overshoot (O)						
Lowest quintile	3.6	2.5	1.9	1.3	1.1	0.8
standard error	0.33	0.31	0.29	0.26	0.24	0.22
2nd quintile	3.3	2.5	2.0	1.5	1.4	1.1
standard error	0.48	0.46	0.45	0.43	0.42	0.40
3rd quintile	3.3	2.5	2.1	1.6	1.5	1.3
standard error	0.76	0.75	0.74	0.73	0.73	0.72
4th quintile	1.9	1.3	1.0	0.6	0.6	0.5
standard error	0.27	0.26	0.25	0.23	0.22	0.21
Highest quintile	1.0	0.6	0.4	0.2	0.2	0.2
standard error	0.11	0.10	0.09	0.08	0.07	0.07
Total	2.6	1.9	1.5	1.1	0.9	0.8
standard error	0.20	0.19	0.19	0.18	0.18	0.18
Mean positive overshoot (MPO)						
Lowest quintile	11.9	16.9	21.8	28.3	30.9	41.2
standard error	1.00	1.82	2.77	4.49	5.45	8.03
2nd quintile	13.3	21.2	29.9	38.3	46.5	53.1
standard error	1.83	3.70	6.05	9.69	12.68	16.61
3rd quintile	13.4	23.3	32.4	54.7	60.9	93.9
standard error	3.06	6.92	11.48	23.94	28.89	49.85
4th quintile	9.2	15.4	19.9	32.1	45.8	76.9
standard error	1.25	2.91	4.70	10.18	15.29	25.35
Highest quintile	8.5	11.8	15.1	24.5	29.2	33.6
standard error	0.79	1.57	2.73	6.76	9.18	14.20
Total	11.7	18.4	24.9	36.7	43.4	59.0
standard error	0.86	1.83	3.05	5.92	7.79	12.41

When catastrophic payments are defined with respect to nonfood expenditure, both incidence and intensity (overshoot) of catastrophic payments are much higher (Table 3.3 vs Table 3.4) than total consumption. An important finding from this analysis is that when we assess the incidence of catastrophic payments in healthcare against household total nonfood consumption, it is higher than when it was assessed against household total consumption (as a proxy measure of adjusted household income). In other words, poorer households cut proportionately more nonfood expenditure to cope with the health outlays (Table 3.4).

Table 3.4: Incidence and intensity of catastrophic health payments, using nonfood consumption, Bangladesh, 2010

	Threshold budget share					
	5%	**10%**	**15%**	**25%**	**30%**	**40%**
Headcount (H)						
Lowest quintile	66.8	45.6	33.8	20.6	17.0	11.8
2	58.1	37.9	25.9	15.7	12.3	8.0
3	55.3	34.0	23.9	13.9	10.6	7.9
4	46.9	27.3	17.8	8.9	7.2	4.7
Highest quintile	29.1	13.8	8.7	5.0	3.6	2.1
Total	**51.2**	**31.7**	**22.0**	**12.8**	**10.2**	**6.9**
Overshoot (O)						
Lowest quintile	17.8	15.0	13.1	10.4	9.5	8.1
2	14.1	11.7	10.2	8.1	7.4	6.5
3	12.9	10.8	9.3	7.5	6.9	6.0
4	8.6	6.8	5.7	4.5	4.1	3.5
Highest quintile	4.0	3.0	2.5	1.8	1.6	1.3
Total	**11.5**	**9.5**	**8.1**	**6.5**	**5.9**	**5.1**
Mean positive overshoot (MPO)						
Lowest quintile	26.7	33.0	38.6	50.6	55.9	68.3
2	24.2	31.0	39.2	51.7	60.4	80.6
3	23.4	31.7	39.1	54.1	65.3	76.6
4	18.3	25.0	32.1	50.4	56.5	73.7
Highest quintile	13.7	21.7	28.3	36.3	44.0	63.2
Total	**22.4**	**29.9**	**37.0**	**50.5**	**58.2**	**73.5**

Measures of distribution-sensitive catastrophic payments

This part of analysis focuses on catastrophic payment headcount and overshoot to household income distribution. The concentration index of the incidence of catastrophic payments (C_E) are negative for all thresholds (Table 3.5), which indicate that the poor exceed the thresholds. Similarly, the concentration index of payment overshoot (C_O) for all threshold are also negative indicating that the average payments exceed the thresholds is greater among the worse off. Rank weighted headcount (H_W) and overshoot (O_W) are commonly used to measure sensitivity to the distribution of income. In all cases, H_W is greater than H, indicating that catastrophic payments are more frequent among the poor. According to social welfare interpretation, such catastrophic payments are worse than if they were not at all related to income (Wagstaff and van Doorslaer, 2003).

Table 3.5: Measures of distribution-sensitive catastrophic payments, Bangladesh, 2010

	Threshold budget share					
	5%	**10%**	**15%**	**25%**	**30%**	**40%**
Total expenditure						
Concentration index (C_E)	-0.150	-0.190	-0.203	-0.269	-0.302	-0.306
standard error	0.01	0.02	0.02	0.03	0.03	0.04
Rank-weighted headcount (H_W)	25.848	12.107	7.151	3.717	2.841	1.717
standard error	0.58	0.43	0.34	0.25	0.22	0.17
Concentration index (C_O)	-0.224	-0.244	-0.256	-0.268	-0.265	-0.257
standard error	0.03	0.04	0.04	0.05	0.06	0.07
Rank-weighted overshoot (O_W)	3.209	2.331	1.863	1.361	1.199	0.974
standard error	0.26	0.25	0.24	0.23	0.23	0.22
Nonfood expenditure						
Concentration index (C_E)	-0.143	-0.196	-0.224	-0.253	-0.267	-0.281
Rank-weighted headcount (H_W)	58.554	37.918	26.966	16.059	12.872	8.853
Concentration index (C_O)	-0.251	-0.268	-0.277	-0.286	-0.289	-0.291
Rank-weighted overshoot (O_W)	14.353	12.006	10.399	8.326	7.618	6.557

In general, the distribution of catastrophic payments depends on whether health payments are expressed as a share of total expenditure or a share of nonfood expenditure. In

the former case, catastrophic payments fall, in all six thresholds, with total expenditure. As a result, the rank weighted head count (H_W) and overshoot (O_W) are larger than the unweighted indexes in table 3.4 and 3.5. When health payments are assessed relative to nonfood expenditure, the concentration indexes are negative for all thresholds. It indicates that the households with low nonfood expenditures are more likely to incur catastrophic payments. As a result, the weighted indexes are larger than the unweighted indexes.

Table 3.6. Weighted vs unweighted incidence and intensity of catastrophic payments, Bangladesh, 2010.

Total Expenditure						
Incidence of catastrophic payments by thresholds						
Thresholds	5%	10%	15%	25%	30%	40%
Unweighted (H)	22.5	10.2	5.9	2.9	2.2	1.3
Weighted (H_W)	25.8	12.1	7.2	3.7	2.8	1.7
Overshoot of catastrophic payments by thresholds						
Unweighted (H)	2.6	1.9	1.5	1.1	0.9	0.8
Weighted (H_W)	3.2	2.3	1.9	1.4	1.2	1.0

Nonfood Expenditure						
Incidence of catastrophic payments by thresholds						
Unweighted (H)	51.2	31.7	22.0	12.8	10.2	6.9
Weighted (H_W)	58.6	38.0	27.0	16.0	12.9	8.9
Overshoot of catastrophic payments by thresholds						
Unweighted (H)	11.5	9.5	8.1	6.5	5.9	5.1
Weighted (H_W)	14.4	12.0	10.4	8.3	7.6	6.6

Table 3.6 shows that considering the economic status of household both incidence and intensity/overshoot changes dramatically (22.5 vs 25.8% and 2.6 vs 3.2%). When we consider nonfood consumption, both incidence and intensity vary drastically (51.2 vs 58.6 and 11.5 vs 14.4%).

Impacts of household healthcare expenditure on poverty

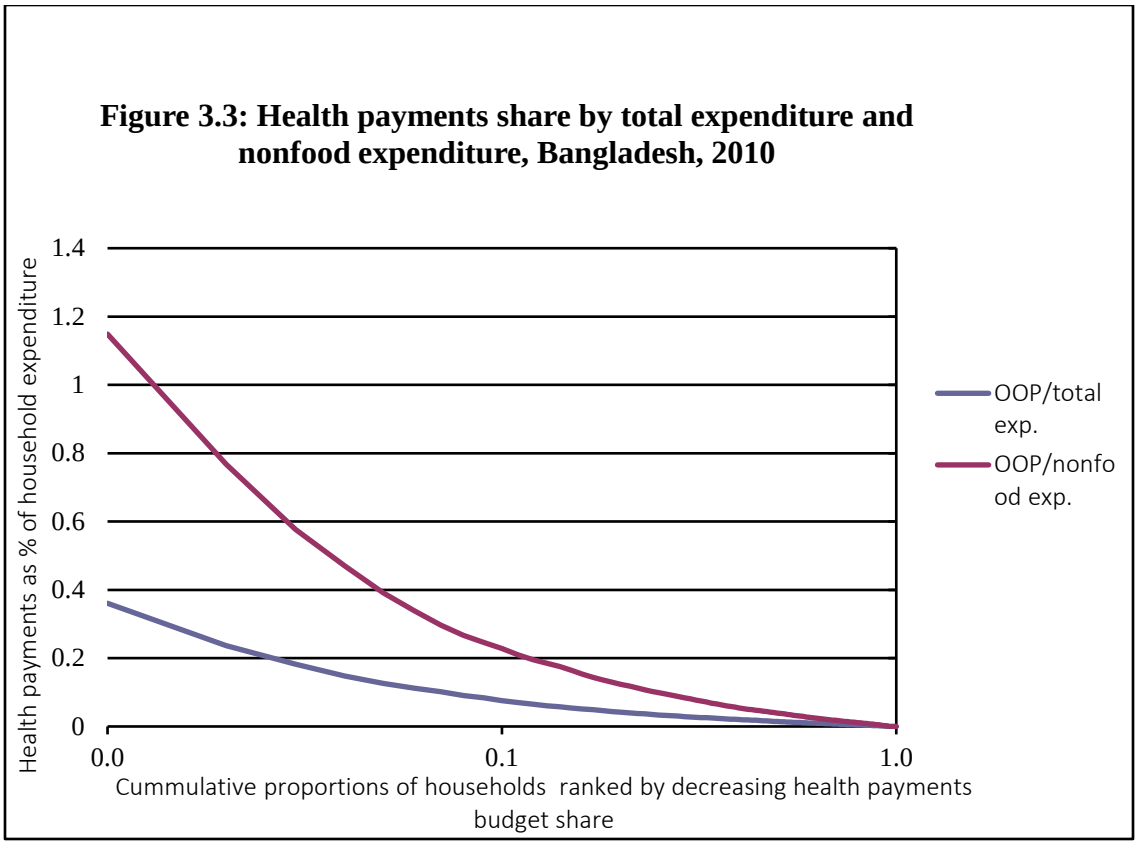
Table 3.7: Measures of poverty based on consumption gross and net of spending on healthcare, Bangladesh, 2010

	Gross of health payments	Net of health payments	Difference	
Poverty line = Upper poverty line (Titumir and Rahman, 2011) (Tk. 19,813)			Absolute	Relative
Poverty headcount	33.2%	36.4%	3.2%	9.6%
Poverty gap (Tk.)	Tk.1,458	Tk.1,817	Tk.359	24.6%
Normalized poverty gap	7.4%	9.2%	1.8%	24.3%
Normalized mean positive poverty gap	22.2%	25.2%	3.0%	13.5%
Poverty line = Lower poverty line (Tk. 15,888)				
Poverty headcount	17.0%	20.0%	3.0%	17.6%
Poverty gap	Tk.483.5	Tk.720.3	Tk.237	49.0%
Normalized poverty gap	3.0%	4.5%	1.5%	50.0%
Normalized mean positive poverty gap	17.9%	22.7%	1.3%	26.8%

Poverty lines (PLs) are usually based on consumption of basic needs (CBN). Using the CBN method, calculation of PLs entails estimation of the average level of per capita expenditure at which individuals can meet basic food and nonfood needs. Upper poverty line consists of gross consumption plus amount spent on nonfood consumption, and uses the limit of Bangladesh Tk.19, 813 per household per year (Titumir and Rahman, 2011). The lower PL is assessed adding gross consumption with median amount spent on nonfood consumption equivalent to Tk. 15,888. When assessment is based on total household consumption, 33.2% of the population is estimated to be in poverty. If OOP payments for healthcare are netted out of household consumption, this percentage rises to 36.4%. Therefore, 3.2% of population is not counted as living in poverty but would be considered poor if spending on healthcare were discounted from household resources. This represents a substantial increase of 10.0% in the

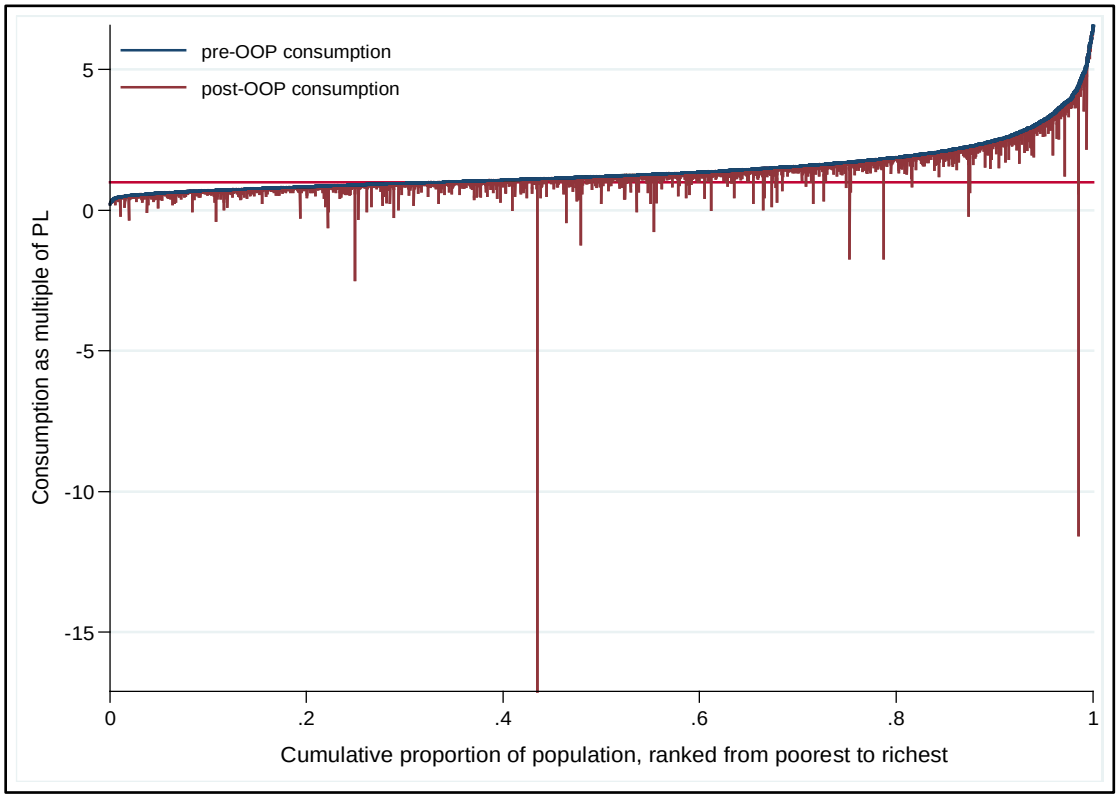
estimation of poverty. The estimated poverty gap (average deficit to reach poverty level) also increases about 25.0% from Tk.1, 458 to Tk.1, 817. The normalized poverty gap increases from 7.4% to 9.2% when health payments are netted out of household consumption. The normalized mean positive poverty gap increases from 22.2% to 25.2%. This suggests that the rise in the poverty gap is due to more households being brought in to poverty as well as deepening of the poverty among those were already poor (Table 3.7).

Similarly, for the lower poverty line, 3.0% of the population is not counted as poor as the OOP includes in the household consumption. Here poverty gap increases from Tk.484 to Tk.720, indicating a 49.0% increase. Normalized poverty gap increases from 3.0 to 4.5% predicting a 50.0% increase. The normalized mean positive poverty gap increases from 17.9 to 22.7%. These findings conclude that, even in the lower poverty line, the rise in the poverty gap is due to both increase in head counts and pushing households into deeper poverty.



The relationship between health-payment budget share and cumulative fraction of households ranked by decreasing value of household prepayment budget share shows that the catastrophic payment headcount depends on budget share threshold. The sharper the curve, the less sensitive the headcounts is to choice of threshold. Both the curves are nearly right at just 1-point threshold. Total expenditure curve shows that a threshold of 5.0% leads to a catastrophic payment headcount of 22.5%. When the threshold raised to 10.0%, the proportion of households with catastrophic payments falls to 10.2%. Again, when the threshold raised further 15.0 and 25.0%, the headcounts falls to 2.9 and 1.0% respectively (Figure 3.3). There is also a sharp difference when we consider total expenditure and nonfood expenditure.

Figure 3.4: Pen's parade of the household consumption gross and net of health payments, Bangladesh, 2010



This stylized version (Figure 3.4) of the Pen's parade charts household total consumption as a fraction of the cumulative proportion of households ranked in ascending order of total consumption. When health payments produce re-ranking in the income distribution, it is still possible to visualize the effect of healthcare payments on the parade using the "paint drips" chart developed by Wagstaff and van Doorslaer (2003). It shows the Pen's parade for household consumption gross of health payments. For each household, the vertical bar, or "paint drips" shows the extents to which health payments reduce consumption. In other words, the households become impoverished by health payments. The graph shows that health payments are larger at higher values of consumption, but in the lower and middle part 80.0% of households brought below the poverty line by health payments.

Discussions

Although strong, our findings should be interpreted with caution. As usual for all survey data source, this study may suffer from recall bias. Household income and expenditure were mainly collected for the last 12 months. Food consumption data were collected on daily and weekly basis and non-food consumption data were collected on monthly and yearly consumption.

Using household as a unit of analysis does not account for any complexity or diversity within families. In addition, the data contain significant number of zeros OOP payments. This might be caused by poor households not being able to use health services and could not make any payments at all, which needs further research.

Longitudinal data are ideally used for analysis of effects of catastrophic illness shocks. This would allow researchers to assess how spending on non-medical goods, and services changes due to health shocks (Gertler and Gruber, 2002; Wagstaff, 2004). As our data is cross-sectional, we made an approximation of material disruption following catastrophic payments. This approach is well accepted in the literature (O'Donnell, van Doorslaer and Wagstaff, 2008). Households' catastrophic payments may have two types of impacts; short term - when financed by cutting back on current consumption and long term- when the expenditure is financed through savings, sale of assets, or credits. To identify long-run impacts is beyond the scope of this study. With cross-sectional data, we could not distinguish between short-term and long-term impacts of catastrophic payments and subsequent poverty status.

The choice of threshold of catastrophic payments is obviously a normative value judgement, and we do not impose our judgement. Rather, in our analysis we have used

threshold from 5% to 40%. It is noticeable that incidence, overshoot, and mean positive overshoot are prevalent in all levels of threshold. This may be a concern for the policy makers who are interested in improving equity in healthcare financial burden. Both incidence and intensity decreases with income/consumption, because the richer households spent a lesser budget share on healthcare.

We identified only those households that incurred medical expenses. What were left out in this study are those who did not use healthcare due to unavailability of fund for the minimum payments or lack of access. These groups of people face subsequent deterioration of health and may have a greater welfare loss than those incurring catastrophic payments. To avoid these difficulties, Pradhan and Prescot (2002) suggested to measure exposure to, rather than incurrence of, catastrophic payments.

Earning losses is another issue of concern for equity in healthcare financial burden, besides catastrophic payments. Lost earnings have a long-term economic consequences and loss of welfare. In Indonesia, earning losses were more important in disrupting household living standards than medical spending (Gertler and Gruber, 2002).

Researchers debated on the issue of which denominator-- income, expenditure, or consumption would be the best for measuring catastrophic payments. Income is not directly corresponding to medical spending. On the other hand, health payments-to-income ratio is also not responsive to the means of healthcare financing. When household expenditure is used as the denominator, the catastrophic payments are defined in relation to the health payments budget share. There is a problem in this measurement. That is, the budget share may be low for the poor in low-income households, and high for the high-income households. For the poor,

most resources are absorbed by essential items like foods, leaving little to spend on healthcare. Thus, researchers proposed to define catastrophic payments with respect to health payments as a share of nondiscretionary expenditure, or expenditure net of spending on necessities. The definition of nondiscretionary also generated some debates; what is discretionary for the rich may be nondiscretionary for the poor. Therefore, nonfood expenditure may be more capable of distinguishing between the rich and the poor than total expenditure.

When we consider diminishing marginal utility of income, the opportunity costs of health spending by the poor is always greater than the rich are. Therefore, it is essential that opportunity cost should be weighted differently for the poor and the rich. This can be measured by using concentration indexes of headcount (H^w) and overshoot (O^W). A positive value indicates a greater tendency for the better off to exceed the payment threshold. On the other hand, a negative value indicates a greater tendency of worse-off to exceed the threshold. Wagstaff and van Doorslaer (2003) recommended adjusting both the headcount and the overshoot by multiplying each measure by its compliment.

All the health actors like World Bank, World Health Organization, OECD and European Union agreed that the only way to avoid catastrophic healthcare payments is to introduce risk-pooling system, including social/ community or private insurance. World health organization strongly suggests introducing universal coverage and or introducing single payment system.

Conclusions

This study provides a comprehensive estimation and understanding of the distribution of healthcare financial burden in Bangladesh. The incidence and intensity of catastrophic payments delineate how healthcare expenditure contribute to poverty. Our findings suggest

that incidence and intensity of catastrophic payments are highly prevalent in Bangladesh HSF, which is concordant with van Doorslaer, (2007). The poorest quintile bears the most. It is recommended to devise alternative healthcare financing including new pooling mechanisms like social, community and private insurance through taxation be devised.

The distribution of catastrophic payments clearly depends on whether payments are expressed as a share of total expenditure or of nonfood expenditure. This explains the fact that OOP payments budget share rise with total household resources (van Doorslaer et al. 2007). Consequently, the rank weighted head count and overshoot are smaller than unweighted. Therefore, nonfood expenditure is treated as the gold standard for assessing household ATP, and subsequently to measure incidence and intensity of catastrophic payments.

At 2010 purchasing power parity (PPP), using cost of basic needs (CBN) method, the lower and upper poverty line was fixed. In Bangladesh, 17.0% of the population is estimated to be in extreme poverty. If OOP payments are netted out of household consumption, this percentage rises to 20.0%. Therefore, using the conventional method, 3.0% of the population is not counted as living in extreme poverty. All the poverty measures including poverty gap, normalized poverty gap, and normalized mean positive poverty gap rise from total expenditure to nonfood expenditure. This rise in the poverty gap is due to more household being brought into poverty as well as deepening the poverty of households that are already poor.

We hope, these findings may benefit the country in designing new health policy aiming for financial protection of households. The results of the study may be applicable for the low and middle countries with similar socio-economic conditions in formulating the health policy to

lessen the burden of OOP payments. Further, findings of this study may stimulate future researches on how to minimize the burden of healthcare expenditure.

Research on financial burden of healthcare costs have gaining more attentions among researchers and policy makers around the world who are concerned about equity in health systems financing. One indication is that on 15 November 2016, the Inter-Agency Expert Group on Sustainable Development Goals (IAEG-SDG) in Geneva has revised the measuring indicator 3.8.2: *Coverage by Health Insurance or a Public Health System per 1,000 populations,* to *Proportion of Population with Large Household Expenditure on Health, as a Total Share of Household Expenditure or Consumption* (McIntyre et al. 2016). Future research along this topic may include short term and long-term impacts of catastrophic payments. Further, to assess healthcare financial burden more comprehensively, we also need more research on the healthcare financial burden of those who cannot afford to use any healthcare services.

References

Ahmed S. Catastrophic Out-of-pocket Healthcare Payments for Rural Households in Bangladesh: Potential Impact of Introducing User Fees (Doctoral dissertation).

Alam K, Mahal A. Economic impacts of health shocks on households in low and middle income countries: a review of the literature. Globalization and health. 2014 Apr 3;10(1):21.

Alamgir NI, Naheed A, Luby SP. Coping strategies for financial burdens in families with childhood pneumonia in Bangladesh. BMC public health. 2010 Oct 19;10(1):622.

Bangladesh National Health Account 2007-2012. Health Economics Unit (HEU), Ministry of Health and Family Welfare. Government of the People's Republic of Bangladesh. Dhaka, 2012.

Bangladesh Bureau of Statistics. Bangladesh Household Income and Expenditure Survey. (2010). Statistics Division, Ministry of Planning. Government of Bangladesh.

Berki SE. A look at catastrophic medical expenses and the poor. Health affairs. 1986 Nov 1;5(4):138-45.

Berman P, Ahuja R, Bhandari L. The impoverishing effect of healthcare payments in India: new methodology and findings. Economic and Political Weekly. 2010 Apr 17:65-71.

Chuma J, Maina T. Catastrophic health care spending and impoverishment in Kenya. BMC health services research. 2012 Nov 21;12(1):413.

Dalal K, Rahman A. Out-of-pocket payments for unintentional injuries: a study in rural Bangladesh. International journal of injury control and safety promotion. 2009 Mar 1;16(1):41-7.

Deaton A. The analysis of household surveys: a microeconometric approach to development policy. World Bank Publications; 1997.

Flores G, Krishnakumar J, O'donnell O, Van Doorslaer E. Coping with health-care costs: implications for the measurement of catastrophic expenditures and poverty. Health economics. 2008 Dec 1;17(12):1393-412.

Gertler P, Gruber J. Insuring consumption against illness. The American Economic Review. 2002 Mar 1;92(1):51-70.

Ghosh S. Catastrophic payments and impoverishment due to out-of-pocket health spending: the effects of recent health sector reforms in India. 2010.

Hamid SA, Ahsan SM, Begum A. Disease-specific impoverishment impact of out-of-pocket payments for health care: evidence from rural Bangladesh. Applied health economics and health policy. 2014 Aug 1;12(4):421-33.

Islam A, Maitra P. Health shocks and consumption smoothing in rural households: Does microcredit have a role to play?. Journal of development economics. 2012 Mar 31;97(2):232-43.

Kabir R, TAKhan H, Kabir M, Rahman MT. Population ageing in Bangladesh and its implication on health care. European Scientific Journal. 2013 Nov 1;9(33).

Khan FU. Economic consequences of health shocks and coping strategies: Evidence from urban poor households in Bangladesh. Erasmus University; 2010.

Limwattananon S, Tangcharoensathien V, Prakongsai P. Catastrophic and poverty impacts of health payments: results from national household surveys in Thailand. Bulletin of the World Health Organization. 2007 Aug;85(8):600-6.

McIntyre, D., McKee, M., Balabanova, D., Atim, C., Reddy, K. S., & Patcharanarumol, W. (2016). Open letter on the SDGs: a robust measure for universal health coverage is essential. The Lancet, 388(10062), 2871-2872.

Majumder MA. World Health Statistics 2011: How does Bangladesh compare with other South-East Asian countries?. South East Asia Journal of Public Health. 2013 Jan 8;1(1):4-11.

Malik K. Human development report 2013. The rise of the South: Human progress in a diverse world.

Molla AA, Anwar KS, Hamid SA, Hoque ME, Haq AK. Analysis of Disability Adjusted Life Years (DALYs) among arsenic victims: a cross-sectional study on health economics perspective. Bangladesh Medical Research Council bulletin. 2004 Aug;30(2):43-50.

Molla AA, Chi C, Mondaca AL. Predictors of high out-of-pocket healthcare expenditure: an analysis using Bangladesh household income and expenditure survey, 2010. BMC Health Services Research. 2017 Jan 31;17(1):94.

O' Donnell, O., van Doorslaer, E., Rannan-Eliya, R. F., et al. (2008). Who pays for health care in Asia? Journal of Health Economics 27(2008) 460-475.

OECD, Eurostat, WHO (2011), A System of Health Accounts, OECD Publishing. doi: 10.1787/9789264116016-en

Park C. Risk pooling between households and risk-coping measures in developing countries: Evidence from rural Bangladesh. Economic Development and Cultural Change. 2006 Jan;54(2):423-57.

Powell-Jackson T, Hoque ME. Economic consequences of maternal illness in rural Bangladesh. Health economics. 2012 Jul 1;21(7):796-810.

Pradhan M, Prescott N. Social risk management options for medical care in Indonesia. Health economics. 2002 Jul 1;11(5):431-46.

Rahman MM, Gilmour S, Saito E, Sultana P, Shibuya K. Health-related financial catastrophe, inequality and chronic illness in Bangladesh. PloS one. 2013 Feb 25;8(2):e56873.

Russell S. The economic burden of illness for households in developing countries: a review of studies focusing on malaria, tuberculosis, and human immunodeficiency virus/acquired immunodeficiency syndrome. The American journal of tropical medicine and hygiene. 2004 Aug 1;71(2 suppl):147-55.

Titumir RA, Rahman KM. Poverty and inequality in Bangladesh. Unnayan Onneshan. Dhaka: Unnayan Onneshan. 2011.

Van Doorslaer E, O'Donnell O, Rannan-Eliya RP, Somanathan A, Adhikari SR, Garg CC, Harbianto D, Herrin AN, Huq MN, Ibragimova S, Karan A. Catastrophic payments for health care in Asia. Health economics. 2007 Nov 1;16(11):1159-84.

Van Doorslaer E, O'Donnell O, Rannan-Eliya RP, Somanathan A, Adhikari SR, Garg CC, Harbianto D, Herrin AN, Huq MN, Ibragimova S, Karan A. Effect of payments for health care on poverty estimates in 11 countries in Asia: an analysis of household survey data. The lancet. 2006 Oct 20;368(9544):1357-64.

Wagstaff A. Poverty and health sector inequalities. Bulletin of the world health organization. 2002 Jan;80(2):97-105.

Wagstaff A, Doorslaer EV. Catastrophe and impoverishment in paying for health care: with applications to Vietnam 1993–1998. Health economics. 2003 Nov 1;12(11):921-33.

Wagstaff A. The Millennium Development Goals for health: rising to the challenges. World Bank Publications; 2004.

Wagstaff A. The economic consequences of health shocks: evidence from Vietnam. Journal of health economics. 2007 Jan 31;26(1):82-100.

World Health Organization. (2005). Designing health financing systems to reduce catastrophic health expenditure.

World Health Organization. The world health report 2000: health systems: improving performance. World Health Organization; 2000.

Wyszewianski L. Financially catastrophic and high-cost cases: definitions, distinctions, and their implications for policy formulation. Inquiry. 1986 Dec 1:382-94.

Xu K, World Health Organization. Distribution of health payments and catastrophic expenditures methodology. 2005.

Xu K, Evans DB, Kawabata K, Zeramdini R, Klavus J, Murray CJ. Household catastrophic health expenditure: a multicountry analysis. The lancet. 2003 Jul 12;362(9378):111-7.

Chapter 4

Conclusions

Before discussing final conclusion and policy implications, we would like to discuss some limitations of this research. First, as usual, survey data source may suffer from recall bias. Healthcare expenditures were collected for the preceding 30 days. Food consumption data were collected on daily and weekly basis, and non-food consumption data were collected on monthly and yearly consumption. All of these measurements are susceptible to recall bias. Second, using household as a unit of analysis does not account for any complexity or diversity within families. Third, the data contain a significant number of zero OOP payments. This might be caused by poor households not being able to use health services because they could not make any payments at all, which needs further research. Fourth, our data set comes from a cross sectional survey, and we made an approximation of material disruption following catastrophic payments. Longitudinal data is always more reliable to identify catastrophic illness. However, using cross-sectional survey date to assess equity has been well established in the empirical literature (O'Donnell, van Doorslaer and Wagstaff, 2008). Notably the world's leading experts and team leading by Wagstaff and van Doorslaer have been conducting the same type of analysis, first in European Union, then OECD, and in the last decade, in Asia and Latin America. (van Doorslaer et al., 1999; Wagstaff, 2002, Wagstaff, 2007; Wagstaff and van Doorslaer, 2007). At the same time, I recognize that with cross- sectional data, we could not distinguish between short-term and long-term impacts of catastrophic payments and subsequent poverty status.

This macro-level data analysis shows that there is heavy reliance on OOP payments for healthcare in Bangladesh, which exceed 63.0% of the total national health expenditure.

Further, this heavy reliance on OOP payments resulted in reducing household's living standards, that lead to poverty and/or ultimately pushes to destitute.

The findings indicate that health systems financing in Bangladesh is regressive because of high OOP payments, and the absence of prepayment system of risk pooling. The role of social insurance in Bangladesh is very negligible, and private health insurance is absent or if present, only in some pocket areas ran by NGOs. To improve equitably financial burden in healthcare, the Bangladesh health system needs to introduce health insurance schemes for the poor, elderly, disabled and disadvantaged. WHO has recommended in its measureable country specific milestones in monitoring progressivity, and that there is no other alternatives, but to move to a prepayment funding mechanism (WHO, 2010). One option is to launch a national health insurance program. The taxation/premiums should be adjusted according to households' ATP, and not by health status. The states should cover premiums for the ultra-poor. The system may be introduced as a small-scale pilot project, for example, for maternal and child health under the present financing strategy, "Expanding Social Protection towards Universal Coverage" (MoHFW, 2012). Routine monitoring of progressivity, as the analysis presented in this research, should be initiated and findings should be translated to inform policy.

If Bangladesh wants to have a more progressive health financing system, it needs a strong emphasis on direct taxes, particularly on personal and corporate income taxes. Indirect taxes, private insurance, and OOP payment, as often the case, tend to be regressive. Alternative health finance, such as earmarked tax on cigarette smoking or alcohol consumption may provide additional funding. Healthcare tax on mobile airtime may also be a progressive source of finance to minimize the burden of OOP payments.

The economy of Bangladesh is growing fast - from low-income to lower middle-income. As the economy grows, social insurance is typically established, and OOP financing falls. However, for Bangladesh, we see opposite scenarios. Introduction of social insurance is very slow and OOP payments are growing fast. Introduction of social health insurance with a subsidy premium for the poor and vulnerable may reduce this reliance. Health cards have some positive effect on OOP payments (Pradhan and Prescot, 2002). Thailand introduced an identity card named “Health Card” in 1983 to protect the poor in the community (Pannarunothai, Srithamrongsawat, Kongpan, & Thumvanna, 2000). Australian Health Care Card (Correa-Valez, Gilfford and Bice, 2005) and Indonesian Health Card Program (Johar, 2009) may serve as good example. Development of such type of health card, which is a type of public financed healthcare, may be an option for financial protection of the poor in Bangladesh.

The findings from this research may contribute to policy making in Bangladesh, particularly in relation to the proposed financial risk protection, social protection, and universal coverage. Our findings provide empirical evidence for future healthcare reforms. More specifically, this study provides a comprehensive estimation and understanding of the distribution of healthcare financial burden in Bangladesh. The findings of incidence and intensity of catastrophic payments delineate how healthcare expenditure contribute to poverty. Our findings suggest that incidence and intensity of catastrophic payments are highly prevalent in Bangladesh health systems financing, which is concordant with van Doorslaer’s finding (2007). The poorest quintile bears most of the burden.

One unique approach that I applied in the analysis of catastrophic healthcare payments is to assess OOP against nonfood consumption, rather than the conventional method of using

general consumption as a reference. The distribution of catastrophic payments clearly depends on whether payments are expressed as a share of total expenditure or of nonfood expenditure. This explains the fact that OOP payments budget share rise with total household resources. Consequently, the rank weighted head count and overshoot are smaller than unweighted. Therefore, nonfood expenditure is treated as the gold standard for assessing household ATP.

Using the conventional method, 3.0% of the population is not counted as living in extreme poverty. There are significant increases of all poverty measures, including poverty gap, normalized poverty gap, and normalized mean positive poverty gap, when the reference point of ATP was changed from total expenditure to nonfood expenditure. This rise in the poverty gap is due to more household being brought into poverty as well as exacerbating their poverty level.

The results of the study may be applicable for the low and middle-income countries with similar socio-economic conditions in the region in formulating the proper policy to lessen the burden of OOP payments and improve the equity of healthcare financial burden. Further, findings of this study may stimulate future researches on how to minimize the burden of healthcare expenditure.

Research on financial burden of healthcare have been gaining more attentions among researchers and policy makers around the world who are concerned about equity in health systems financing. One indication is that on 15 November 2016, the Inter-Agency Expert Group on Sustainable Development Goals (IAEG-SDG) in Geneva has revised the measuring indicator *3.8.2: Coverage by Health Insurance or a Public Health System per 1,000 populations*, to *Proportion of Population with Large Household Expenditure on Health, as a Total Share of*

Household Expenditure or Consumption (McIntyre et al. 2016). Future research along this topic may include short term and long-term impacts of catastrophic payments. Further, to assess healthcare financial burden more comprehensively, we also need more research on the healthcare financial burden of those who are too poor and cannot afford to use any healthcare services.

Empirical evidence on how the HSF operates in a country is essential from the perspectives of distributive justice. Our study findings provide empirical evidence to assess distributive justice of healthcare financial burden. The conventional method of poverty measure masks the real status of poverty and often leads to underestimation of poverty. Using the new approach introduced in this study, researchers may be able to have a more accurate estimate of the impact of healthcare OOP on poverty.

Based on our study findings, we recommend public health researchers to explore the barriers and consequences of zero healthcare expenditure and the reason for not utilizing healthcare when their health conditions required. Long-term implications of catastrophic payments are important area of future research. For this purpose, longitudinal studies are warranted. Health systems financing in most high-income countries seem to be progressive based on the empirical literature (Van Doorslaer et al. 1999, Xu et al., 2003). At the same time, we need to know more specific distributions of healthcare financial burden across income groups. Even if its healthcare financing scheme is progressive, assessment of relativity of payment concentration curve with Lorenz curve may generate more refined information on the distribution of financial burden that will inform policy makers on where improvement are needed. . There is even less empirical literature on healthcare financial burden among middle-

and low-income nations. Hope this study will stimulate more researchers in other middle- and low-income nations to conduct study on healthcare financial burden of their system.

References

Correa-Velez, I., Gifford, S. M., & Bice, S. J. (2005). Australian health policy on access to medical care for refugees and asylum seekers. Australia and New Zealand health policy, 2(1), 23.

MOHFW (2012). Expanding social protection for health towards universal health coverage. Healthcare financing strategy 2012–2032. Dhaka: Health Economics Unit, Ministry of Health and Family Welfare, Government of the People's Republic of Bangladesh. 2012.

World Health Organization (2010). The World Health Report 2010: Health systems financing: the path to universal coverage, Geneva: World Health Organization.

Pannarunothai, S., Srithamrongsawat, S., Kongpan, M., & Thumvanna, P. (2000). Financing reforms for the Thai health card scheme. Health Policy and Planning, 15(3), 303-311.

Pradhan, M. and N. Prescott (2002). "Social risk management options for medical care in Indonesia." Health Economics 11: 431-446.

van Doorslaer, E., O'Donnell, O., Rannan-Eliya, R. P., Somanathan, A., Adhikari, S. R., Garg, C. C., Harbianto, D., Herrin, A. N., Huq, M. N., Ibragimova, S., Karan, A., Lee, T. J., Leung, G. M., Lu, J. F., Ng, C. W., Pande, B. R., Racelis, R., Tao, S., Tin, K., Tisayaticom, K., Trisnantoro, L., Vasavid, C. and Zhao, Y. (2007). Catastrophic payments for health care in Asia. Health Econ; 16(11):1159-84.

Van Doorslaer E, Wagstaff A, Van der Burg H, Christiansen T, Citoni G, Di Biase R, Gerdtham UG, Gerfin M, Gross L, Häkinnen U, John J. The redistributive effect of health care finance in twelve OECD countries. Journal of health economics. 1999 Jun 30;18(3):291-313.

Wagstaff A. Poverty and health sector inequalities. Bulletin of the world health organization. 2002 Jan;80(2):97-105.

Wagstaff A, Doorslaer EV. Catastrophe and impoverishment in paying for health care: with applications to Vietnam 1993–1998. Health economics. 2003 Nov 1;12(11):921-33.

Wagstaff A. The economic consequences of health shocks: evidence from Vietnam. Journal of health economics. 2007 Jan 31;26(1):82-100.

McIntyre, D., McKee, M., Balabanova, D., Atim, C., Reddy, K. S., & Patcharanarumol, W. (2016). Open letter on the SDGs: a robust measure for universal health coverage is essential. The Lancet, 388(10062), 2871-2872.

O' Donnell, O., van Doorslaer, E., Rannan-Eliya, R. F., et al. (2008). Who pays for health care in Asia? Journal of Health Economics 27(2008) 460-475.

Xu K, Evans DB, Kawabata K, Zeramdini R, Klavus J, Murray CJ. Household catastrophic health expenditure: a multicountry analysis. The lancet. 2003 Jul 12;362(9378):111-7.

BIBLIOGRAPHY

Adams AM, Ahmed T, El Arifeen S, Evans TG, Huda T, Reichenbach L. Innovation for universal health coverage in Bangladesh: a call to action. The Lancet. 2014 Jan 3;382(9910):2104-11.

Ahmed S. Catastrophic Out-of-pocket Healthcare Payments for Rural Households in Bangladesh: Potential Impact of Introducing User Fees (Doctoral dissertation).

Akanda, M., Monowa, M. (2011). Household demands for health care expenditure by controlling endogeneity bias in Bangladesh. *Dhaka Univ. J. Sci*. 59(1): 137-46.

Alam K, Mahal A. Economic impacts of health shocks on households in low and middle income countries: a review of the literature. Globalization and health. 2014 Apr 3;10(1):21.

Alamgir NI, Naheed A, Luby SP. Coping strategies for financial burdens in families with childhood pneumonia in Bangladesh. BMC public health. 2010 Oct 19;10(1):622.

Bangladesh Bureau of Statistics, Statistical Division, Ministry of Planning, Government of the People's Republic of Bangladesh. Report of the Household Income and Expenditure Survey 2010. Dhaka, Bangladesh, 2011.

Bangladesh Bureau of Statistics, Statistical Division, Ministry of Planning, Government of the People's Republic of Bangladesh. Statistical Pocket Book, 2013. Dhaka, Bangladesh, 2014.

Bangladesh National Health Account 2007-2012. Health Economics Unit (HEU), Ministry of Health and Family Welfare. Government of the People's Republic of Bangladesh. Dhaka, 2012.

Berki SE. A look at catastrophic medical expenses and the poor. Health affairs. 1986 Nov 1;5(4):138-45.

Berman P, Ahuja R, Bhandari L. The impoverishing effect of healthcare payments in India: new methodology and findings. Economic and Political Weekly. 2010 Apr 17:65-71.

Bilger M, Sajaia Z, Lokshin M. Health equity and financial protection: streamlined analysis with ADePT software. World Bank Publications; 2011.

Chuma J, Maina T. Catastrophic health care spending and impoverishment in Kenya. BMC health services research. 2012 Nov 21;12(1):413.

Correa-Velez, I., Gifford, S. M., & Bice, S. J. (2005). Australian health policy on access to medical care for refugees and asylum seekers. Australia and New Zealand health policy, 2(1), 23.

Culyer, A. J., & Wagstaff, A. (1993). Equity and equality in health and healthcare. Journal of Health Economics 12, 431-457.

Dalal K, Rahman A. Out-of-pocket payments for unintentional injuries: a study in rural Bangladesh. International journal of injury control and safety promotion. 2009 Mar 1;16(1):41-7.

Deaton A. The analysis of household surveys: a microeconometric approach to development policy. World Bank Publications; 1997.

Desmet, M., Chowdhury, A. Q., & Islam, M. K. (1999). The potential for social mobilisation in Bangladesh: the organisation and functioning of two health insurance schemes. Social Science & Medicine, 48(7), 925-938.

Flores G, Krishnakumar J, O'donnell O, Van Doorslaer E. Coping with health-care costs: implications for the measurement of catastrophic expenditures and poverty. Health economics. 2008 Dec 1;17(12):1393-412.

Gastwirth, J. L. (1971). A general definition of the Lorenz curve. Econometrica: Journal of the Econometric Society, 1037-1039.

Gertler, P. and J. Gruber (2002). “Insuring consumption against illness.” American Economic Review 92(1): 51-70.

Ghosh S. Catastrophic payments and impoverishment due to out-of-pocket health spending: the effects of recent health sector reforms in India.

Gilson L. Government health care charges: is equity being abandoned? A discussion paper.

Gupta I. Out-of-pocket expenditures and poverty: Estimates from NSS 61st round. Draft paper. Institute of Economic Growth, New Delhi. 2009 May 12.

Hamid SA, Ahsan SM, Begum A. Disease-specific impoverishment impact of out-of-pocket payments for health care: evidence from rural Bangladesh. Applied health economics and health policy. 2014 Aug 1;12(4):421-33.

International Labor Organization Social health protection: An ILO strategy towards universal access to health care. Geneva: International Labor Organization, 2007.

Islam A, Maitra P. Health shocks and consumption smoothing in rural households: Does microcredit have a role to play?. Journal of development economics. 2012 Mar 31;97(2):232-43.

Johar, M. (2009). The impact of the Indonesian health card program: A matching estimator approach. Journal of health economics, 28(1), 35-53.

Kabir R, TAKhan H, Kabir M, Rahman MT. Population ageing in Bangladesh and its implication on health care. European Scientific Journal. 2013 Nov 1;9(33).

Kakwani, N. C. (1977). Measurement of tax progressivity: an international comparison. The Economic Journal, 87(345), 71-80.

Khan FU. Economic consequences of health shocks and coping strategies: Evidence from urban poor households in Bangladesh. Erasmus University; 2010.

Kutzin J. Health financing policy: a guide for decision-makers. Health financing policy paper. Copenhagen, WHO Regional Office for Europe. 2008;24.

Limwattananon S, Tangcharoensathien V, Prakongsai P. Catastrophic and poverty impacts of health payments: results from national household surveys in Thailand. Bulletin of the World Health Organization. 2007 Aug;85(8):600-6.

Majumder MA. World Health Statistics 2011: How does Bangladesh compare with other South-East Asian countries?. South East Asia Journal of Public Health. 2013 Jan 8;1(1):4-11.

Malik K. Human development report 2013. The rise of the South: Human progress in a diverse world.

McIntyre, D., McKee, M., Balabanova, D., Atim, C., Reddy, K. S., & Patcharanarumol, W. (2016). Open letter on the SDGs: a robust measure for universal health coverage is essential. The Lancet, 388(10062), 2871-2872.

Mercer A, Khan MH, Daulatuzzaman M, Reid J. Effectiveness of an NGO primary health care programme in rural Bangladesh: evidence from the management information system. Health Policy and Planning. 2004 Jul 1;19(4):187-98.

Ministry of Health and Family Welfare. Expanding social protection for health towards universal health coverage. Healthcare financing strategy 2012–2032. Dhaka: Health Economics Unit, Ministry of Health and Family Welfare, Government of the People's Republic of Bangladesh. 2012.

Molla AA, Anwar KS, Hamid SA, Hoque ME, Haq AK. Analysis of Disability Adjusted Life Years (DALYs) among arsenic victims: a cross-sectional study on health economics perspective. Bangladesh Medical Research Council bulletin. 2004 Aug;30(2):43-50.

Molla AA, Chi C, Mondaca AL. Predictors of high out-of-pocket healthcare expenditure: an analysis using Bangladesh household income and expenditure survey, 2010. BMC Health Services Research. 2017 Jan 31;17(1):94.

Normand C. Equity in the Finance and Delivery of Health Care: An International Perspective. British Medical Journal. 1993 Jul 10;307(6896):140-1.O' Donnell, O., van Doorslaer, E., Rannan-Eliya, R. F., et al. (2008). Who pays for health care in Asia? Journal of Health Economics 27(2008) 460-475.

O' Donnell, O., van Doorslaer, E., Rannan-Eliya, R. F., et al. (2008). Who pays for health care in Asia? Journal of Health Economics 27(2008) 460-475.

O'Donnell O, Van Doorslaer E, Wagstaff A, Lindelow M. Analyzing health equity using household survey data: a guide to techniques and their implementation. 2008. Washington, DC: The World Bank Google Scholar. 2010.

O'Donnell, O., E. van Doorslaer, et al. (2005). Explaining the incidence of catastrophic expenditures on health care: Comparative evidence from Asia. EQUITAP Working Paper #5, Eramsus University, Rotterdam and IPS, Colombo.

OECD, Eurostat, WHO (2011), A System of Health Accounts, OECD Publishing. doi: 10.1787/9789264116016-en

Organization for Economic Co-operation and Development. A System of Health Accounts 2011. Organization for Economic Co-operation and Development; 2011.

Pannarunothai, S., Srithamrongsawat, S., Kongpan, M., & Thumvanna, P. (2000). Financing reforms for the Thai health card scheme. Health Policy and Planning, 15(3), 303-311.

Park C. Risk pooling between households and risk-coping measures in developing countries: Evidence from rural Bangladesh. Economic Development and Cultural Change. 2006 Jan;54(2):423-57.

Pearce, DW. In The Dictionary of Modern Economics. MIT Press. Cambridge, MA, 1981; p. 197.

Powell-Jackson T, Hoque ME. Economic consequences of maternal illness in rural Bangladesh. Health economics. 2012 Jul 1;21(7):796-810.

Pradhan M, Prescott N. Social risk management options for medical care in Indonesia. Health economics. 2002 Jul 1;11(5):431-46.

Rahman MM, Gilmour S, Saito E, Sultana P, Shibuya K. Health-related financial catastrophe, inequality and chronic illness in Bangladesh. PloS one. 2013 Feb 25;8(2):e56873.

Rawls J. Distributive justice. Perspectives In Bus Ethics Sie 3E. 1967:48.

Russell S. The economic burden of illness for households in developing countries: a review of studies focusing on malaria, tuberculosis, and human immunodeficiency virus/acquired immunodeficiency syndrome. The American journal of tropical medicine and hygiene. 2004 Aug 1;71(2 suppl):147-55.

Sen, A. (2002). Why health equity? Health Economics 11(8): 659-66.

Somanathan, A., O. O'Donnell, et al. (2005). Who gets health care in Asia? EQUITAP Working Paper # 4, Erasmus University, Rotterdam and IPS, Colombo.

StataCorp. 2015. Stata Statistical Software: Release 14. College Station, TX: StataCorp LP.
The World Factbook, 2012. Source: https://www.cia.gov/library/publications/the-world-factbook/ Retrieved on 01/17/2015.

Titumir RA, Rahman KM. Poverty and inequality in Bangladesh. Unnayan Onneshan. Dhaka: Unnayan Onneshan. 2011.

Van Doorslaer E, Wagstaff A, Van der Burg H, Christiansen T, Citoni G, Di Biase R, Gerdtham UG, Gerfin M, Gross L, Häkinnen U, John J. The redistributive effect of health care finance in twelve OECD countries. Journal of health economics. 1999 Jun 30;18(3):291-313.

Van Doorslaer E, O'Donnell O, Rannan-Eliya RP, Somanathan A, Adhikari SR, Garg CC, Harbianto D, Herrin AN, Huq MN, Ibragimova S, Karan A. Effect of payments for health care on poverty estimates in 11 countries in Asia: an analysis of household survey data. The lancet. 2006 Oct 20;368(9544):1357-64.

van Doorslaer, E., O'Donnell, O., Rannan-Eliya, R. P., Somanathan, A., Adhikari, S. R., Garg, C. C., Harbianto, D., Herrin, A. N., Huq, M. N., Ibragimova, S., Karan, A., Lee, T. J., Leung, G. M., Lu, J. F., Ng, C. W., Pande, B. R., Racelis, R., Tao, S., Tin, K., Tisayaticom, K., Trisnantoro, L., Vasavid, C. and Zhao, Y. (2007). Catastrophic payments for health care in Asia. Health Econ; 16(11):1159-84.

Wagstaff A, O'Donnell O, Van Doorslaer E, Lindelow M. Analyzing health equity using household survey data: a guide to techniques and their implementation. World Bank Publications; 2007 Nov 2.

Wagstaff A. The Millennium Development Goals for health: rising to the challenges. World Bank Publications; 2004.

Wagstaff, A., & Doorslaer, E. van. (2002). Equity in the finance of health care: Some international comparisons. 1992, 11(4), 361–387.

Wagstaff A. Poverty and health sector inequalities. Bulletin of the world health organization. 2002 Jan;80(2):97-105.

Wagstaff A, Doorslaer EV. Catastrophe and impoverishment in paying for health care: with applications to Vietnam 1993–1998. Health economics. 2003 Nov 1;12(11):921-33.

Wagstaff A. The economic consequences of health shocks: evidence from Vietnam. Journal of health economics. 2007 Jan 31;26(1):82-100.

Wong YN. World Development Report 2012: Gender equality and development. InForum for Development Studies 2012 Nov 1 (Vol. 39, No. 3, pp. 435-444). Routledge.

World Health Organization (2010). The World Health Report 2010: Health systems financing: the path to universal coverage, Geneva: World Health Organization.

World Health Organization. (2005). Designing health financing systems to reduce catastrophic health expenditure.

World Health Organization. Declaration of Alma-Ata: International Conference on Primary Health Care, Alma-Ata, USSR, 6–12 September 1978. Retrieved February. 1978;14:2006.

World Health Organization. Global action plan for the prevention and control of non-communicable diseases 2013-2020.

World Health Organization. Health financing strategy for the Asia Pacific Region (2010-2015). Manila: WHO Regional Office for the Western Pacific; 2009.

World Health Organization. Sixty-fourth World Health Assembly. Youth and health risks. WHA64. 28. 24 May, 2011.

World Health Organization. The world health report 2000: health systems: improving performance. World Health Organization; 2000.

World Health Organization. The World health report, 2000. Health systems: improving performance. Geneva: World Health Organization. 2000. URL: http://www. who. int/whr/2000/en/index. html. 2005.

Wyszewianski L. Financially catastrophic and high-cost cases: definitions, distinctions, and their implications for policy formulation. Inquiry. 1986 Dec 1:382-94.

Xu K, Evans DB, Carrin G, Aguilar-Rivera AM, Musgrove P, Evans T. Protecting households from catastrophic health spending. Health affairs. 2007 Jul 1;26(4):972-83.

Xu K, Evans DB, Kawabata K, Zeramdini R, Klavus J, Murray CJ. Household catastrophic health expenditure: a multicountry analysis. The lancet. 2003 Jul 12;362(9378):111-7.

Xu K, World Health Organization. Distribution of health payments and catastrophic expenditures methodology.

Annex-1

Institutional Review Board
Office of Research Integrity | Oregon State University
B308 Kerr Administration Building, Corvallis, OR 97331-2140
Telephone (541) 737-8008
irb@oregonstate.edu | http://research.oregonstate.edu/irb

DETERMINATION

Date of Notification	05/02/2016		
Study ID	7453		
Study Title	Household healthcare expenditure in Bangladesh: Anaylsis of predictors, progressivity, and impacts on poverty		
Person Submitting Form	Azaher Molla		
Principal Investigator	Azaher Molla		
Study Team Members	None		
Funding Source	Internal	Proposal #	N/A
PI on Grant or Contract	N/A	Cayuse #	N/A

DETERMINATION: RESEARCH, BUT NO HUMAN SUBJECTS

The above referenced submission was reviewed by the OSU Institutional Review Board (IRB) Office. The IRB has determined that your project, as submitted, does meet the definition of research but **does not** involve human subjects under the regulations set forth by the Department of Health and Human Services 45 CFR 46.

OSU IRB review is not required for this study.

Please do not include IRB contact information on any of your study materials.

Note that amendments to this project may impact this determination.

The federal definitions and guidance used to make this determination may be found at the following links: Human Subject