

**CATASTROPHIC HEALTH EXPENDITURES AND  
POVERTY IN PAKISTAN**

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**Dissertation is Submitted in Partial Fulfillment of the  
Requirement for the Master of Philosophy in Health Economics,  
Pakistan Institute of Development Economics, Islamabad, 2015**

# **DEDICATION**

**TO MY FAMILY AND TEACHERS**

## **ACKNOWLEDGMENTS**

This thesis has been a long process in the making and I could not be able to complete it without the support of so many people. First, I pay my special thanks to Almighty ALLAH who gave me strength to complete this dissertation. I am highly grateful to Dr. Shujaat Farooq, my supervisor for his guidance and support during the completion of this thesis. His supervision at every stage of the study has helped to shape it in the form it is being presented. Without his support, my efforts would not be fruitful. My sincere thanks to Dr. Mahmood Khalid, my co-supervisor for his valued help and guidance for this research.

Special thanks to Dr. Durr-e-Nayab for always being so much co-operative and helpful. She has been extremely supportive and encouraging during these two years. Special thanks are due to all my teachers, who have helped me in my learning process at the Pakistan Institute of Development Economics, Islamabad. I would also like to thank library staff of PIDE for helping me in research.

Finally, my special thanks are due to my all family members, especially my parents, my sister Sadaf and my husband for their unconditional support during all the stages of the thesis preparation. I am also thankful to my friends and colleagues for encouragement and help they gave me for the completion of this thesis.

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## **ABSTRACT**

This study aims to examine the incidence and determinants of catastrophic health expenditures in Pakistan. Moreover, its impact on child schooling and poverty status of a household has also been examined. Catastrophic health expenditures persist across the world but they are more pronounced in developing countries. Annually millions of people fall below poverty due to these catastrophic payments. They are involuntary and affect the economic welfare of a household. People have to sacrifice their other basic needs in order to meet catastrophic health expenditures. This study defines catastrophic health expenditures at two thresholds i.e. 10 percent of total household expenditure and 40 percent of nonfood expenditure. The Pakistan Panel Household Survey (PPHS) data set of 2010 show high incidence of catastrophic health expenditures in Pakistan. However, the incidence and intensity values are higher when catastrophic payments are defined in relation to nonfood expenditure. Among socio-economic factors, any illness/disability in the household, the distance to health facility, hospitalization status of any household member and place of residence significantly affects the catastrophic health expenditures. However, individual characteristics of household head i.e. his age, sex and education status significantly affect catastrophe-2 (defined at 40 percent of nonfood expenditure) than catastrophe-1 (defined at 10 percent of total expenditure of a household). The results of Propensity Score Matching (PSM) technique shows that catastrophic health expenditures significantly affect poverty status of a household but no significant impact is seen in case of child schooling. Moreover, the results of poverty impact on Out of Pocket (OOP) payments have shown that there is an increase in poverty due to catastrophic health payments. Although, the incidence and intensity of poverty is less when poverty line is adjusted downward.



## CHAPTER 1

### INTRODUCTION

#### **Back ground and Introduction**

The prime function of the health system is not only to provide preventive and curative services to the people but also to protect them from catastrophic effects of illness and sufferings (WHO, 2000; Rahman et al., 2013). Ill health and diseases create economic burden for patients and their families as well as emasculates their earning capacity all around the globe, and especially in developing world (Uplekar et al., 2001). As a result it affects the individuals and household's long-term economic welfare (Gertler & Gruber, 2002). It is a major challenge for health system in developing world to protect households from the financial burden, resulting from the health expenditures and to make sure that everybody should receive health services when needed. As high expenses paid as a result of out of pocket (OOP) payments at the time of health service utilization can lead to an individual to reduce spending on other basic needs or sometimes even preventing people from seeking health care (Cavagnero et al., 2006).

OOP payments are a major source of health financing in many countries (Xu et al., 2003; Rahman et al, 2013; Roberts et al., 2004) and being considered as a major barrier in undermining an equitable health system (Whitehead et al., 2001; Palmer et al., 2004). These OOP payments may cause households to incur catastrophic costs (Bredenkamp et al., 2011). Catastrophic payments occur when households have to spend a large share of their net income on health by ignoring other essential items. As a result some of them slip

into current and long-term poverty and others forgo treatment (Cavagnero et al., 2006). All over the world, approximately 44 million households face catastrophic health expenditures annually, and about 25 million households are pushed into poverty by their heavy health expenses and majority of them belongs to developing countries (Xu et al., 2007).

According to the WHO estimates, households who spend more than 50 percent of their non-food expenditures on health care needs, have higher probability of being impoverished (WHO, 2000). However, there is no consensus in the literature over the threshold of catastrophic as different studies have taken different values including food expenditures, non-food expenditures and income. OOP expenditures can also be defined as catastrophic if a household's health expenditure exceeds 40 percent of their income remaining after meeting subsistence needs (Su et al., 2006).

In developed countries people are protected from catastrophic spending by adequate coverage through insurance or due to tax-based health system. However, in many middle and low income countries high OOP payments along with lack of risk pooling mechanisms and rampant poverty leads to catastrophic expenditures. Incurring debts, loans and selling productive assets are common consequences of catastrophic expenditures (Whitehead et al., 2001). Ensor and Pham (1996) found that 60 percent of poor rural households in North Vietnam were in debt due to heavy health expenditures. Similar patterns are also found in other parts of the world including Africa, China, India and Cambodia (Krishna, 2004; Yu et al., 1996; Evans, 1995; Damme et al., 2004). Cutting down in food and curtailing children's education are common coping strategies which can further generate a vicious circle of poverty and indebtedness (Whitehead et al., 2001; Tipping, 2000).

Although, impact of catastrophic health expenditures on welfare has not received much attention, however, it is now a recent phenomenon that the subject is highlighted on research agenda (Whitehead et al., 2001; WHO, 2000) and its importance has also been estimated (Xu et al., 2003). This interest is may be due to the recent trends of marketization and liberalization in developing countries that makes utilization of health services unaffordable leading to a serious problem of catastrophic payments (Schwartz et al., 1978; Berki, 1986; Wyszewianski, 1986). Another reason is the growing importance of the effects of ‘shocks’ on household economy, as the work done by Dreze and Sen on poverty and famine is famous worldwide (Dreze & Sen, 1989; Sen 1981). Thus, the protection of people from catastrophic expenses is now widely accepted as a desirable objective of health policy (Wagstaff, 2002a; WHO, 2002).

## **1.2. Importance of the Study: The Pakistan Context**

Pakistan is a welfare state and according to its constitution the state is responsible to provide basic necessities of life such as food, clothing, housing, education and medical relief to all citizens irrespective of their sex, caste, creed or race who are permanently or temporarily unable to earn their livelihood due to infirmity, sickness or unemployment (Article 38d). Health is a fundamental human right and ‘health for all’ is a global declaration made by WHO and UNICEF in the year 2000 for the equitable distribution of resources among all the population groups. However, in Pakistan health is treated as a commodity. OOP payments remain the most important source of funding for healthcare (Malik & Syed, 2012; NCP, 2005<sup>1</sup>) that exacerbates poverty and inequality among

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<sup>1</sup> The Network for Consumer Protection

different segments of the population. As rich people have resources they can pay for health care but poor due to meagre resources have to reduce its spending on basic necessities of life to meet health expenditures.

Like many other developing countries, Pakistan is also facing the double burden of disease, rampant poverty, high fertility and poorly performing health system (WHO, 2013). The share of health expenditures as percentage of GDP is quite low with around only 0.6 percent of GDP and is insufficient for growing population needs. Due to inadequate priorities, it could not reach even one percent of GDP. Table 1.1 shows that despite the share of health expenditures in GDP is increasing overtime it shows a decreasing trend. However, for the last two years the health expenditures as percentage of GDP have been increased from 0.2 to 0.3 and 0.4 percent respectively but still the values are quite low as compared to the figures of previous years as well as below the standards of WHO recommendations.

**Table 1.1: Public Sector Health and Nutrition Expenditure (in Rs. Billion)**

<b>Years</b>	<b>Total Health Expenditures</b>	<b>Development Expenditures</b>	<b>Current Expenditures</b>	<b>Health Expenditure as % of GDP</b>
2000-01	24	6	18	0.7
2002-03	29	7	22	0.6
2004-05	38	11	27	0.6
2006-07	50	20	30	0.6
2008-09	74	33	41	0.6
2009-10	79	38	41	0.5
2010-11	42	19	23	0.2
2011-12	55	26	29	0.3
2012-13*	79	17	62	0.4

Note: Expenditure figure for the respective year are for the period (Jul-March)

Source: *Economic Survey of Pakistan 2013-14*

With respect to other regional countries drastic measures would be required in order to scale up the health expenditures in Pakistan. As illustrated by Table 1.2, Pakistan's total

health expenditures are 3 percent of its GDP while this is 4, 5 and 6 percent in case of India, Iran and Nepal, respectively. The annual per capita health expenditures of Pakistan as reported by WHO (2014) are US \$36, out of which the share of public sector is only US\$11, the remaining comes from private sector i.e. out of pocket payments. However, for India, Iran and Sri Lanka the respective figures are US\$62 and 19, US\$326 and 161, US\$93 and 39.

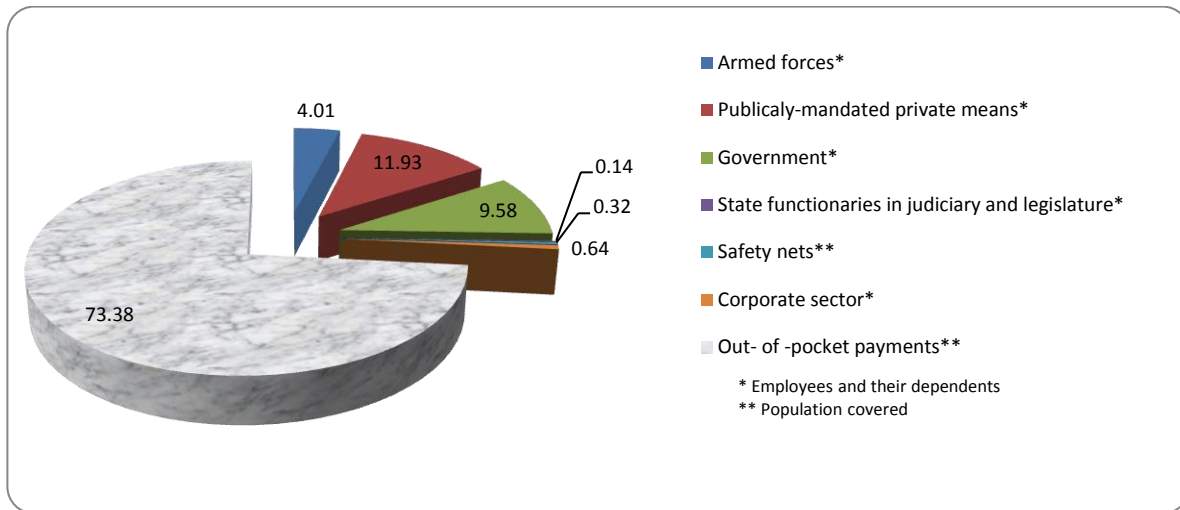
**Table 1.2: Health Expenditure in Pakistan in Comparison to some Regional Countries 2011**

Countries	Total Health Expenditures (% of GDP)	Govt. Health Expenditures (% of GDP)	Per Capita Total Health Expenditures (in US \$)	Per Capita Govt. Health Expenditures (in US \$)
Pakistan	3	31	36	11
India	4	30	62	19
Iran	5	49	326	161
Bangladesh	4	38	27	10
Nepal	6	45	41	19
Sri Lanka	3	42	93	39

*Source:* World Health Statistics 2014. WHO

The health system of Pakistan is composed of many institutional actors. According to estimates, only one fourth (26%) of the total population is covered for health care costs up to a certain limit while rest 73 percent pay out-of-pocket. As shown in Figure 1.1, beside OOP financing, health coverage is mainly provided to armed forces and government employees etc., while a minor percentage fall under safety nets and corporate sectors. It suggests that the bottom income group of the Pakistan society finance their health mainly by their OOP payments. These vulnerable and poor masses don't have the formal jobs or jobs in government sector and in the absence of social insurance and social health protection they are vulnerable to health shocks (NCP, 2005).

**Figure 1.1: Sources of Health Financing in Pakistan (%)**



Source: WHO, 2010

Even when a person goes to a government hospital, he has to pay for various costs including user fees, as well as drugs and other items. Unofficial payments are also required to be paid especially in government facilities and hospitals (Malik & Syed, 2012). As more than one quarter of the population is below the poverty line of 1 US dollar per day, it may face catastrophic expenditures in the absence of health protection and may be pushed into the ‘medical poverty trap’ or either do not receive any care.<sup>2</sup> The social protection strategy (2005) reveals that healthcare expenses are responsible for more than 70 percent of the economic shocks incurred by poor households. Around two-thirds of the households were reported to be affected by at least one or two health shocks and faced catastrophic expenditures during the last three years.

As one of the goals of the health system is to provide financial protection to the people and to provide them with quality services without any discrimination. In Pakistan as OOP expenditures are very high which increases the likelihood of catastrophe, this study aims to

<sup>2</sup> Trends of poverty head counts in Pakistan are shown in Appendix Table B1.

examine the extent and determinants of catastrophic health expenditures in Pakistan on a national level. It is an in depth study that assess the impact of catastrophic health expenditures on current enrollment of school children and socio economic status of a household because it is expected that children who have been taken out from their schools due to poverty have very low chances of going back into the schools. Most importantly, the impact of health payments on poverty headcount and poverty gap has also been examined in this study. It will not only contribute to the literature but also help policy makers to target the vulnerable segment of the society that falls into poverty due to these high OOP payments.

### **1.3. Objectives of the Study**

The study aims to investigate the following four objectives:

- To analyze the incidences of catastrophic health expenditures across Pakistan;
- To analyze the determinants of catastrophic health expenditures;
- To examine the impact of catastrophic health expenditures on socioeconomic status of a household and child schooling; and
- To assess the poverty impact on health care payments (before and after OOP payments).

#### **1.4. Hypotheses of the Study**

The hypotheses of the study are as follows:

- Significant variation exists in Pakistan in terms of incidence of catastrophic health expenditures.
- Socio-economic factors significantly influence the catastrophic health expenditures.
- Catastrophic health expenditures have an impact on socioeconomic status of a household and child schooling.
- OOP health payments push additional number of people below poverty.

#### **1.5. Significance of the Study**

In Pakistan millions of people suffer annually from catastrophic expenditures due to high OOP payments, lack of insurance and weak health system and were pushed deeper into the vicious circle of impoverishment. Moreover, Pakistan is also facing double burden of disease, high fertility and rampant poverty that puts lot of pressure on limited health resources. Thus, in such a scenario it is important to understand the underlying reasons and explanations of catastrophic health expenditures and its impact on poverty in Pakistan. It is also important from policy and program perspective in two ways; firstly it provides essential insights by studying economic consequences of health shocks and secondly it helps in providing financial protection to the people and to ensure the distribution of services equitably among all groups of the society.



## **1.6. Organization of the Study**

The organization of this dissertation is as follows. It consists of six chapters. The first chapter introduces us with the topic including the importance of the study in Pakistani context, objectives, hypotheses and rationale of the study. The second chapter provides a comprehensive literature on catastrophic health expenditures by wrapping its measurement and definition issues. It also reviews its relationship with poverty in it. Then the literature on the impact of catastrophic health expenditures on child schooling has also been described. Further, the empirical literature on the determinants of catastrophic health expenditures has also been presented in this chapter. The third chapter first describes the sources of data and various methodologies used for the measurement of catastrophic health expenditures. The description of explanatory variables used in the analysis has also been mentioned in this chapter. The technique of PSM to analyze the impact of catastrophic payments on child schooling and household economic status has also been documented in this chapter. Moreover, the impact of health payments on poverty measures (gross and net OOP payments) has also been presented in this chapter. The results of the study comprises of two chapters. The fourth chapter describes the results of incidence and intensity of catastrophic health expenditures along with detailed bi-variate analysis of different socio-economic and demographic factors. In the penultimate chapter, multivariate analysis and results of PSM technique and poverty impact on OOP payments is given. Finally, chapter six concludes the overall dissertation with some policy implications and recommendations.

## **CHAPTER 2**

### **LITERATURE REVIEW**

There is ample literature to suggest that in developing countries there is high incidence of catastrophic expenditures that pushes millions of people into poverty annually (Rahman et al., 2013; Onwujekwe1, Hanson & Uzochukwu, 2012). Countries where risk pooling mechanisms are available people are protected from catastrophic effects of illness. Though, many low income countries lacked these mechanisms results in high OOP payments, asset depletion, loans, sacrifice of future productive investments and sometimes even financial catastrophe (Xu et al., 2007). The cost of ill health has long been a serious problem in USA for few decades ago but now it is a leading cause of impoverishment in developing countries (Whitehead et al., 2007; Naga & Lamiraud, 2008).

In this chapter, research literature on catastrophic health expenditures and its impact on poverty have been documented. Section 2.2 discusses the various definitional issues used to measure catastrophic health expenditures. Section 2.3 describes the detailed effects of catastrophic health expenditures. Section 2.4 discusses the impact of demographic and socio-economic factors on catastrophic health payments. Section 2.5 covers the literature on catastrophic payments and its relationship with poverty. Section 2.6 provides the extensive literature on the impact of catastrophic health expenditures on child schooling and the last section concludes the chapter.

#### **2.2. Catastrophic Health Expenditures: Incidences and Measurement**

OOP payments are one of the main causes of catastrophic health expenditures to occur (WHO, 2004). Usually, in countries where OOP spending is less, few households tend to

be affected by catastrophic expenditures (WHO, 2005; Bredenkamp, Mendola & Gragnolati, 2011). Comparison of eleven different Asian countries also shows that high OOP payments cause a large increase in poverty (Doorslaer et al., 2006). Another study shows that if OOP payments are less than 15 percent of the total health care spending, then few households will suffer from catastrophic payments<sup>1</sup> (WHO, 2005).

Not all high health care costs can be regarded as catastrophic. A large bill for cardiac surgery cannot cause economic burden for a family who can afford it or if its cost is bear by third party. On the other hand, less expenditure on even low cost disease can be financially disastrous for a poor family having no insurance coverage (Berki, 1986; Xu et al., 2003). However, there is no consensus on the single threshold of catastrophic spending (Wyszewianski, 1986; O'Donnell et al., 2008). In different studies, the threshold varies from 5-20 percent of total household income (Berki, 1986; Wagstaff & Doorslaer, 2003; O'Donnell et al., 2008) although many argued that it should be measure in relation to household's nonfood expenditure (Xu et al., 2003; Russell, 1996). Thus commonly used threshold is 40 percent when capacity to pay approach is used (Xu et al., 2007; Murray et al., 2003). However, all levels suggest that a household must reduce its expenditure on basic necessities when it spends a large amount of its budget on health care and have adverse effects on its livelihood (Chuma & Maina, 2012).

Catastrophic expenditure can occur in all countries of the world at different stages of development. Most of the countries of Organisation for Economic Co-operation and Development (OECD) have developed the financial risk pooling mechanisms gradually but still some households in these countries face catastrophic expenses. Many middle income

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<sup>1</sup> Figure C1 is shown in the appendix

countries still lacked the mechanisms to provide financial protection to people (WHO, 2005).

However, low income countries experience high OOP payments and lack risk-sharing mechanisms that pushes households into poverty, incur debts, selling of assets and reduction of basic necessities of life (Shahrawat & Rao, 2012; Xu et al., 2003; Wagsaff & Doorsaler, 2006; O'Donnell et al., 2008; Bonu, Bhushan & Peters, 2007).

### **2.3. The Effects of Catastrophic Health Expenditures**

High OOP payments have severe negative consequences. Due to rise in the cost of public and private health care facilities many families are pushed below poverty and a situation is created called as 'medical poverty trap'. The four main categories of the effects include untreated illness, reduced access to care, impoverishment and irrational use of drugs.

#### *i) Untreated illness:*

As rich people have financial resources they can spend on health care however, poor people due to meagre resources cannot afford the cost of treatment and thus remain untreated. Such people are at a higher risk of further deterioration in health. In Caribbean, around 20 percent people who suffered from illness did not seek treatment due to financial constraints (Theodore, 1999). Similarly in Kyrgyz Republic, patients were not get admitted into the hospitals as they could not afford high hospital costs (World Bank, 1999). In some rural areas of India, 17 percent people have reported illness but more than a quarter did not seek any care due to financial reasons (Iyer & Sen, 2000).

*ii) Reduction in the access to care*

Due to the introduction of user fees there is a decline in the utilization of health services. The Research Institute of Social Development of USA has written about user fees in these words “Of all measures proposed for raising revenue from local people this [user fees] is probably the most ill-advised”. The results of 39 developing countries have shown that user fees raises the revenues slightly but significantly reduces the access of poor people to basic health services (Sen & Koivusalo, 1998). Low-income people delay seeking care till emergency arises due to financial constraints (Tipping, 2000).

*iii) Long-term impoverishment*

As health expenditures are forced payments, people can buy care even if it affects their future welfare. The negative effects of medical expenditures are even greater than any other expenses because they are involuntary and total cost is not known even after treatment. The economic cost of ill health has long been a problem in Western countries but now it is a major problem in developing countries (Fu, 1999; WB, 1999; Gottlieb, 2000). In Dhaka, Bangladesh maternity care services have hidden charges that makes one-fifth of households to spend 50-100 percent of their income on maternity services (Nahar & Costello, 1998). Likewise in Vietnam, monthly wages of 2 months is equal to an average cost of hospital admission of a patient (Segall, Tipping & Lucas, 2000) and in rural China the cost rises up to seven months wages of poor people (Yu, Cao & Lucas, 1997).

In order to meet health care expenses, people usually borrow money and sell their productive assets. A study in two rural districts of Uganda have shown that around 40

percent of patients had obtained money for treatment not only by taking debt but also by working on others land or selling their cattle and agricultural land (McPake, Asimwe & Mwesigye, 1999). Similar patterns of loans are also found in other parts of world like China, Vietnam, Cambodia and Africa (Ensor & Pham, 1996; Prescott, 1997).

*iv) Irrational use of drugs*

In developing countries drugs are sold without any prescriptions by unqualified people who have financial incentives by over prescription that leads to an unnecessary and overuse of drugs. Medically they are not needed and hazardous for patient's health. In Maharashtra, India the analysis of prescriptions revealed that more than 50 percent prescriptions were irrational and unnecessary while 11 percent were harmful. Moreover 24 percent of cases were given unnecessary injections (Phadke, 1996). In India more than 50 percent OOP expenditure were spent on drugs and consultation fees (Iyer & Sen, 2000). Similarly, in Mexico's poor region 74 percent visits to health centers results in inadequate treatment or cure given by traditional healers or drug sellers (Briggs, 2000).

#### **2.4. The Determinants of Catastrophic Health Expenditures**

Various studies assess the determinants of catastrophic health expenditures. A study in Burkina Faso found that economic status, health care utilization of a household particularly for modern medicine, presence of illness in an adult household member and chronically ill members are the key determinants of catastrophic health expenditures (Su, Kouyate & Flessa, 2006). World Health Organization (2005) study shows that presence of an elderly, handicapped or chronically ill person in the household increases the likelihood to be

affected with catastrophic health expenditures as they usually have greater utilization of health services but they lack resources. Moreover, some studies suggested that lack of health insurance and use of inpatient or outpatient care are key factors in high OOP payments and catastrophic health expenditures (Kavosi et al., 2012; Onwujekwe, Hanson & Uzochukwu, 2012; Dror, Putten-Rademaker, & Koren, 2008; Cavagnero et al., 2006). Still others argued that insurance increases the risk of catastrophic spending (Wagstaff & Lindelow, 2008; Ekman, 2007).

The differences may exist between developed and developing countries in terms of factors affecting catastrophic health expenditures. For example two US studies revealed that households headed by older people, unemployed persons, people having disabilities or those having lack of access to insurance were more likely to be affected than other households (Merlis, 2002; Wyszewianski, 1986). However, in many low and middle countries, socio-economic status is defined as the key determinant of catastrophic payments (Chakraborty, 2011; Chuma & Maina, 2012; Pal, 2010; Xu et al., 2003; Rous & Hotchkiss, 2003).

Many studies have identified education to be an important determinant of catastrophic health expenditures. As education brings awareness and helps individuals in maintaining their health efficiently (Grossman, 1972). In a study of six Asian countries, it is observed that a household head having tertiary level education is associated with a 34-60 percent reduction in the probability of financial catastrophe (O'Donnell et al., 2005). It may be because education can be used as a proxy for future wealth as more education brings more income. As a result, it improves health because getting sick becomes costly with high level of education (Cowell, 2006).

Similarly, household size also affects catastrophic health expenditures. Along with it, household composition is also an important determinant. Presence of more number of children and elderly in the household increases the probability to spend more on health care (Cavagnero et al., 2006; O'Donnell et al., 2005; Pal, 2010). Likewise, living conditions also influence the health expenditures. Healthy environment leads to good health and reduces the expenditures on health (Rous & Hotchkiss, 2003). Findings of Parikh, Biswas and Karmakar (2003) also reveals that using solid cooking fuels for long time increases the chances of getting disease.

Households living in urban areas exert a negative effect on the incidence of catastrophic spending as people living in rural areas face difficulties in terms of accessibility of services. Travelling cost also increases their health expenditures (WHO, 2010; O'Donnell et al., 2005; Pal, 2010). Moreover, the findings of some studies show that more use of private sector for health treatment as compared to public sector leads to high incidence of catastrophic health expenditures (Onwujekwe, Hanson & Uzochukwu, 2012; Damme et al., 2004; Rous & Hotchkiss, 2003).

However, households adopt a combination of different strategies to finance OOP payments in developing countries including the use of savings, borrowing money selling assets to ignoring illness and non-treatment (Damme et al., 2004; WHO, 2010; McIntyre & Thiede, 2003; Sauerborn, Adams & Hien, 1996).<sup>2</sup>

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<sup>2</sup> Figure C3 is shown in Appendix.



## 2.5. Catastrophic Health Expenditures and Poverty

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

*-Poor woman, Zawyet Sultan, Egypt*

Health care payments are one of the major causes of impoverishment (Doorslaer et al., 2006). A World Bank study (2000) shows that after illiteracy and unemployment, health care expenditures are one of the most important determinants of poverty. Findings of another study in rural India reveals that illness and health care expenses are one of three main factors responsible for 85% of all cases of impoverishment (Krishna, 2004).

Developing countries like Pakistan, India, Bangladesh and Vietnam bear some of the highest burdens of OOP expenditures for health (Malik & Syed, 2012; WHO, 2010; Doorslaer et al., 2007). As a result health impoverishment is very significant in these countries affecting a large number of people (Doorslaer et al., 2006). Estimates from various studies have shown that annually 32–40 million people are pushed into poverty due to health expenditures in India alone (Bonu, Bhushan & Peters 2007; Doorslaer et al., 2006; Garg & Karan, 2009).

Similarly, another study by Shahrawat and Rao (2012) in India shows that overall 5 percent households suffer from catastrophic health expenditures and 3.5 percent of the population falls below poverty line. The impact of OOP spending is pronounced for poor people. However, medicines constitute the major share (72%) of total OOP expenditures and if removed then only 0.5 percent people fall below poverty due to spending on health. Garg and Karan (2009) in their state level analysis in India also found medicines as major

component (70%) of OOP health expenditures. However, Bredenkamp, Mendola and Gragnolati (2011) in their recent study in six Western Balkan countries<sup>3</sup> found transportation costs as a main constitute of total health expenditures in Albania and Serbia while informal payments are significant in all countries but particularly severe in Albania. Moreover, the results of Rajshahi city (Bangladesh) study shows that on average households spent 11 percent of their total budget on health care and around 9 percent of households suffered from financial catastrophe. Poor households tend to spend less on health but faces a four times higher risk of catastrophe as compared to the rich households. Furthermore inpatient, outpatient, public and private facilities users suffer more from catastrophic payments than users of self-medication and traditional healers (Rahman et al., 2013).

A number of empirical studies in Asia and Latin America have explored that health expenditures exacerbate poverty. One such study on health expenditures in 11 Asian countries by Doorslaer et al. (2006) reported that about 78 million people, which are almost 3 percent of the population of these 11 low to middle-income countries fell below the extreme poverty threshold of \$1 per day due to direct health care costs. In Vietnam, results revealed that out-of-pocket payments would raise the poverty from 15 to 18.4 percent if using a food-based poverty line (Wagstaff & Doorslaer, 2003). Similarly, in Pakistan due to OOP expenses the poverty rate would increase by a rate of 6 percent if using a \$2.00 per day measure and 17 percent if using a \$1.25 per day measure (WB, 2012).

The World Bank's poverty based study '*Voices of the Poor*' in 50 countries reported the case of a 26 year old Vietnamese man who becomes poor from being the richest man in his

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<sup>3</sup> The study includes countries Albania, Bosnia, Herzegovina, Montenegro, Serbia and Kosovo.

community due to the large health care spending on his daughter severe illness. Another case was of 30 year old woman, mother of four children who has been compelled to sell all the family's property and carrying wood on her head by walking ten kilometers daily in order to pay the medical cost of her diabetic husband.

Another study conducted in 59 countries shows that those households who incurred catastrophic expenses varied widely between countries. It ranges from less than 0.01 percent in Slovakia and Czech Republic to 10.5 percent in Vietnam<sup>4</sup>. The countries which are in transition like Azerbaijan, Ukraine, Cambodia and some Latin American countries have high rates of catastrophic expending. The empirical results also reveals that a 1 percent increase in the proportion of total health expenditure due to out-of-pocket payments is associated with an average 2.2 percent increase in the proportion of households incurring catastrophic payments (Xu et al., 2003).

Similarly, a study of 89 countries found that 3 percent households in low income countries, 1.8 percent in middle income countries and 0.6 percent households in high income countries incur catastrophic expenditures (Xu et al., 2007). In another study, by using National Sample Survey (NSS) data in India Peters et al. (2002) showed that the national poverty line can be lowered by 2.2 percent if OOP payments are deducted from household expenditures. It is also found that one fourth of patients were become poor due to the hospitalization cost and in order to make these payments people incur debts and sell their assets in a large number.

For few African countries, studies considering the levels of catastrophic health expenditures are also documented. In Burkina Faso, 6-15 percent of households incur catastrophic health expenditures even with low level of health expenditures (Su, Kouyate

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<sup>4</sup> Figure C2 is shown in Appendix.

& Flessa, 2006). However, in Uganda, 2.9% of households faced financial catastrophe in 2003 (Xu et al., 2006). In Kenya, using different thresholds, Chuma and Maina (2012) estimates the incidence and intensity of catastrophic health expenditure for both outpatient and inpatient care and found that every year, Kenyan households spend one tenth of their budget on health care expenditures. The burden of out-of-pocket payments is highest among the poor. About 1.48 million Kenyans are pushed below the poverty line due to health costs.

In Nigeria, around 27 percent of households incurred catastrophic health expenditures higher among poor and rural residents (Onwujekwe, Hanson & Uzochukwu, 2012). In Cambodia, even low level of out-of-pocket health payments frequently causes indebtedness that leads towards poverty (Damme et al., 2004).

## **2.6. Catastrophic Health Expenditures and Child Schooling**

The numerous repercussions of health shocks include deteriorating health outcomes weakening of economic stability of a household and curtailing children education. In order to meet health care expenses, people reduce their consumption of essential items like food, clothing and housing etc. In such scenario, withdrawal of children from schools is a common strategy adopted especially when priority is given to health care (Caneiro & Heckman, 2002). In developing countries many households reduce their consumption of education due to the income constraints, primarily when they have limited or no assets and they have to pay for health care services (Kremer, 2003). As a result of the low financial protection for health in low and middle income countries not only health outcomes are worsening but also economic instability and low enrollment rates of children in schools can be seen in families incurring catastrophic health payments (Senne, 2014).

There is ample research on the effect of health sufferings on children schooling decisions in industrialized countries like Norway, USA and Italy (Johnson & Reynolds, 2011). The researchers found that sudden health calamity in a household increase the probability of leaving education for teenagers residing in the household. Furthermore, students belong to the affected households are also unlikely to complete their degrees as family suffering from catastrophic payments. Thus, the health shocks not only affect the wellbeing of a person or a household but also affect the schooling of children (Johnson & Reynolds, 2011; Beegle, Weerdt & Dercon, 2007). Under these circumstances, the reductions in the human capital formation can be expected to be devastated for the country's economy in the long run (Banerjee & Duflo, 2007).

However, little research has been found on the impact of catastrophic payments on child schooling in developing countries. A study done by Fallon and Lucas (2002) on Southeast Asian countries reveals that children belong to poor households experience a decline in school enrollment rates due to high catastrophic health payments. In Indonesia, there is an overall decline in school enrollment rates and an increase in dropout rate particularly among the poor youth of 13 to 19 years old. Similarly, in Mexico similar results were observed, during debt crisis in 1982 secondary school enrollment rates were found lower as compared to the primary enrollment rates. This means that youth in secondary schooling were more affected by the crisis as compared to the children between 6 and 12 years of age.

## **2.7. Conclusion and Research Potential of the Study**

Various studies around the world have reviewed the incidence and determinants of catastrophic health expenditures. As OOP payments are a dominant mode of health financing in many countries but its proportion in total health expenditures is higher in low and middle countries. Annually millions of people are pushed below poverty due to these health payments. They not only create economic burden for patients and families but also undermines the income of a household. People usually borrow money, sell their productive assets and withdraw their children from schools in order to meet health expenses. These findings suggest that catastrophic health expenses have severe negative effects on economic welfare of a household. Similarly, there are many other factors that determine the catastrophic health expenditures. Socio economic status of a household is one of the key factors as some studies have found that poor households due to lack of resources are more vulnerable to medical poverty trap.

There are few studies in Pakistan that analyze the incidence and determinants of catastrophic health expenditures (Malik, 2011; Malik & Syed, 2012; WB, 2012) but according to my knowledge no single study in Pakistan has analyzed the impact of catastrophic health expenditures on school enrollment of children and poverty status of a household. The current study will contribute to fill this research gap and also helps policy makers to formulate an effective health policy.

## CHAPTER 3

### DATA SOURCES AND METHODOLOGY

As detailed in section 1.3, the objectives of the study are to analyze the incidences of catastrophic health expenditures, to find the determinants of catastrophic health expenditures, its worsened impact on poverty and child schooling and to assess the poverty impact on health care payments (before and after OOP payments) in Pakistan. The hypothesis of the study is that there is high incidence of catastrophic health expenditures in Pakistan that pushes the households into poverty and also effects the school enrollment of children. Keeping in view the importance of catastrophic health expenditures, the present study is undertaken to understand the phenomenon of medical poverty trap by especially focusing the poor households that fall into poverty due to health payments. It will help both the health planners and policy makers to make better decisions regarding the equitable distribution of health services to the people.

This chapter describes the data sources and methodological framework to examine the incidences, determinants and worsen impact of catastrophic health expenditures in Pakistan. Section 3.2 presents the complete description of data while section 3.3 first discusses in detail the measurement issues of catastrophic health expenditures and then describes the explanatory variables used in the analysis. Section 3.4 describes the technique of PSM applied to analyze the impact of catastrophic health expenditures on household economic status and child schooling. Section 3.5 explains the methodology for estimating the poverty impact on OOP payments. The last section concludes the chapter.

### 3.2. Data Source and Sampled Population

The data for this study is taken from Pakistan Panel Household Survey (PPHS) conducted by PIDE in 2010. It is the third round of the survey as the first two were conducted in 2001 and 2004 respectively. The survey carried out in 16 districts<sup>8</sup> representing all the four provinces of Pakistan (Nayab & Arif, 2012). However, it is worth mentioning that previous two surveys had not covered the urban sample but in PPHS 2010 urban sample is also added. The total rural households interviewed were 2800<sup>9</sup> and the number of urban households was 1342 makes the total sample size up to 4142 households. The detailed distribution of households within the provinces is mentioned in Appendix Table B2.

The scope of PPHS 2010 is wide. It provides information on various socio-demographic and economic issues. Modules regarding shocks, subjective wellbeing, food security and overall security situation were also part of it. As special focus of this survey is to see the transition of households into and out of the poverty so all the three rounds of the survey have included the detailed consumption modules in it including the information of food and non-food expenditures. Two separate questionnaires for males and females were prepared and health module is part of female questionnaire. In health section detailed questions have been asked about access to health facility, any illness/injury in the household during last year, woman's reproductive health, birth history, immunization and children's health status. It is the latest available dataset meeting all the requirements for the desired analysis.

The information about the status of school enrollment of children is also available in PPHS dataset to analyze the impact of catastrophic health expenditures on child schooling. The

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<sup>8</sup> Attock, Hafizabad, Faisalabad, Vehari, Muzaffargarh, Bahawalpur, Larkana, Nawabshah, Mirpur Khas, Badin, Gawadar, Khuzdar, Loralai, Lakimarwat, Mardan, Dir

<sup>9</sup> Out of 2800 households, 2198 are panel households and the remaining 602 are split households.



ongoing study has borrowed the micro poverty series from Arif and Shujaat (2014) who have estimated the poverty headcount at household level for all the three rounds of PPHS by following the official methodology in which the expenditures of both food and non-food items were used.<sup>10</sup>

Health module of illness and injury gather information from all the individuals of households who get any illness/injury during last one year. The out of pocket payments (OOP) were recorded in three questions in this module which cover the information on consultation fee for doctor, treatment cost or expenditure on medicines and hospitalization/diagnostic tests charges etc. at individual level. They can be combined together to get the annual expenditure or OOP of households on health as the recall period of health expenditure was one year in all these three questions. Though the information of health expenditures is available at individual level, however it is aggregated at household level by sum up individual annual health expenditures. The information on health expenditures of some households was not available and they were excluded from the analysis thus restrict the sample to 3197 households. Out of these sampled households, 69 percent belong to rural areas while the rest 31 percent belong to urban areas. About 45 percent of the households belong to province Punjab, followed by 29 percent from Sindh, 15 percent from Khyber Pakhtunkhwa and 11 percent from Baluchistan. (Detailed sample profile is given in Appendix Tables B3, B4 and B5).

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<sup>10</sup> The Planning Commission of Pakistan measured official poverty line by using the Pakistan Integrated Household Survey (PIHS) 1998-99 dataset, based on 2,350 calories per adult equivalent per day.

### 3.3. Definition and Measurement of Catastrophic Health Expenditures

The health expenditures become “catastrophic” if they constitute a large share of household budget and affect the household’s ability to maintain its standard of living (O’Donnell et al., 2008; Pal, 2010). Another common approach has been to define health expenditures as catastrophic if it exceeds the predefined limit of household income or total expenditure in a given time period (Xu et al., 2003; Berki, 1986; Wagstaff & Doorslaer, 2003). Thus catastrophic health expenditures can be defined as

$$M = H / TE * 100$$

M= percentage share of health expenditure in total household income/expenditures

H= household expenditure on health

TE= total income/expenditures of a household

The idea behind is that spending large amount of money on health care is must be at the sake of the consumption of other essential goods and services. Thus, according to Russel (1996), this approach deals with the opportunity cost of health payments.

The level of threshold is set arbitrarily in the existing literature. In different studies it ranges from 10 percent to 40 percent (Pradhan & Prescott, 2002; Berki, 1986). Although, the most commonly used level of threshold is 10 percent when total expenditure is used as the denominator. However, dealing with both rich and poor at the same threshold level lead to some problems. As rich households have more resources to spend on health, thus they are more likely to exceed the threshold as compared to poor households (Wagsaff & Doorslear, 2003). In short run, they can reduce their consumption of luxury items but poor households have to abandon essential consumption in order to bear OOP payments for health care (Russel, 1996). Thus, it is really difficult to infer whether a household is incurring a financial catastrophe, despite OOP spending is above the threshold level.

Therefore, it has been argued that OOP expenditures can be defined in terms of household's capacity to pay (Xu et al., 2003). It is referred to as share of health expenditure net of food spending or spending on basic necessities of life. Commonly researchers have used 40 percent threshold when ability to pay approach is used (Xu et al., 2003; O'Donnell et al., 2008). However, this criterion also leads to conclusion that a poor household has higher ability to pay as compared to a household who is above the subsistence level (Wagstaff, 2008).

Moreover, both of these approaches consider OOP health payments as involuntary and have negative impact on the welfare of the household (O'Donnell et al., 2005; Pal, 2010; Wagstaff, 2008). Despite there are some weaknesses, the above two measures can be used for comparison across countries or societies. They gave insights about catastrophic expenditures to evaluate the financial protection provided by health systems of different countries (Su, Kouyate & Flessa, 2006; Thuan et al., 2006; Pal, 2010).

The study also uses both total expenditures of a household and nonfood expenditures to define catastrophic health expenditures.

### ***3.3.1. Incidence and Intensity of Catastrophic Health Expenditures***

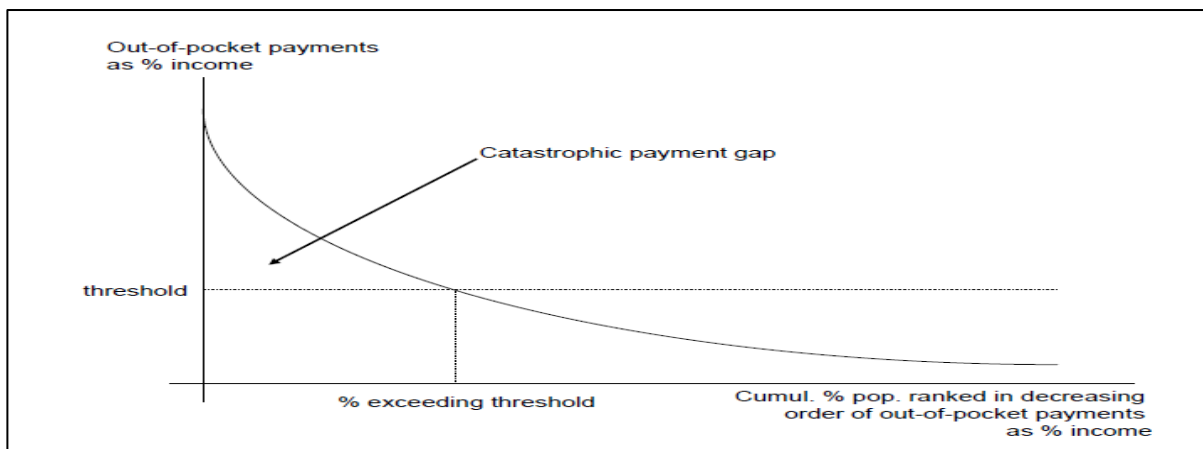
Suppose  $T$  would be OOP expenditures on health care,  $x$  is total household expenditure or  $y$  is nonfood or non-discretionary expenditure. Then a household would incur catastrophic expenditures if  $T/x$  or  $T/[x-y]$  would exceed the defined threshold,  $z_{cat}$ . The value of  $z_{cat}$  represents the point at which further expenses on health care forces a household to sacrifice its other basic necessities, borrowing money, sell assets or descent into poverty. The incidence of catastrophic expenses can be estimated from the number (or fraction) of

individuals in the sample whose health payments as a share of their total income (or nonfood expenditure) exceeded the specified threshold. In Figure 3.1 the horizontal axis shows the cumulative share of households arranged by the ratio  $T/x$  in decreasing order. By reading off the graph at the threshold point  $z_{cat}$ , one gets the fraction  $H$  of households whose health expenditures as a proportion of their total income exceeded the threshold  $z_{cat}$ . This is the *catastrophic payment headcount*. It is equal to:

$$H = 1/N \sum_{i=1}^N E_i \quad (3.1)$$

An indicator,  $E$  equals to 1 if  $T_i/x_i > z_{cat}$  and zero otherwise, where  $N$  is the sample size.

**Figure 3.1: Catastrophic Spending Gap**



Source: Wagstaff & Doorslaer, 2003

However, this measure does not capture the height by which households actually exceeding the threshold. For this purpose, another measure *catastrophic payment gap* has been developed. It shows the average amount by which OOP payments (as a proportion of total income) exceed the threshold. It is measured as:

$$CPG = 1/N \sum_{i=1}^N O_i \quad (3.2)$$

Where  $O_i = E_i[(T_i/x_i) - z_{cat}]$ . In the figure, it is the area shown under the curve but above the threshold line.

However, both incidence (H) and intensity (O) are related through mean positive overshoot which is defined as follows:

$$MPO = O/H \quad (3.3)$$

Our study also defines the incidence and intensity of catastrophic health expenditures at various thresholds of 5%, 10%, 15%, 25%, 30% and 40% of both total expenditures of a household and nonfood expenditures. For this purpose, both total expenditures of a household and nonfood expenditures are used. First the share of health payments in total household income is obtained by dividing health expenditures with total household expenditures and then health expenses are divided with nonfood expenditures to get their share in nonfood consumption expenditures.

### ***3.3.2. The Determinants of Catastrophic Health Expenditures***

In order to analyze the determinants of catastrophic health expenditures, this study uses the two most commonly used cut points in literature i.e.

- a) Catastrophe-1: OOP payments over 10% of total household expenditure
- b) Catastrophe-2: OOP payments over 40% of nonfood consumption expenditure

As suggested by the empirical findings, the catastrophic health expenditures are influenced by many socio-economic and demographic factors. Studies indicated that health status appears to be an important determinant of catastrophic payments. However, in most surveys data on health status does not exist. Therefore, composition of household can be

used as proxy for health care needs of household members (Pradhan & Prescott, 2012). As children and elderly are more susceptible to ill health and more number of children and elderly in the household results in larger spending on health care (Cavegnaro et al., 2006). Similarly, household size also affects catastrophic payments. Larger family size means higher will be the probability of someone being ill. Further if the disease is transmittable, then there will be chances that more persons will be sick in larger household. Thus, household size positively affects the catastrophic health expenditures (O'Donnell et al., 2005; Rous & Hotchkiss, 2003; Pal, 2010). However, larger household size also provides more informal carers that can replace formal care and thus contain the medical costs (O'Donnell et al., 2005). Studies indicated that presence of any chronic illness or handicapped person in the household is one of the major reasons of catastrophic health expenditures (Su, Kouyate & Flessa, 2006; WHO, 2005). Likewise, medical expenses due to the hospitalization of any household member also lead to catastrophic expenditures (Cavegnaro et al., 2006; Damme et al., 2004). Moreover, living conditions also influence health expenditures through health risks (Rous & Hotchkiss, 2003; O'Donnell et al., 2005). It is captured by using indicators of access to safe drinking water and toilet facilities in different studies.

Place of residence is another characteristic that influences health expenditures. It determines the availability and accessibility to services regarding health and other aspects of life. More concentration of health facilities in urban areas raises their utilization while rural areas face difficulty in terms of availability of services. Travelling cost also increases catastrophic expenditures for rural areas although they are often not documented in the data (O'Donnell et al., 2005; Pal, 2010). Health expenditures also vary across different

provinces due to differences in geography, culture, norms and health services utilization pattern.

Similarly, gender and age of household head also likely to influence catastrophic health expenditures. As studies indicated that female headed households have higher chances of incurring catastrophic expenditures as compared to male headed households (Cavegnaro et al., 2006; Okunade, Suraratdecha & Benson, 2009).

Another important variable that affect catastrophic health expenditures is education. As more education brings more money and increases the households capacity to pay for health care (Pal, 2010). Studies indicated that household heads having higher education are less likely to incur catastrophic expenditures (Okunade, Suraratdecha & Benson, 2009; O'Donnell et al., 2005; Cavegnaro et al., 2006). Similarly, working status of household head also affects OOP health expenditures (O'Donnell et al., 2005; Cavegnaro et al., 2006).

To find out the effect of these determinants, this study has undertaken both the bi-variate and multivariate analysis to examine the relationship between a set of independent and dependent variable. After the bi-variate analysis, the following equations have been used for multi-variate analysis:

$$CHE1_i = \alpha_0 + \alpha_1 Ch_i + \alpha_2 Ed_i + \alpha_3 El_i + \alpha_4 X_i + \mu_i \quad (3.3)$$

$$CHE2_i = \alpha_0 + \alpha_1 Ch_i + \alpha_2 Ed_i + \alpha_3 El_i + \alpha_4 X_i + \mu_i \quad (3.4)$$

Equation 3.3 and 3.4 measures the determinants of catastrophe-1 and catastrophe-2 respectively where the dependent variable represents the incidence of catastrophe. It is dichotomous in nature with two outcomes and its range varies from 0 'households do not

face catastrophe' to 1 'households who experienced catastrophe'. Therefore, the Binary Logistic Regression has been applied to estimate the correlates of catastrophe-1 and catastrophe-2. The details of Binary Logistic Regression have been given in Appendix A1. On the right hand side of the two equations,  $Ch_i$  represents the presence of child in a household,  $Ed_i$  denotes the education status of household's head and  $El_i$  is the presence of an elderly in the household.  $X_i$  represents the vector of other control variables which include working status of household's head, household size, region, presence of any disability in the household and other socio-demographic and economic characteristics of households.

### ***3.3.3. Explanatory Variables of Catastrophic Health Expenditures***

The explanatory variables are composed of a set of demographic and socio-economic variables. The selection of these variables is based on theoretical knowledge, data availability and prior studies on catastrophic health expenditures. The following independent variables have been included to find out the determinants of catastrophe-1 and catastrophe-2 for equation 3.3 and equation 3.4. At broad level, these independent variables have been divided into three groups named as household characteristics, individual characteristics and regional variables.

#### **Household characteristics**

##### *Presence of child/elderly at home:*

In the study, the variables have been categorized as presence of child/elderly at home vs. no elderly and child at home.

##### *Household size:*



In PPHS survey, household size has been given as a continuous variable, from which it has been grouped into three categories i.e. zero to five members, six to 10 members and 11 or more family members.

*Chronic illness/disability:*

The study has divided this variable into two categories i.e. presence of illness/disability in the household or not.

*Hospitalization status of a household member:*

In the study, it is classified into two categories i.e. any household member hospitalized or not.

*Access to safe drinking water and toilet facilities:*

For the analysis, the variables have been grouped into two categories as households having access to safe drinking water/toilet facilities or not.

**Regional Variables**

*Place of residence:*

This variable is categorized as rural and urban areas for the analysis.

*Provinces:*

This study has used the four provinces which are Punjab, Sindh, Khyber Pakhtunkhwa and Baluchistan.

## **Individual Characteristics**

### *Age of household head:*

In the study, the age of household head has been grouped into three categories i.e. less than twenty five years, twenty five to forty and forty one years and above.

### *Education of household head:*

The study has measured the education status of household head into two levels; no education and some education including primary and higher education.

### *Working status of household head:*

This variable is categorized as household head currently working vs. non-working.

## **3.4. Impact of Catastrophic Health Expenditures on Poverty and Child Schooling**

In order to analyze the impact of catastrophic health expenditures on household economic status (poverty) and child schooling, propensity score matching (PSM) technique is applied. The variable of child schooling aged 5-14 years have been taken for this purpose and it is classified into two categories i.e. children currently enrolled in schools vs. not enrolled in schools. Likewise the household is defined as poor whose per capita consumption expenditure is below the defined poverty line of Rs. 1671.89 per adult per month where as those households whose per capita consumption expenditures are above the defined poverty line they are classified as non-poor.

By using PSM it is examined whether households who incurred catastrophic health expenditures have higher levels of impoverishment and greater number of children

currently not attending schools than control households. (The comparison of PSM with other methods is mentioned in Appendix A2). Here PSM technique is most suitable to apply because rich due to availability of resources have more health expenditures as compared to poor people, thus it is inappropriate to compare poor households with rich households otherwise it will create the problem of selection bias. So in order to solve this problem, PSM method is developed by Rosenbaum and Rubin (1983).

The basic idea is to find a comparison group similar in characteristics to the treated group (catastrophe incurring group) in all aspects except one that is the comparison group does not incur catastrophic health expenditures. The method actually balances the observed covariates between the incurring (catastrophic) group and non-incurring group based on the similarity of their predicted probabilities of facing catastrophic health expenditures — named as their propensity scores<sup>11</sup> (Ravillion, 2003).

As mentioned before, there are two groups identified i.e. households who incurred catastrophic health expenditures and those who do not. In PSM analysis, the former one is called as ‘treated units’ and the latter one as ‘non-treated units’ and they are matched to each other on the basis of their propensity scores

$$P(X_i) = \text{prob}(D_i = 1 | X_i) = E(D | X_i) \quad (1)$$

where

$$P(X_i) = F(h(X_i))$$

$F(h(X_i))$  can have a normal or logistic cumulative distribution.

$D_i = 1$  if the household is facing catastrophic expenditures and 0 otherwise.

$X_i$  is a vector of pre-treatment characteristics.

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<sup>11</sup> Detailed steps of PSM are in Appendix A3.

According to Rosenbaum and Rubin (1983) the following two conditions must be satisfied before estimating *the Average Treatment on the Treated* (ATT) effect based on the propensity score:

i. *The Balancing Hypothesis:*

$$D_i = X_i \mid p(X_i) \quad (2)$$

It means that values with the same propensity score, the pre-treatment characteristics must be same for both treated and control groups. In other words, conditional on the propensity scores, the exposure to treatment for both treated and non-treated groups should be almost identical as in a randomized experiment.

ii. *Unconfoundedness with a given propensity score:*

$$\begin{aligned} Y_1, Y_0 &= D_i \mid X_i \\ &= D_i \mid p(X_i) \end{aligned} \quad (3)$$

If assignment to treatment is unconfounded conditional on the variable's pre-treatment, then assignment to treatment is unconfounded given the propensity score.

Once the propensity scores are calculated by using equation (1), the Average Treatment on the Treated (ATT) effect is estimated as follows:

$$\begin{aligned} \text{ATT} &= E(Y_{1i} - Y_{0i} \mid D_i = 1) \\ &= E(\text{ATE} \mid D_i = 1) \\ &= E\{E(Y_{1i} - Y_{0i} \mid D_i = 1, p(X_i))\} \\ &= E\{E(Y_{1i} \mid D_i = 1, p(X_i)) - E\{E(Y_{0i} \mid D_i = 0, p(X_i)) \mid D_i = 1\}\} \end{aligned} \quad (4)$$

where

$Y1i$  is the potential outcome if the household is treated and

$Y0i$  is the potential outcome if the household is not treated.

However, this effect is not immediately obvious as propensity score is a continuous variable. In order to solve this problem, four different methods have been suggested in the literature: (i) Nearest Neighbour (NN) matching, (ii) Kernel matching, (iii) Stratification matching and (iv) Radius matching (RM) (Becker & Ichino, 2002).

The simplest of all methods is NN method in which matching occurs between each treated unit and the controlled unit having closest propensity score. The method is generally utilized with replacement in the control units. In the second step the difference of each pair of matched unit is calculated and then ATT as the average of all these differences is obtained. Although, in NN method each treated unit finds a match but it is not necessary that it should be the best one. This problem can be solved by defining a neighborhood in which a control unit can be considered a match. It is called as Radius Matching method. Thus the ATT effect for both nearest neighbor and radius matching is obtained as follows:

$$\begin{aligned}
 ATT^N &= \frac{1}{N^T} \sum_{i \in T} \left[ Y_i^T - \sum_{j \in C(i)} w_{ij} Y_j^C \right] \\
 ATT^N &= \frac{1}{N^T} \left[ \sum_{i \in T} Y_i^T - \sum_{i \in T} \sum_{j \in C(i)} w_{ij} Y_j^C \right] \quad (5) \\
 &= \frac{1}{N^T} \sum_{i \in T} Y_i^T - \frac{1}{N^T} \sum_{j \in C} w_j Y_j^C
 \end{aligned}$$

where the weights  $w_{ij}$  are defined as:

$$w_{ij} = \frac{1}{N_i^C} \text{ if } ..j \in C(i) \text{ and } ..w_{ij} = 0 \text{ otherwise}$$

and

$C(i) = \min_j \| p_i - p_j \|$  for the nearest neighbour matching method

$C(i) = \{p_j \mid \| p_i - p_j \| < r \}$  for the radius matching method

In third method that is the kernel method, all treated units are matched with a weighted average of all control units by using weights that are inversely proportional to the distance between propensity scores of treated and non-treated units. The ATT is calculated as:

$$\begin{aligned} \text{ATT}^k &= \frac{1}{N^T} \sum_{i \in T} \left\{ Y_i^T - \frac{\sum_{j \in C} Y_j^C G\left(\frac{p_i - p_j}{h_n}\right)}{\sum_{k \in C} G\left(\frac{p_k - p_i}{h_n}\right)} \right\} \\ &= \frac{\sum_{j \in C} Y_j^C G\left(\frac{p_i - p_j}{h_n}\right)}{\sum_{k \in C} G\left(\frac{p_k - p_i}{h_n}\right)} \end{aligned} \quad (6)$$

Where  $G(\cdot)$  is a kernel function and  $h_n$  is a bandwidth parameter. In the stratification method, the range of variation of propensity score is divided into intervals such that within each interval, treated and non-treated units on average have same propensity score. Within every interval, the difference among average outcomes of both treated and untreated observations are calculated as follows:

$$\text{ATT}_q^s = \frac{\sum_{i \in I(q)} Y_i^T}{N_q^T} - \frac{\sum_{j \in I(q)} Y_j^C}{N_q^C} \quad (7)$$

Where  $I(q)$  is the set of units in block  $q$  whereas  $N_q^T$  and  $N_q^C$  are the numbers of treated and control units in block  $q$ . The ATT in the Stratification Matching method is computed as follows:

$$\text{ATT}^s = \sum_{q=1}^Q \tau_q^s \frac{\sum_{i \in I(q)} D_i}{\sum_{\forall i} D_i} \quad (8)$$

However, the weight of each block is given by the corresponding fraction of treated units and  $Q$  is the total number of blocks.

Now this above mentioned methodology is applied to the data set. In the first step, propensity scores are estimated by using Equation 1, where the dependent variable is the household's status as a catastrophic incurring group and a non-incurring group. The right hand side of equation 1 includes three sets of explanatory variables that is a household's major reason of incurring catastrophic health expenditures: (i) Household characteristics, including household size, composition of household members, presence of chronic illness or disabled person in the household and hospitalization status of a sick household member and distance to health facility (ii) regional characteristics includes province, region, access to safe water and sanitation, (iii) individual characteristics, including education and working status of household head or gender and age of household head. As dependent variable is dichotomous in nature with two outcomes—incurring catastrophic health expenditures and do not incurring catastrophic health expenditures. Thus, binary logistic regression is applied to estimate the determinants of incurring catastrophic expenditures whereas non-incurring group is used as the reference category.

After estimating the propensity scores, the ATT is computed. In addition, to make the working sample more comparable, the sample values are restricted to those units with probabilities that lie within the region named as the *common support*—it is the area that contains enough control and treatment observations (Dehejia, 2005). It means excluding those treatment or control observations that have not comparable values.

### **3.5. OOP Payments and Poverty Analysis**

In order to analyze the impact of OOP health payments on household well-being, two methodologies are commonly used: (i) measuring incidence and intensity of catastrophic health expenditures and (ii) the effect of OOP health expenditures on poverty headcount and poverty gap measures (Bredenkamp, Mendola & Gragnolati, 2011; O'Donnell et al., 2008). However, one limitation of catastrophic approach is that it does not provide information of how much 'catastrophic' spending actually causes hardship. Households that are well-off spending even more than 25 percent of their income on health may not be pushed into poverty while others might have spent only 1 percent of their income and yet come below poverty line. Another perspective to catastrophic health expenses is that of impoverishment. The idea behind is that no one should be slipped into poverty—or further into poverty—due to health care payments (Wagstaff, 2008; Wagstaff & Doorslaer, 2003). These two approaches capture different dimensions of financial protection. The first emphasizes on the extent to which households are able to protect themselves against financial loss occurring due to health payments. On the other hand, the second methodology focuses primarily on impoverishment. It examines the effect of OOP payments on the depth and incidence of poverty by looking how households are pushed below poverty line due to OOP payments (Bredenkamp, Mendola & Gragnolati, 2011).

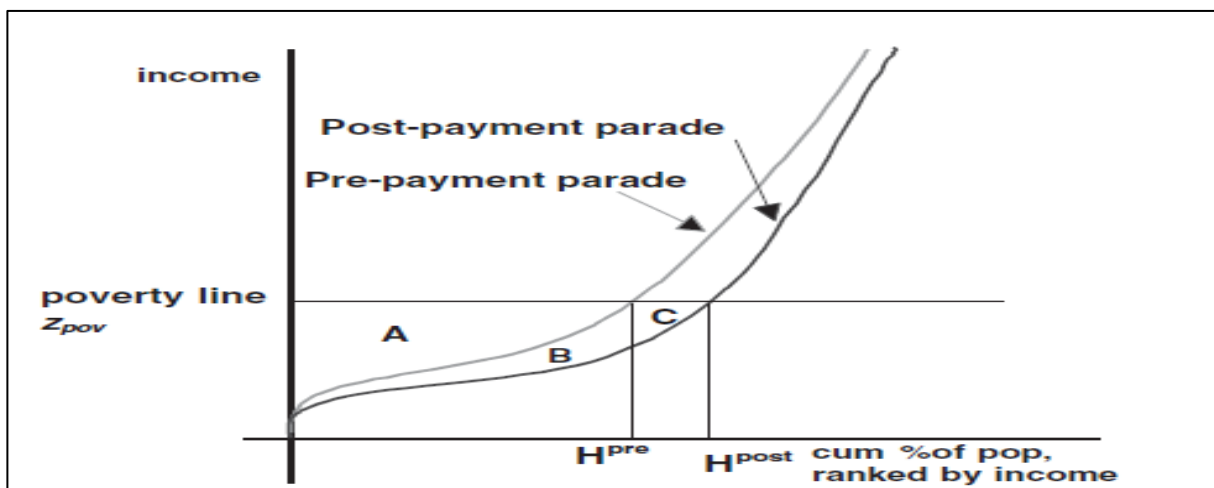
#### **Poverty Impact**

In this study for estimating the poverty impact on OOP payments, the standard methodology is used. It is proposed by Wagstaff and Doorslaer (2003). It is calculated as the difference in poverty levels before health care payments (i.e. gross of OOP expenditures) and after paying for health care (i.e. net of OOP expenditures). It is



illustrated by Figure 3.2 which provides a simple framework to study the impact of OOP expenditures on two poverty measures that is *poverty headcount* and *poverty gap*. The figure is a variant on Jan Pen's parade graph. The two parades plot household income (expenditure) pre and post OOP payments along the y-axis against the cumulative percentage of individuals ranked by expenditure on the x-axis. The point on the x-axis where each parade intersects the poverty line, gives the fraction of people living below poverty. It is called as *poverty headcount ratio* while the area below the poverty line but above each parade is known as *poverty gap*. It actually measures the 'depth of poverty' which poverty headcount is unable to capture.

**Figure 3.2: Poverty Impact on Pen's Parade— before and after health payments**



Source: Wagstaff & Doorslaer, 2003

**(i) Measuring Incidence and Intensity of Poverty Impact**

Suppose  $z_{pov}$  is the poverty line before OOP payments (which may be different from poverty line after OOP payments)  $T_i$  is per capita household expenditure on health and  $x_i$  is the per capita expenditure of a household. Then a poor person or household is defined as

$pi^{pre} = 1$  if  $x_i < z^{pre}$  and zero otherwise. Then ‘pre-payment poverty headcount’ is expressed as:

$$H^{pre} = 1/N \sum_{i=1}^N pi^{pre} \quad (1)$$

Where N is the sample size. Similarly, the ‘post-payment poverty headcount’ is computed by replacing  $pi^{pre}$  with  $pi^{post}$  in Equation 1 and  $pi^{post} = 1$  if  $(x_i - T_i) < z^{post}$  and zero otherwise.

$$H^{post} = 1/N \sum_{i=1}^N pi^{post} \quad (2)$$

Similarly, the intensity of poverty also called as ‘depth of poverty’ is measured by computing the average poverty gap as:

$$G^{pre} = 1/N \sum_{i=1}^N gi^{pre} \quad (3)$$

Where  $gi^{pre} = pi^{pre} (z^{pre} - x_i)$ . While

$$G^{post} = 1/N \sum_{i=1}^N gi^{post} \quad (4)$$

And  $gi^{post} = pi^{post} [z^{post} - (x_i - T_i)]$ .

However, if comparison is required to be done between different countries with different poverty lines, then poverty gap can be normalized on the poverty line as follows:

$$NG^{pre} = G^{pre}/PL \quad (5)$$

$$NG^{post} = G^{post}/PL \quad (6)$$

Thus the impact of poverty measures on OOP payments are simply classified as the difference between the gross and net payment measures that is:

$$PI^H = H^{post} - H^{pre} \quad (7)$$

$$PI^G = G^{post} - G^{pre} \quad (8)$$

$$PI^{NG} = NG^{post} - NG^{pre} \quad (9)$$

(ii) *Defining a Poverty Line*

In order to compute poverty analysis, a poverty line needs to be established. If official poverty line is available then it can be used. For international comparisons, others options can be considered. It can be argued that poverty lines should be adjusted downwards if poverty is to be estimated net of OOP payments for health care. It can only be done if poverty line allowed for resources required to meet health care needs. In case of absolute poverty lines such adjustments are not required. As absolute poverty lines are covering the cost of subsistence food needs only i.e. reaching a target level of 2100 calories a day. They are often termed as ‘extreme poverty lines’. An example of an absolute poverty line is \$1 per day approach used by World Bank. However, higher poverty lines may make some allowance for health care needs. A relative poverty line is defined as a fraction of mean household consumption expenditure.

Therefore, there is no need to adjust a food poverty line but in case of higher poverty lines that include nonfood needs as well it is required to adjust poverty line downward while assessing poverty on the basis of household expenditure net of health care payments. One such method proposed by Wagstaff and Doorslaer (2003) is to deduct from the poverty line the mean health spending of households whose total expenditure is closest to the poverty line.

### **3.6. Summary**

This chapter describes the methodological framework of the measurement of catastrophic health expenditures in Pakistan. The 1st part of the chapter highlights the features of data and gives us the complete information about target population. The second part first discusses the definition and measurement issues of catastrophic health expenditures and then describes the detailed information on the explanatory variables used for the analysis in the later chapter. The determinants of catastrophic health expenditures have been estimated by bi-variate and multi-variate analysis. For multi-variate analysis, the Logistic Regression has been applied as the dependent variable is in binary form with range '0' households not incurring catastrophic expenditures to '1' households suffering from catastrophic health expenditures. The third section deals with PSM technique to analyze the impact of catastrophic health expenditures on household's economic status and child schooling. However, the last section describes the methodology proposed by (Wagstaff and Doorslaer, 2003) to measure poverty impact on OOP payments.

## **CHAPTER 4**

### **RESULTS OF THE STUDY**

#### **INCIDENCE OF CATASTROPHIC HEALTH EXPENITURES**

As discussed earlier, this study is analyzing the incidence of catastrophic health expenditures and its relationship with poverty in Pakistan. Keeping in view the objectives of the study, this chapter presents the salient results on the measurement and incidence of catastrophic health payments that affect the future wellbeing of a household. The catastrophic health expenditures are measured at different thresholds by using both total expenditures of a household and nonfood expenditures. The determinants of catastrophic health expenditures and its impact on household economic status and child schooling are analyzed separately and will be discussed in the next chapter.

The structure of this chapter is as follows. The first section describes the incidence and intensity of catastrophic health expenditures in Pakistan. The results are presented for both total expenditures of a household and nonfood expenditures. Section 4.3 explains the factors which determine the catastrophic health expenditures using bi-variate analysis. The last section presents the summary of the chapter.

#### **4.2. Incidences and Intensity of Catastrophic Health Expenditures**

OOP health payments are a major source of health financing in many developing countries (O'Donnell et al., 2008a). In this case the access of health services is related to the income of the household. Seeking health care is difficult if cost is too high. Households usually

borrow money, sell assets, reduce necessary consumption or sometimes even forgo treatment. Thus, it is the most inequitable mode of financing that pushes millions of people into vicious circle of poverty (WHO, 2010).

Pakistan like other developing countries also faces the highest burden of OOP health expenditures. The share of OOP payments of total health expenditure remains above 60 percent since many years (Malik, 2011). As a result, many people will incur catastrophic health expenditures due to these high OOP payments. Table 4.1 shows the incidences and intensity of catastrophic health expenditures in Pakistan by using various threshold levels of health expenditures as percentage of total household consumption expenditures and non-food expenditures. It is worth to mention again that catastrophic health payments are defined as a share of both total expenditure of a household and nonfood expenditure at different thresholds. In literature 10 percent health expenditures of the total household expenditure and 40 percent of health expenditures of the total non-food expenditure threshold is commonly used. Thus, for rest of the analysis these two thresholds will be used.

**Table 4.1: Incidences and Intensity of Catastrophic Health Expenditures (%), Pakistan**

<b>Catastrophic Payment Measures</b>	<b>Different level of thresholds</b>					
	<b>5%</b>	<b>10%*</b>	<b>15%</b>	<b>25%</b>	<b>30%</b>	<b>40%*</b>
<b>OOP health payments as share of total expenditure</b>						
Headcount (H %)	46.3	24.7	15.1	7.5	5.2	2.9
Overshoot (O %)	8.2	6.6	5.5	4.0	3.4	2.6
Mean Positive Overshoot (MPO %)	17.7	26.7	36.4	53.3	65.4	89.7
<b>OOP health payments as share of non-food expenditure</b>						
Headcount (H %)	71.9	55.4	43.7	28.2	23.6	16.3
Overshoot (O %)	27.1	25.8	24.4	21.3	20.1	17.6
Mean Positive Overshoot (MPO %)	37.7	46.6	55.8	75.5	85.2	108.0

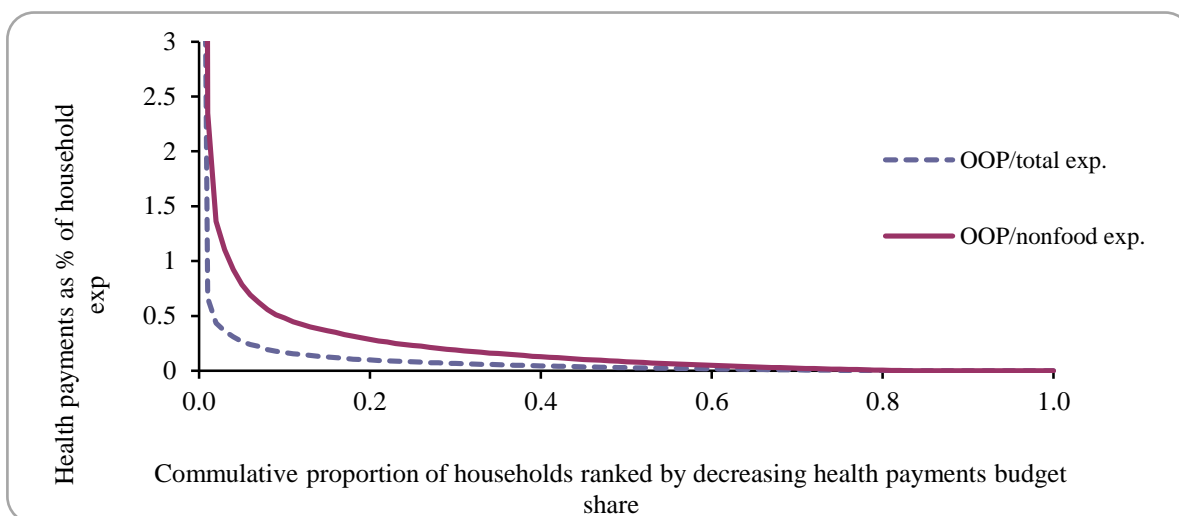
*Source:* Author's estimation from PPHS 2010 Micro Dataset

The catastrophic payment headcount (H) is defined as the number of households whose health payments in terms of their total expenditures exceed the specified threshold, z. It is also known as incidence of catastrophic payments. However, it does not capture the extent to which households actually exceed the defined threshold. It is measured by catastrophic payment overshoot (O). It reflects the average degree by which OOP payments exceed the specified threshold. Both these measures i.e. incidence and intensity are related through mean positive overshoot (MPO) which is defined as overshoot divided by headcount.

The table 4.1 shows the results of incidence and intensity of catastrophic health payments for health care in Pakistan analyzed from PPHS 2010 survey. From the table, it is revealed that by increasing the threshold from 5 percent to 40 percent of total household expenditure, the incidence of catastrophic payments will decline from 46.3 percent to 2.9 percent and the mean gap (overshoot) reduces from 8.2 to 2.6 percent. Unlike the headcount and mean gap, the mean positive overshoot increases as the threshold is raised. This increase in MPO is due to the slight decline in overshoot as compared to the headcount as the level of threshold increases (Bredenkamp, Mendola & Gragnolati, 2010). Those households who spent more than 5 percent of their total budget on health care, on average spent 22.7 percent (5% + 17.7%). Likewise, those who are spending more than 10 percent of their income on health care, on average spent 36.7 percent. Importantly, for both income shares, the incidence and mean gap is higher at lower thresholds. However, the values of headcount and overshoot are always higher when catastrophic payments are defined in relation to nonfood expenditure. As 46.3 percent households reported catastrophic payments at 5 percent of total household income and it is increased to 72 percent when threshold is set with respect to nonfood expenditure. Similarly, at 10 percent

of total expenditure, 25 percent households faced catastrophic expenditure and it is increased to 55.4 percent when capacity to pay approach is used. This difference is also shown by Figure 4.1 which represents the both income share curves. The nonfood expenditure curve (OOP/non-food expenditures) always positions to the right of the total expenditure curve (OOP/total expenditures). For example, for more than 15 percent household's health payments were at least one quarter of nonfood expenses, however health payments were only one fourth of total expenditure for 3 percent households. These results are consistent with other studies on incidence of catastrophic health expenditures in developing countries (O'Donnell et al., 2008; Malik, 2011; Wagstaff & Doorslaer, 2003).

**Fig. 4.1: Income Share Curves of Total Income and Non-food Expenditure**



Source: Author's estimation from PPHS 2010 Micro Dataset by using Adept Software<sup>12</sup>

<sup>12</sup> It is software developed by World Bank for automated economic analysis. It simplifies and speeds up the production of analytical results. It can be widely used as a tool for sensitivity analysis, data checking and as an educational tool.



### 4.3. Catastrophic Health Expenditures: A Bivariate Analysis

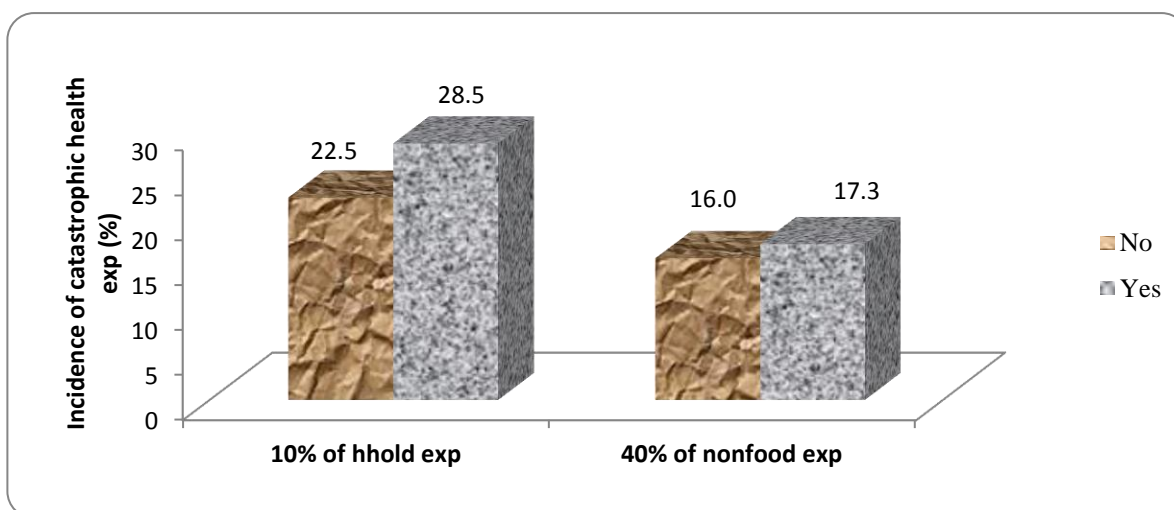
#### a) Household Characteristics

Household characteristics are likely to have a great influence on catastrophic health expenditures. Results of many studies have shown the composition of a household as an important determinant of catastrophic payments (O'Donnell et al., 2005; Pal, 2010; Cavagnero et al., 2006). It is expected that more number of children and elderly in the household increases the probability of incurring high OOP payments on health. As they are more prone to diseases, thus higher will be the spending on health care.

<b>Table 4.2: Incidence of Catastrophic Health Expenditures (%) by Household Characteristics</b>		
<b>Household Characteristics</b>	<b>Catastrophic Health Payments (%)</b>	
	<b>10% of total household expenditure</b>	<b>40% of nonfood expenditure</b>
<b>Presence of Child under age 5</b>		
No	23.0	15.4
Yes	26.5	17.4
<b>Household Size</b>		
0-5 members	23.2	14.0
6-10 members	25.0	16.5
11+ members	25.1	17.1
<b>Presence of illness or disability in the household</b>		
No	12.0	8.2
Yes	31.1	20.6
<b>Distance to the health facility*</b>		
<2km	23.0	15.0
2-10km	24.1	16.2
11+	29.0	20.3
<b>Source of Drinking Water</b>		
Improved	24.3	16.0
Non-improved	31.0	21.4
<b>Type of Sanitation Facility</b>		
Improved	23.4	16.0
Non-improved	28.5	18.1
*The distance of any of these health facilities that is nearest to the household i.e. Govt. Hospital, Rural Health Centre, Basic Health Unit, Private Hospital and Private Doctor is used for the analysis.		
Note: Total includes 3197 households.		
Source: Author's estimation from PPHS 2010 Micro Dataset		

It is evident from results shown in Table 4.2 where households with children under age five face high incidences of catastrophic health expenditures as compared to those households who have no children. The trend is same for both income shares. Similarly, the Figure 4.2 also shows the negative impact of presence of elderly in the household on catastrophic health expenditures. At 10% threshold of total expenditure, 28.5 percent households incur catastrophic expenditures and at 40% threshold of nonfood expenditure 17.3 percent households face catastrophic payments due to the presence of an elderly in the household.

**Fig.4.2. Catastrophic Payments (%) by presence of Elderly in the Household**



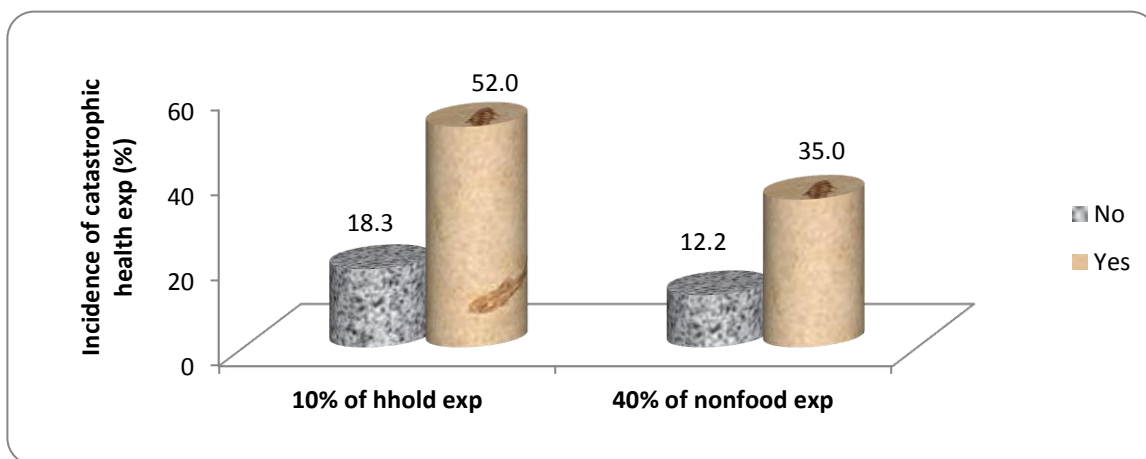
*Source:* Author's estimation from PPHS 2010 Micro Dataset

Family size is also an important variable affecting health payments. The results in Table 4.2 show that with an increase in household size, the incidence of catastrophic payments also increases. For example at 10 percent threshold of total expenditure, households with five members face 23.2 percent incidence of catastrophic payments and this percentage increases to 25 percent for households having more than eleven members. Similarly, by using nonfood expenditure threshold of 40 percent, incidence of catastrophic payments

increases from 14 percent for households having five members to 17.1 percent for households having more than eleven members. Regarding illness or disability in the household, the data in Table 4.2 shows that households having illness or disability faces high catastrophic payments (31 percent at 10% threshold of total expenditure and 20.6 percent at 40% threshold of nonfood expenditure) as compared to those who have no disability/illness in the household (12 percent at 10% threshold of total expenditure and 8.2 percent at 40% threshold of nonfood expenditure). It implies that presence of illness or disability in the household increases the risk of catastrophic payments.

Likewise, the negative association between hospitalization status of any household member and catastrophic expenditures are shown in Figure 4.3. It reveals that if any household member is hospitalized due to illness, it increases the OOP payments on health care that results in financial catastrophe. However, this impact is more pronounced in case of total expenditure of a household (52% vs. 18.3%) as compared to nonfood expenditure (35% vs. 12.2%). These results are supported by some other studies for developing countries (O’Donnell et al., 2005; Damme et al., 2004).

**Fig.4.3. Catastrophic Payments (%), by Hospitalization Status of a Household Member**



Source: Author’s estimation from PPHS 2010 Micro Dataset

Another important variable that affects the incidence of catastrophic payments is distance to health facility. The results in Table 4.2 show that with an increase in distance to health facility the proportion of households incurring catastrophic payments also increases. The trend is same for both thresholds. However, the greater proportion of households faces catastrophic payments when the distance increases from more than 11 km.

Moreover, public hygienic measures i.e. source of drinking water and type of sanitation facility also shows their negative association with catastrophic health expenditures. The results show that those households in which improved source of drinking water and sanitation facility is available face low incidence of catastrophic payments in relation to those households in which these facilities are not available (Table 4.2). These improved measures lead to good and healthy life and reduces health spending. The results are supported by other studies in developing countries (O'Donnell et al., 2005; Pal, 2010; Rous & Hotchkiss, 2003).

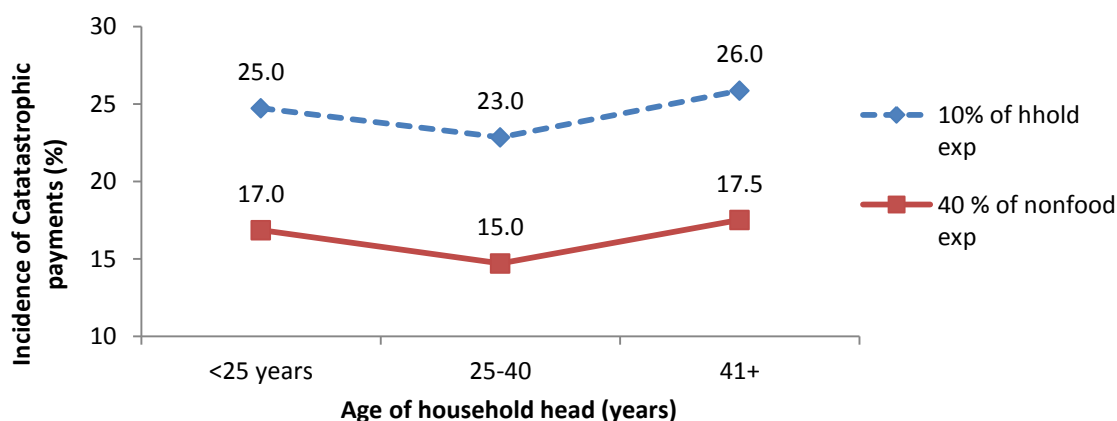
#### **b) Individual Characteristics of Head of Household**

The characteristics of household head i.e. sex, age, education and working status have a strong impact on catastrophic health expenditures (Cavagnero et al., 2006; Pal, 2010). Many studies regarded sex of household head as the key determinant (Okunade, Suraratdecha & Benson, 2009; O'Donnell et al., 2005). It is expected that female headed households incur more catastrophic payments as compared to male headed households. This is also evident from results in Table 4.3 that in female headed households there is high incidence of catastrophic expenditures as compared to male headed households at both thresholds.

<b>Table 4.3: Incidence of Catastrophic Health Expenditures (%) by Individual Characteristics</b>		
<b>Individual Characteristics</b>	<b>Catastrophic Health Payments (%)</b>	
	<b>10% of total household expenditure</b>	<b>40% of nonfood expenditure</b>
<b>Sex of household head</b>		
Male	24.4	16.0
Female	31.2	27.3
<b>Education Status</b>		
No Education	27.0	18.4
Some Education	22.3	14.0
<b>Working Status</b>		
Not working	30.3	21.0
Working	23.1	15.2
<i>Source: Author's estimation from PPHS 2010 Micro Dataset</i>		

The effect of age of household head on catastrophic expenditures is also important in terms of earning and level of experience. The results show that households with heads belonging to younger and older age groups face high incidence of catastrophic expenditures. However, households with heads belong to middle aged (25-40 years) group incur relatively low level of catastrophic payments. This may be due to high level of earnings at middle aged group as compared to younger and older ages<sup>13</sup>.

**Figure 4.4. Catastrophic Payments (%), by Age of Household Head**



*Source: Author's estimation from PPHS 2010 Micro Dataset*

<sup>13</sup> As earnings with age usually follows a parabolic shaped curve i.e. low level of earnings at younger and older ages while earning is at its maximum in the middle aged group.

The education of household head is found to have a very strong relationship with catastrophic health expenditures. Households with educated heads are less likely to incur catastrophic expenditures. As education enhances knowledge and awareness about effective ways to maintain and improve health, thus reduces the spending on health (Grossman, 1972). In addition, education brings more money and increases the household's ability to pay for health. The data in Table 4.3 indicates the positive effect of education of household head on catastrophic health expenditures. Households with heads having some education face relatively low incidence of catastrophic payments (22.3 percent at 10% of total household expenditure and 14% percent at 40% of nonfood expenditure) as compared to those households whose heads have no education (27.0 percent at 10% of total household expenditure and 18.4% percent at 40% of nonfood expenditure). These results are consistent with other studies on effect of education status of household head on catastrophic health expenditures (Pal, 2010; O'Donnell et al., 2005). Similarly, working status of household head also affect the OOP payments on health. The results in Table 4.3 are in the expected direction as those households whose heads are currently working face less incidence of catastrophic expenditures in relation to those households whose heads are not working. The trend is same for both income shares.

### **c) Regional Variables**

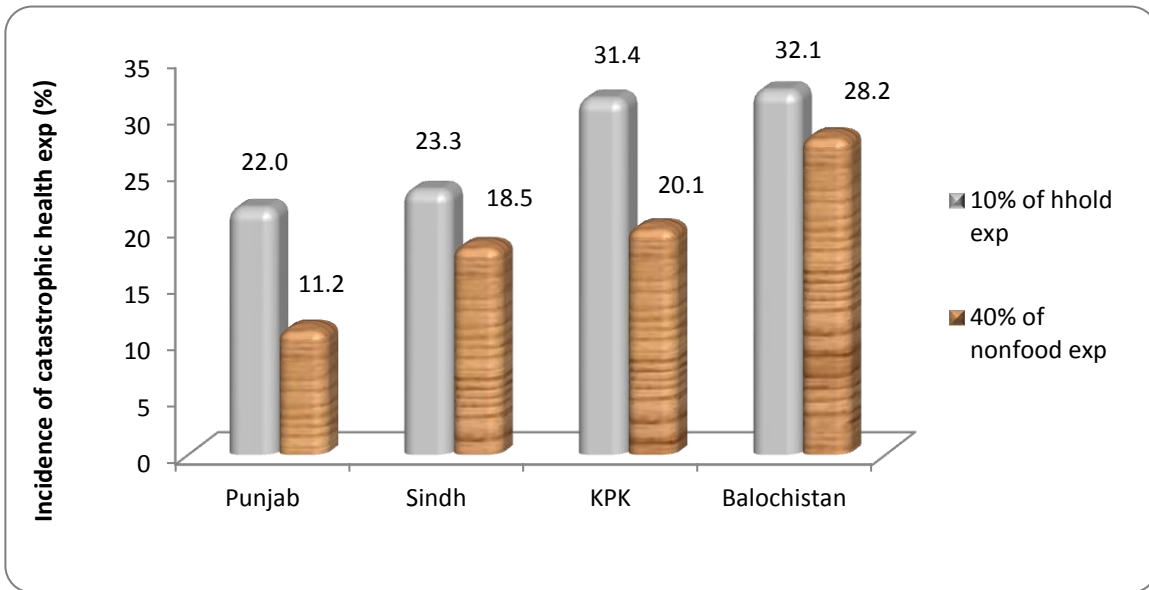
Regional characteristics also exert their influence on catastrophic health expenditures. Residential status (urban/rural) is important in terms of availability and accessibility of health services to the people. As households in rural areas face difficulties in terms of availability of health facilities services as they are more concentrated in urban areas. Travelling cost also raises their health expenditures. Thus, the risk of incurring

catastrophic expenditures is more for households in rural areas. Interestingly, the results in Table 4.4 show that households in urban areas face relatively higher incidence of catastrophic payments as compared to households in rural areas for both thresholds. However, there is not much difference between the two groups. It may be due to more utilization of private health facilities in urban areas. As they are more costly than public facilities, thus raises the health spending by households in urban areas.

<b>Table 4.4: Incidence of Catastrophic Health Expenditures (%) by Regional Variables</b>		
<b>Regional Variables</b>	<b>Catastrophic Health Payments (%)</b>	
	<b>10% of total household expenditure</b>	<b>40% of nonfood expenditure</b>
<b>Place of Residence</b>		
Urban	25.4	18.5
Rural	23.3	15.4
<i>Note:</i> Total includes 3197 households.		
<i>Source:</i> Author's estimation from PPHS 2010 Micro Dataset		

Regarding regional disparities in incidence of catastrophic health expenditures, KPK and Baluchistan suffer more from catastrophic health expenditures as compared to Punjab and Sindh (Figure 4.5). The incidence of catastrophic health expenditure is highest in Baluchistan, followed by KPK and lowest in Punjab and Sindh. It is because Punjab is the most prosperous province of the country in terms of capacity to pay for health and also due to the availability of health facilities in the province. On the other hand, Baluchistan is the most traditional and least developed province of Pakistan in terms of education and access to basic health facilities. The results are consistent with other study on effect of catastrophic payments on different regions (provinces) of Pakistan (Malik, 2011).

**Fig.4.5. Catastrophic Payments (%) by Provinces**



*Source:* Author's estimation from PPHS 2010 Micro Dataset

#### **4.4. Summary of the Chapter**

This chapter explores the level of catastrophic health expenditures across Pakistan. Catastrophic health expenditures are calculated as a share of both total expenditure of a household and nonfood expenditure. The first section describes the results of incidence and intensity of catastrophic health expenditures at different thresholds. However, the values are higher when catastrophic expenditures are defined in relation to nonfood expenditure. The following section consists of bi-variate analysis in which catastrophic health expenditures are explained by different demographic and socio-economic factors. In literature two thresholds i.e. at 10 percent of total household expenditure and 40 percent of nonfood expenditure are commonly used, thus whole bivariate analysis has been done by using these two cut points.



## **CHAPTER 5**

# **THE DETERMINANTS OF CATASTROPHIC HEALTH EXPENDITURES AND ITS IMPACT ON POVERTY AND CHILD SCHOOLING**

Catastrophic health expenditures are defined at household level, as a result its economic effects are spread across all the household members. Thus severely disrupting the household wellbeing. Annually millions of people fall below poverty due to these high OOP payments and majority of them belong to developing countries (Whitehead et al., 2007; Naga & Lamiraud, 2008). There is ample literature that shows the negative effect of catastrophic health expenditures on household economic status and child schooling (Chuma & Maina, 2012; Pal, 2010; Xu et al., 2003; Kremer, 2003; Fallon & Lucas, 2002). The OOP health payments are involuntary and people are forced to sacrifice their essential needs to pay for health care. They sell their land and animals, taking debts from relatives and sometimes even face financial catastrophe.

The configuration of this chapter is as follows. In section 5.2, different determinants associated with catastrophic health expenditures are described. The section 5.3 describes the results of PSM analysis that has been done to study the impact of catastrophic health expenditures on poverty status of a household and child schooling whereas section 5.4 describes in detail the results of poverty impact measures on OOP health payments. The analysis has been done in both ways i.e. down warding the poverty line and without down warding the poverty line. The last section concludes the chapter.

## 5.2. The Determinants of Catastrophic Health Expenditures: Multivariate Analysis

The bi-variate analysis in the previous chapter has shown the incidence of catastrophic health expenditures in terms of selected socio-demographic and economic characteristics. To determine the net effect of predictor variables on catastrophic health expenditures, a multivariate analysis is undertaken for both catastrophe levels i.e. catastrophe-1 and catastrophe-2<sup>14</sup>. The determinants of catastrophic health expenditures are analyzed by using the logistic regression model as described below;

$$CHE1_i = \alpha_0 + \alpha_1 Ch_i + \alpha_2 Ed_i + \alpha_3 El_i + \alpha_4 X_i + \mu_i \quad (3.3)$$

$$CHE2_i = \alpha_0 + \alpha_1 Ch_i + \alpha_2 Ed_i + \alpha_3 El_i + \alpha_4 X_i + \mu_i \quad (3.4)$$

where CHE indicates the occurrence of catastrophic health expenditures.  $Ch_i$  represents the presence of child in a household,  $Ed_i$  stands for the education status of household's head and  $El_i$  is the presence of an elderly in the household.  $X_i$  represent the vector of other control variables including working status of household's head, distance to health facility, household size, hospitalization status of any household member and other socio-demographic and economic characteristics of households. The definitions of independent variables used in logistic model are given in Appendix Table B6 and the regression results are presented in Table 5.1.

The findings indicates the negative effect of composition of household on catastrophic health expenditures as probability of incurring catastrophic payments increases with the presence of children and elderly in the household. Interestingly, results are not significant

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<sup>14</sup> Catastrophe-1 is defined as if health expenditures are more than 10% of total household consumption expenditure and Catastrophe-2 is defined as if health expenditures are above 40% of nonfood consumption expenditure.

for both catastrophe levels 1 and 2 (Table 5.1). Likewise, household size is also expected to have negative association with catastrophic health expenditures. However, the results show that households with more members are significantly less likely to incur catastrophic health expenditures. The trend is same for both income shares. These findings are different to what we have observed in our bivariate analysis that with an increase in family size, proportion of households incurring catastrophic payments also increases. Thus, further probing of data is needed to explore such type of trend. Although results are corresponding with the findings of O'Donnell et al (2005) study on six Asian countries in which India and Sri Lanka also shows positive effect of large household size on catastrophic health expenditures (O'Donnell et al., 2005). Another ADB (2007) Indian study also endorses these findings.

Some results are consistent with the literature indicating that the odds of incurring catastrophic health expenditures increases as the distance to the nearest health facility increases and results are also statistically significant for both catastrophe levels. Similarly, the presence of disability/illness in the household also has a significant negative impact on catastrophic expenditures. Households having illness or disability are 3 times more likely to incur catastrophic payments as compared to those households having no illness or disability. The results are same for both threshold levels. Moreover, the hospitalization status of any household member also increases the likelihood of facing catastrophic payments. The results in Table 5.1 show that hospitalization of a household member raises the probability of catastrophic payments by 5.14 times at 10 percent of total expenditure (catastrophe-1) and 4.16 times at 40 percent of nonfood expenditure (catastrophe-2). The results are also statistically significant.

**Table 5.1: Logistic Regression Results of the Determinants of Catastrophic Health Expenditures, Pakistan (2010)**

Correlates	Model 1 (Catastrophe-1)	Model 2 (Catastrophe-2)
	Odd Ratio	Odd Ratio
Presence of a child (yes=1)	1.008	1.066
Presence of an elderly (yes=1)	1.113	1.011
Household size (0-5 members as reference)		
6-10 members	0.811***	0.764**
11+ members	0.617**	0.431*
Distance to health facility	1.005**	1.006**
Presence of illness/disability in the household (yes=1)	3.538*	3.529*
Hospitalization status of any household member (yes=1)	5.141*	4.163*
Sex of household head (male=1)	0.939	0.657***
Literacy of household head (literate=1)	0.856	0.773**
Age of household head	1.006	1.043***
Age square of household head	1.001	1.001
Work status of household head (working=1)	0.913	0.845
Place of Residence (urban=1)	0.808***	0.748**
Drinking water (improved=1)	0.850	0.817
Sanitation facility (improved=1)	0.568*	0.624*
Region (Punjab as reference)		
Sindh (yes=1)	1.327**	2.394*
KPK (yes=1)	2.132*	2.684*
Baluchistan (yes=1)	2.294*	4.255*
LR $\chi^2$ (18)	431.51	337.66
Log likelihood	-1344.71	-1067.52
Prob. > $\chi^2$	0.0000	0.0000
Pseudo-R <sup>2</sup>	0.13	0.13
Number of Observations (N)	2774	2774

\*significant at 1%, \*\* significant at 5%, \*\*\* significant at 10%

Source: Author's estimation from PPHS 2010 Micro Dataset

In addition, male headed households are less likely to incur catastrophic payments than female headed- households but results are significant only for catastrophe level -2. These multivariate findings support the bivariate relationship between headship of household and probability of incurring catastrophic expenses. Education of household head is also found to be negatively correlated with the likelihood of incurring catastrophic expenditures. It may be because education can be used as a proxy for future income and imparts its

negative influence on health spending through good health. These findings are consistent with other studies (O'Donnell et al., 2005; Pal, 2010), however, the results are significant only for threshold of 40 percent of nonfood expenditure. Age of household head also shows a negative association with catastrophic OOP payments but its effect is significant for catastrophe level-2. This may be because with an increase in age the earnings will decline that affects the household's capacity to pay for health expenditures. Households with working heads are also less likely to incur catastrophic payments although its effect is not significant for any of the two thresholds.

Furthermore, the results show that households living in urban areas are significantly less likely to incur catastrophic health expenditures (Table 5.1). This is because rural areas face difficulties in access of health facilities as they are widely available in urban areas. As a result travelling cost increases their health expenditures. These results are consistent with other studies (WHO, 2010; Cavagnero et al., 2006) but contrary to our bivariate analysis that households in urban areas face more catastrophic payments as compared to households in rural areas. This is somewhat puzzling to explain this pattern and requires further probing of data. Similarly, households having access to safe drinking water and sanitation facilities are also less likely to incur catastrophic OOP payments. However the results are significant for sanitation facilities of both defined thresholds. With reference to Punjab, households in Sindh, KPK and Baluchistan have significantly higher probabilities of incurring catastrophic payments. For catastrophe-1, Sindh is 1.3 times and KPK and Baluchistan are 2 times more likely to incur catastrophic expenditures and for catastrophe-2, Sindh and KPK are 2 times while Baluchistan is 4.2 times more likely to incur catastrophic payments.

### **5.3. Catastrophic Health Expenditures and PSM Analysis**

For the impact analysis of catastrophic health expenditures, two variables have been selected related to household wellbeing i.e. poverty status and child schooling. Following the methodology mentioned in chapter 3, section 3.4 first propensity scores are estimated using logistic regression and then ATT effect is calculated after satisfying the two conditions i.e. balancing and unconfoundedness.

The results of equation 1 i.e. determinants of catastrophic health expenditures have been described in section 5.2 by including all the variables for which these two conditions are met. The dependent variable is binary in nature i.e. whether household is suffering from catastrophic health expenditures or not. The results show that rural, having more number of children and elderly and female headed households are more likely to incur catastrophic health expenditures. Moreover, households facing illness/ disability or if any household member was hospitalized have higher probability of incurring catastrophic health payments. Likewise, households whose heads are educated and belong to younger age group are also less likely to incur catastrophic health expenditures.

However, the results associated with equation 4 are presented in Table 5.2 and 5.3 having calculations of ATT under three methods i.e. nearest neighbor (NN), kernel matching and stratification method. In NN method each treated unit is matched with the controlled unit having nearest propensity score. The method is generally utilized with replacement in the control units. In the second step the difference of each pair of matched unit is calculated

and then ATT as the average of all these differences is obtained<sup>15</sup>. In kernel method, all treated units are matched with a weighted average of all control units by using weights that are inversely proportional to the distance between propensity scores of treated and non-treated units. In the stratification method, the range of variation of propensity score is divided into a set of intervals such that within each interval, treated and non-treated units on average have same propensity score. The bootstrapped standard errors and ATT's are reported for both catastrophe level-1 and catastrophe level-2 in Tables 5.2 and 5.3.

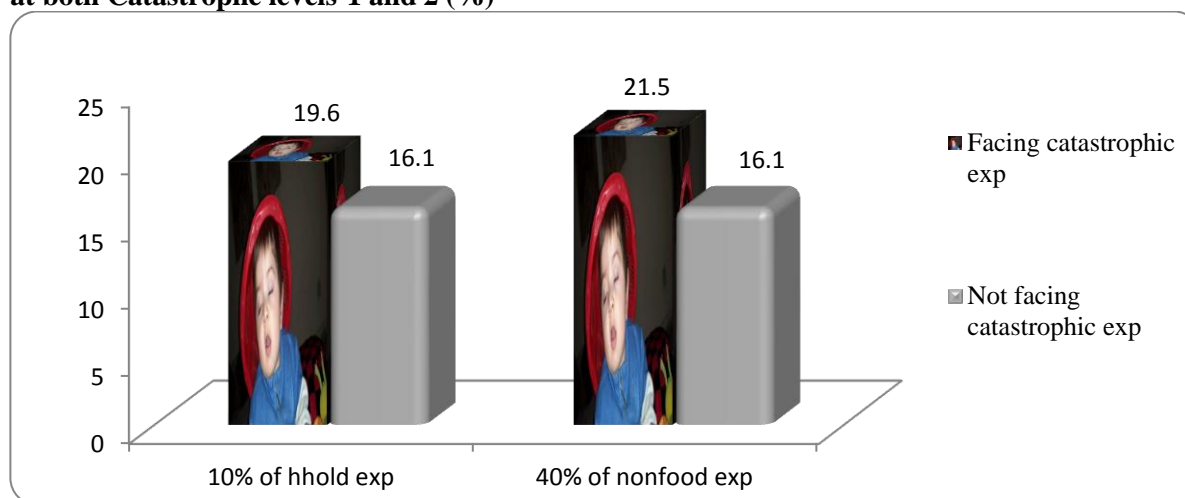
### **5.3.1. Impact of Catastrophic Health Expenditures on Poverty Status**

Before analyzing the results of PSM analysis on poverty status of household, first poverty statistics at both catastrophe levels-1 and 2 have been presented. As described earlier, the study uses the official poverty line that has been inflated for year 2010. The Figure 5.1 shows that the poverty incidence is slightly higher at catastrophe-2 (21.5 percent) as compared to catastrophe-1 (19.6 percent). However, among non-incurring (catastrophic) group there is no difference in poverty incidence for both defined thresholds. As these simple poverty statistics are insufficient to estimate the impact of catastrophic health expenditures on household's economic status, PSM methodology is applied that is more suitable for this purpose.

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<sup>15</sup> In NN method if closest neighbor is far away, the problem of bad matches may occur. It can be avoided by applying a tolerance level on propensity score distance. Calliper matching can be used for this purpose, not only bad matches can be avoided but matching quality can also be increased [Caliendo & Kopeining (2008); Smith & Todd (2005)].

**Fig.5.1. Poverty Incidence in Catastrophic Incurring and Non-Catastrophic Incurring Group at both Catastrophe levels-1 and 2 (%)**



Source: Author's estimation from PPHS 2010 Micro Dataset

The calculated ATT on poverty status under the three measures i.e. nearest neighbor, kernel and stratification have been presented in Table 5.2. The impact of catastrophic health expenditures on poverty is statistically significant for all the three measures. The results show that households incurring catastrophic expenditures have higher probability of being poor. However, this impact varies across three measures ranging from 5.0 to 5.8 percent with the lowest value for nearest neighbor method and highest for stratification method for catastrophe-1. The trend is same for both thresholds but differ in magnitude of values for catastrophe-2 as it varies between 6.7 to 7.3 percent, with the lowest value for kernel method and highest for nearest neighbor method. Thus, catastrophic incurring households are more likely to be poor than catastrophic non-incurring households with similar characteristics.



**Table 5.2. ATT Effects Of Propensity Score Matching On Poverty**

Measures/ATT	Catastrophe-1 (Yes=1)	Catastrophe-2 (Yes=1)
<b>Nearest neighbor method</b>		
ATT	<b>0.050</b>	<b>0.073</b>
N.Treated	694	454
N.Control	482	351
St.error bootstrap	0.024	0.034
t-stat	2.085	2.126
<b>Kernel method</b>		
ATT	<b>0.055</b>	<b>0.067</b>
N.Treated	694	454
N.Control	2071	2281
St.error bootstrap	0.016	0.019
t-stat	3.498	3.587
<b>Stratification method</b>		
ATT	<b>0.058</b>	<b>0.072</b>
N.Treated	694	454
N.Control	2702	2903
St.error bootstrap	0.015	0.023
t-stat	3.951	3.180

\*For radius method simulation takes more than 24 hours so it has been dropped from the analysis.

Source: Author's estimation from PPHS 2010 Micro Dataset

### 5.3.2. Impact of Catastrophic Health Expenditures on Child Schooling

Along with poverty status, another variable that has been selected is child schooling. Empirical evidence shows that due to high OOP payments on health, parents withdrawal their children from school to save school fees as well as make children available to help them in work (Whitehead, Dahlgren & Evans, 2001). Thus, future welfare of the household is seriously affected.

The ATT effect of catastrophic health expenditures on child schooling is presented in Table 5.3. The results show negative association between current enrollment of children and catastrophic health expenditures, but the effect is not statistically significant for any of the three measures of both catastrophe levels-1 and 2.

**Table 5.3. ATT Effects Of Propensity Score Matching On Child Schooling**

Measures/ATT	Catastrophe-1 (Yes=1)	Catastrophe-2 (Yes=1)
<b>Nearest neighbor method</b>		
ATT	-0.025	-0.002
N.Treated	1357	909
N.Control	831	598
St.error bootstrap	0.033	0.044
t-stat	-0.768	-0.052
<b>Kernel method</b>		
ATT	-0.018	-0.002
N.Treated	1357	909
N.Control	4391	4792
St.error bootstrap	0.017	0.019
t-stat	-1.078	0.108
<b>Stratification method</b>		
ATT	-0.015	-0.011
N.Treated	1355	909
N.Control	5695	6079
St.error bootstrap	0.017	0.023
t-stat	0.903	-0.484

\*For radius method simulation takes more than 24 hours so it has been dropped from the analysis.

Source: Author's estimation from PPHS 2010 Micro Dataset

#### 5.4. Poverty Impact of Health care Payments

This section presents the result of poverty measures corresponding to household's total consumption pre and post OOP health care spending. The comparison of these two shows the level of impoverishment occur due to health payments. The idea behind this is that OOP health payments occurring due to illness are likely to push households from 'non-poor state' before a health problem to 'poor state' after a health problem. By adding health payments to households total consumption (gross of health payments) gives an idea of living standard of a household without a health problem. However, by excluding health payments from total consumption (net of health payments) gives a sense of standard of living with a health problem.

The study uses the poverty line defined as Rs.1671.89 per adult per month for 2010<sup>16</sup>. For first table (Table 5.4a) no adjustments have been made in the poverty line. However, the poverty headcount have been recalculated by excluding per capita health spending from per capita total expenditures.

**Table 5.4a. Poverty Impact of OOP Payments in Pakistan, 2010-*With Original Poverty line***

Measures	Gross of health payments	Net of health Payments	Poverty Impact PI=net-gross	Percentage Point Change (PI/gross*100)
Poverty Headcount (%)	23.6	30.5	6.9	29.2
Poverty Gap (Rs.)	100.5	166.4	65.9	65.5
Poverty Normalized Gap (%)	6.0	9.9	3.9	65.0
Z <sup>pre</sup> Poverty line	1671.89			
Z <sup>post</sup> Poverty line	1671.89			

*Source:* Author's estimation from PPHS 2010 Micro Dataset

The results in Table 5.4a show that on the basis of household's consumption expenditure, 23.6 percent of the population falls below poverty and after accounting OOP health payments, the poverty rate increases to 30.5 percent. It indicates that about 7 percent of the population cannot be poor if resources would have been available to them to spend on other things which they were forced to divert to health care needs. Thus, the impact of health payments on poverty is not negligible, as health expenditures increased the number of poor households by 29.2 percent. However, this approach does not capture the extent to which households who are already poor were further pushed into deeper poverty as a result of health spending. The comparison of gross and net poverty gap shows that OOP health payments raises the poverty gap by 65.5 percent. For the normalized poverty gap that is also standardized by respective poverty line, the poverty gap increases by 65 percent. This

<sup>16</sup> It has been constructed by inflating the official poverty lines of 2001 and 2004 i.e. Rs.723.4 per adult per month and Rs. 878.64 per adult per month respectively. The Planning Commission of Pakistan measures the official poverty line by using Pakistan Integrated Household Survey (PIHS) 1998/99 data, based on 2350 calories per adult per equivalent per day. (For more details see Arif & Farooq, 2012).

mainly suggests that an increase in poverty gap is due to more households being brought below poverty as a result of health spending and not because of the deepening of the poverty who are already poor.

For second table (Table 5.4b), analysis has been done by revising the poverty line i.e. pre and post poverty lines are different<sup>17</sup>. In order to make adjustments to the poverty line, the methodology proposed by Wagstaff and Doorsaler (2003) has been applied. The average health spending of households (quintile) whose mean total consumption expenditure is closest to the poverty line has been subtracted from the poverty line. Among the five quintiles, the total expenditure of quintile-2 (1836.96 Rs. per capita) is closest to the poverty line<sup>18</sup>. Thus, the mean health spending of this quintile (151.56 Rs. per capita) has been deducted from the poverty line. Thus, the new post payment poverty line is Rs. **1520.33** per adult per month.

**Table 5.4b. Poverty Impact of OOP Payments in Pakistan, 2010-By Down warding the Poverty line**

Measures	Gross of health payments	Net of health Payments	Poverty Impact PI=net-gross	Percentage Point Change (PI/gross*100)
Poverty Headcount (%)	23.6	24.4	0.8	3.3
Poverty Gap (Rs.)	100.5	124.6	24.1	24.0
Poverty Normalized Gap (%)	6.0	8.2	2.2	36.6
Z <sup>pre</sup> Poverty line				1671.89
Z <sup>post</sup> Poverty line				1520.33

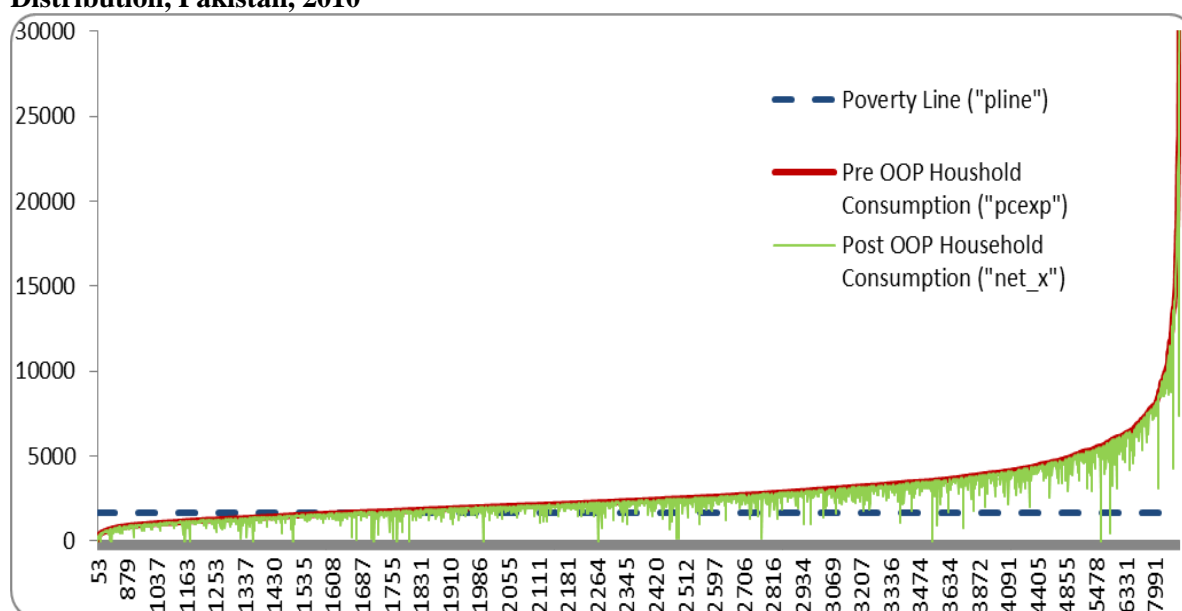
Source: Author's estimation from PPHS 2010 Micro Dataset

<sup>17</sup> According to some studies if official poverty line is available, then there is no need to make adjustments in the poverty line (especially if analysis is done for developing countries) [Gupta, 2009; Garg & Karan, 2008; Quantitative Techniques for Health Equity Analysis-Technical Note#19] while some argues that if poverty line includes a health spending component then it can be adjusted downward while estimating poverty net of OOP payments (Wagstaff & Doorslaer, 2003; O'Donnell, 2008). Therefore, analysis can be done in both ways with and without down warding poverty line.

<sup>18</sup> The mean total consumption expenditure and health spending of remaining quintiles are mentioned in Appendix Table B7.

The results from Table 5.4b show that impact of OOP payments is smaller on headcount in case of using revised poverty line. This indicates the lower poverty line for net OOP payments. The headcount increases from 23.6 percent to 24.4 percent after accounting OOP health expenditures. As a result, 3.3 percent households fall below poverty due to these health payments. Moreover, the OOP payments increase the poverty gap and normalized poverty gap by 24 and 36.6 percent respectively. Overall, the trend of results is same however, the intensity and incidence of poverty is less when adjustments are done with the poverty line.

**Fig.5.2. Effect of Health Payments on Pen’s Parade of the Household Consumption Distribution, Pakistan, 2010**



Source: Author’s estimation from PPHS 2010 Micro Dataset

The Figure 5.2 shows the effect of OOP payments on Pen’s Parade Graph. It is also called as “paint drop chart” (Wagstaff & Doorslaer, 2003). The pre and post payment incomes of households and poverty line are plotted against the cumulative distribution of households

by per capita income (ranked in ascending order). The vertical bar clearly shows that some households are pushed deeper into poverty due to health payments. It is also evident from the graph that health expenditures are greater at higher values of consumption expenditure but it is mostly the households in the middle and lower end of the graph that are dragged into poverty due to health expenses.

### **5.5. Summary of the Chapter**

The first section of this chapter describes the results of multivariate analysis to see the net effect of predictor variables on catastrophic health expenditures. The second section presents the findings of PSM analysis to examine the impact of catastrophic health expenditures on child schooling and poverty status of a household. The results show significant impact of catastrophic payments on household economic status while no significant impact is seen in case of child schooling. The last section explains the findings of the effect of OOP health payments on poverty impact measures. The results show that there is an increase in poverty rate due to health payments however, the intensity of poverty impact measures is less when poverty line is adjusted downward.

## CHAPTER 6

### CONCLUSIONS AND POLICY IMPLICATIONS

OOP payments are major source of health expenditures in many countries and being considered as a major barrier in achieving an equitable health system. These payments may cause households to incur catastrophic costs. Households in developed countries are protected through insurance coverage but in developing countries due to lack of risk pooling mechanisms there is high incidence of OOP payments, asset depletion, borrowing, sacrifice of future investments and sometimes even face financial catastrophe. The devastating effects of ill health has long been a problem in USA and other countries but now it is a major issue in developing countries where millions of people are pushed below poverty annually due to these catastrophic payments.

Health expenditures become catastrophic when people have to sacrifice their other basic needs and spend a large portion of their budget on health. As a result, some of them being slipped into poverty and others remain without treatment. In literature catastrophic threshold varies from 5 to 20 percent of total household income as different studies have used different thresholds. According to WHO, health payments can also be considered as catastrophic if households spent above 40 percent of their nonfood expenditure on health. Withdrawal of children from schools, reducing consumption and forgoing treatment are common coping strategies that affect the future economic welfare of a household.

Given paramount importance of catastrophic health expenditures, especially its prevalence in Pakistan, this dissertation covered the following objectives; a) determine the incidence of catastrophic health expenditures in Pakistan; b) analyze the determinants of catastrophic payments; c) examine the impact of catastrophic health

expenditures on household's economic status and child schooling; and d) assess the impact of health care payments on poverty measures. Though, Pakistan is facing double burden of disease, high poverty and weak health system, as a result millions of people suffer annually from catastrophic expenditures. Thus, the analysis provides important insights from policy perspective. It also helps in providing financial protection to the people and to ensure the distribution of services equitably among all groups of the society.

## **6.2. Summary of Major Findings**

OOP payments not only creates economic burden for patients and families but also undermines their earning capacity, thus affecting the welfare of a household. As detailed in Chapter 3, the data for this study is taken from PPHS 2010. It is the latest available dataset with national representation meeting all the requirements for the desired analysis. The analysis includes all the households having health expenditure during last year while those who have no expenditure are excluded. The summary of main findings of this study is as follows;

The first objective was to determine the incidence of catastrophic health expenditure across Pakistan. Catastrophic payments are defined at both thresholds i.e.10 percent of total expenditure of a household and 40 percent of nonfood expenditure. The PPHS has detailed questions about spending on different components of health. They were added together to get annual health spending of a household. From consumption module information on total expenditure and nonfood expenditure of a household can be derived easily.

The results of the study revealed that there is high incidence of catastrophic health expenditures in Pakistan. However, both the incidence and intensity values are higher when catastrophic payments are defined with respect to nonfood expenditure. However,



for bivariate and multivariate analysis the thresholds of 10 percent of the total household expenditure and 40 percent of the total non-food expenditure are applied as they are most commonly used by researchers in literature.

Among household characteristics, presence of children and elderly in the household significantly affects the catastrophic health expenditures for both income shares. These findings are as expected as children and elderly are more vulnerable to diseases results in large spending on health care. Likewise, illness or disability in the household also increases the OOP payments for health care. Moreover, availability of improved source of drinking water and sanitation facility in the household lowers the risk of facing catastrophic payments. These results are in the expected direction because these improved measures lead to good and healthy life and minimizes the health spending.

Individual characteristics of household head have a strong impact on catastrophic health expenditures. Except age of household head, his education and working status shows a positive association with catastrophic health expenditures. Sex of household head is also an important variable affecting the catastrophic payments. Female headed households incur more catastrophic payments as compared to male headed households. Urban rural disparities also exist but households in urban areas face more catastrophic payments than rural households. This may be due to more utilization of private health facilities in urban areas. As they are costly, thus raises the health spending of urban households. With respect to provinces, KPK and Baluchistan face higher incidence of catastrophic payments than Punjab and Sindh for both defined thresholds.

Multivariate analysis has been done to check the effect of predictor variables. Overall the distance to health facility, any illness or disability in the household, hospitalization status of any household member and place of residence affects the catastrophic health expenditures of both thresholds with significant results. However, sex and age of

household head and his education significantly affect catastrophe-2 (40 percent of nonfood expenditure) than catastrophe-1 (10 percent of total household expenditure). In contrast, household size also shows positive effect of household size on catastrophic health expenditures for both thresholds.

Another objective is to assess the impact of catastrophic health expenditures on poverty status of a household and child schooling. For this purpose, propensity score matching (PSM) technique is applied. By using PSM, it is examined whether households who incurred catastrophic health expenditures have higher levels of impoverishment and greater number of children currently not attending schools than control households. The first step of PSM is the estimation of propensity scores using logistic regression and in the next step ATT effect is calculated after satisfying the two conditions i.e. balancing and uncounfoundedness.

First the ATT is calculated for poverty status for three measures i.e. nearest neighbor, kernel and stratification method. The impact of catastrophic health expenditures on poverty is statistically significant for all the three measures. However, this impact varies across three measures for both catastrophe levels 1 and 2. This shows that catastrophic incurring households are more likely to be poor than catastrophic non-incurring households with similar characteristics. Likewise, the ATT effect of catastrophic health expenditures on child schooling is also estimated. The results show negative association between school enrollment of children and catastrophic health payments, but the effect is not statistically significant for any of the three measures of both catastrophe levels-1 and 2.

The last objective of the study is to estimate the effect of OOP health expenditures on poverty measures by using the standard methodology proposed by Wagstaff and Doorslaer (2003). It is calculated as the difference in poverty levels gross and net OOP

expenditures. The idea behind is that no one should be slipped into poverty due to health care payments. For the study official poverty line defined as Rs. 1671.89 per adult per month for 2010 is used. The analysis has been done in both ways i.e. down warding the poverty line and without down warding the poverty line. The results show that in both cases there is an increase in poverty due to health care payments, however, the intensity and incidence of poverty is less when adjustments are done with the poverty line.

These findings suggest that the following hypotheses of the present study are found to be sustained;

*Hypothesis 1:* There is high incidence of catastrophic health expenditures in Pakistan.

*Hypothesis 2:* Demographic and socio-economic factors significantly influence the catastrophic health expenditures.

*Hypothesis 3:* There is an impact of catastrophic health expenditures on poverty status of a household and child schooling;

*Hypothesis 4:* Additional number of people will fall into poverty due to health care payments.

### **6.3. Conclusions**

OOP payments are a major of health financing in many countries but its proportion is higher in developing countries. These payments may cause economic burden for families and they will suffer from catastrophic costs. Annually millions of people will fall into poverty due to high catastrophic payments and majority of them belongs to low income countries.

Health expenditures become catastrophic when people have to sacrifice their essential needs and have to spend a large share of their budget on health. In literature catastrophic threshold varies from 5 to 20 percent of total household income as different studies have used different cutoff points. However, WHO has defined catastrophic payments if households spend more than 40 percent of their nonfood expenditure on health.

Catastrophic health expenditures are defined at both thresholds i.e. 10 percent of total household expenditure and 40 percent of nonfood expenditure of a household. The study has found that there is high incidence of catastrophic health expenditures in Pakistan. However, both the incidence and intensity values are higher when catastrophic payments are defined with respect to nonfood expenditure.

Another objective of the study is to examine the association of various socio-economic and demographic factors with catastrophic health expenditures. Separate analysis has been done for both catastrophe levels 1 and 2. Results show that household characteristics i.e. illness/disability in the household, distance to health facility, type of toilet facility and hospitalization status of any household member significantly affect the catastrophic health expenditures. However, individual characteristics of household head i.e. his age, sex and education status significantly affect catastrophe-2 than catastrophe-1. Among provinces, households in Sindh, KPK and Baluchistan face higher incidence of catastrophic health expenditures than households in Punjab province.

The third objective is to assess the impact of catastrophic health expenditures on poverty status of a household and child schooling. For this purpose PSM technique is applied. In the first step of PSM, propensity scores are estimated and then ATT effect is calculated. The results show that the impact of catastrophic health expenditures on

poverty is statistically significant for all the three measures i.e. nearest neighbor, kernel and stratification method. However, negative relationship is shown between child schooling and catastrophic health expenditures but effect is not statistically significant for both catastrophe levels-1 and 2.

The last objective of the study is to estimate the impact of poverty measures on gross and net OOP payments. It is calculated by using the standard methodology proposed by Wagstaff and Doorslaer (2003). For this purpose, poverty line defined as Rs. 1671.89 per adult per month for 2010 is used. First analysis is done without down warding the poverty line and then it is done by down warding the poverty line. The results show that there is an increase in incidence of poverty due to health payments, however the occurrence and intensity of poverty is less when poverty line is adjusted downward.

#### **6.4. Policy Implications**

Based on the findings of the study the following recommendations are presented;

- Individual characteristics of household head appear to be an important predictor of catastrophic health expenditures. Households whose heads are educated tend to face less incidence of catastrophic health expenditures. As education can be used as a proxy for future income thus in order to minimize the risk of catastrophic health expenditures, education status of household heads should be improved.
- There is a need to improve the accessibility to health services. As distance to health facility appears to be a strong determinant of catastrophic health expenditures. With an increase in distance to health facility, the proportion of households incurring catastrophic health payments also increases. This is because along with treatment cost, people have to bear travelling cost that

further increases their OOP health expenditures. Improving the access to health facilities shows its positive impact on catastrophic health expenditures.

- Catastrophic health expenditures have a severe impact on poverty status of a household. Income indicates the affordability of a person to spend on health care. Rich people can pay for health care due to availability of resources however, poor due to meagre resources have to reduce its consumption of essential items in order to meet health expenditures. Annually, millions of people are pushed into poverty due to these OOP health payments. Thus, there is a need to target those households which are poor by expanding size of the benefits for chronic illnesses and hospital treatment to save households from financial catastrophe due to ill health.

### **6.5. Future Research Needs**

Our findings and policy implications suggest the additional research and analysis on the following topics;

- Further in depth studies should be conducted to explore the reasons of positive effect of large household size on catastrophic health expenditures. Though, it is expected that with an increase in family size, proportion of households incurring catastrophic health expenditures also increases.
- Further studies should be conducted by incorporating the travelling cost in the national health surveys so that a more comprehensive analysis on catastrophic health expenditures can be done.
- Likewise, there is a need to conduct more studies to estimate total (observed and unobserved) incidence of catastrophic health expenditures. Many poor people remain untreated due to financial constraints, therefore presented figures

could underestimate the real situation. It is because catastrophic health expenditures can only be measured for those who utilized the services and paid the user fee. It should be calculated by combining the reported OOP expenditures of those who utilized the health services along with the supposed OOP health payments of those who did not seek treatment.

- Similarly, studies can be done by splitting the OOP health expenditures into its components i.e. drug expenses, consultation fee and diagnostic tests etc. and separate in depth analysis can be done to analyze the proportion of each category in total health expenditure. It will be helpful to infer that on which component largest spending is done so that targeted policies can be made to provide financial protection to people from catastrophic effects of ill health.

## Appendix-A: Theoretical Part

### A1. Binary Logistic Regression

Logistic regression applies maximum likelihood estimation after transforming the dependent into a logit variable (the natural log of the odds of the dependent occurring or not). In this way, logistic regression estimates the odds of a certain event occurring. There are certain types of regression models in which the response variable is dichotomous in nature, taking a value 1 or zero. Suppose we want to study that a household is facing catastrophic expenditures or not. Hence the dependent variable can take only two values; 1 if a household is facing catastrophic expenditures and 0 if not. Logistic regression analysis is a uni/multivariate technique which allows for estimating the probability that an event occurs or not, by predicting a binary dependent outcome from a set of independent variables.

$$P_i = E(Y = 1 | X_i) = \beta_1 + \beta_2 X_i$$
$$P_i = E(Y = 1 | X_i) = \frac{1}{1 + \exp[-(\beta_1 + \beta_2 X)_i]} = \frac{1}{1 + \exp(-Z_i)} \quad (a1)$$

Where  $Z_i = \beta_1 + \beta_2 X$

The equation (a1) is known as the (cumulative logistic distribution function. Here  $Z_i$  ranges from  $-\infty$  to  $+\infty$ ;  $P_i$  ranges between 0 and 1;  $P_i$  is non-linearly related to  $Z_i$  (i.e.  $X_i$ ) thus satisfying the two conditions required for a probability model. In satisfying these requirements, an estimation problem has been created because  $P_i$  is nonlinear not only in  $X$  but also in the  $\beta$ 's. this means that one cannot use OLS procedure to estimate the parameters. Here  $P_i$  is the probability of facing catastrophic expenditures is given by;

$$P_i = \frac{1}{1 + \exp(-Z_i)}$$

And  $1 - P_i$  is the probability of not facing catastrophic expenditures is given by;

$$1 - P_i = \frac{1}{1 + \exp(Z_i)}$$

Therefore, we can write



$$\frac{P_i}{1-P_i} = \frac{1 + \exp(Z_i)}{1 + \exp(-Z_i)} \quad (\text{a2})$$

$P_i / (1-P_i)$  is the odds ratio in favor of facing catastrophic expenditures i.e. the ratio of the probability that a household will incur catastrophic health expenditures to the probability that it will not incur catastrophic health expenditures. Taking the natural log of equation 2 will give us;

$$L_i = \ln [P_i / (1 - P_i)] = Z_i = \beta_1 + \beta_2 X_i$$

That is the log of the odds ratio is not only linear in X, but also linear in the parameters. L is called the Logit.

## **A2. Comparison of PSM with other Methods:**

The PSM method is most suitable to the studying issue as compared to other methods like regression analysis, double difference method or paired observation analysis. The regression method usually ignores the selection biases and assumes that socio-economic and demographic characteristics of treated (households incurred catastrophic health expenditures) and control households (households do not incur catastrophic health expenditures) are identical. Although it is understood that non-incurring catastrophe group is comparatively better—thus less likely to be impoverished. Therefore, using mean outcome of non-incurring (catastrophic expenditures) households as an approximation is not suitable because households that incurred catastrophic expenditures and households do not incur catastrophic expenditures usually have different socio-economic characteristics.

The other two methods i.e. paired observations and DD methods require pre and post intervention information of a household. The paired observations technique is applicable only on one variable and assumes no effect of other variables, thus inappropriate in this case. The double difference is a popular non-experimental approach in which outcome (economic status) changes over time are estimated relative to the outcome observed for a pre-intervention baseline. However, the PPHS 2001 and 2004 provides baseline information but it would not remain homogenous as treated households have passed through several socio-economic changes during 2004 and 2010 thus makes it impossible to capture the heterogeneity over that period.

### **A3. Detailed Steps of PSM Method:**

The steps of PSM are as follows:

**Step 1:** First the representative sample of both eligible participants as well as non-participants is required. For good matching, sample of non-eligible participants must be larger. However, if two samples come from different surveys then both surveys should be comparable.

**Step 2:** Then logit model should be estimated by pooling the two samples. All the variables in the data that probably determine participation can also be included.

**Step 3:** In the next step 'propensity scores' can be estimated for both sampled participant and nonparticipants.

**Step 4:** The propensity scores that are out of range of some non-participant sample can be excluded in order to restrict potential matches with the treatment group.

**Step 5:** Then for each observation in the treated group, there must be an observation in the non-treated group that has the closet propensity score. It is called as nearest neighbor.

**Step 6:** For first five neighbors, the mean value of outcome indicator can be calculated. The gain can be estimated by taking the difference between mean and actual value for the treated group.

**Step 7:** The mean of individual gains can be calculated to obtain the average of overall gain.

## Appendix-B: Tables

Years	Poverty Headcount
2000-01	34.4
2004-05	23.9
2005-06	22.3
2007-08	17.2*
2010-11	12.4*
*The figures may be considered as interim indication of poverty situation in the country.	
<i>Source:</i> Economic Survey of Pakistan 2013-14	

	Panel Households	Split Households	Rural Households	Urban Households	Total Sample
Pakistan	2198	602	2800	1342	4142
Punjab	893	328	1221	657	1878
Sindh	663	189	852	359	1211
KP	377	58	435	166	601
Balochistan	265	27	292	160	452
<i>Source:</i> Nayab & Arif, 2012					

Variables	Percentage (%)	Number (N)
<b>Presence of Child</b>		
No	47.5	1522
Yes	52.4	1675
<b>Presence of Elderly</b>		
No	64.3	2058
Yes	35.6	1139
<b>Household Size</b>		
0-5 members	32.0	935
6-10 members	51.2	1666
11+ members	16.7	569
Missing Values	-	27
<b>Chronic Illness/Disability</b>		
No	32.8	1051
Yes	67.1	2146
<b>Household member is Hospitalized</b>		
No	80.6	2577
Yes	19.3	620
<b>Access to Drinking Water</b>		
Non-improved source	5.7	182
Improved source	94.2	3004
Missing Values	-	101
<b>Access to Toilet Facility</b>		

No	23.1	733
Yes	76.8	2439
Missing Values	-	25
<b>Total (N)</b>	<b>100</b>	<b>3197</b>

<b>Table B4: Percentage Distribution of Sampled Population – Regional Characteristics</b>		
<b>Variables</b>	<b>Percentage (%)</b>	<b>Number (N)</b>
<b>Place of Residence</b>		
Rural	71.1	2265
Urban	28.8	918
Missing Values	-	14
<b>Provinces</b>		
Punjab	43.8	1403
Sindh	31.3	1001
KPK	16.8	538
Baluchistan	7.9	255
<b>Total (N)</b>	<b>100</b>	<b>3197</b>

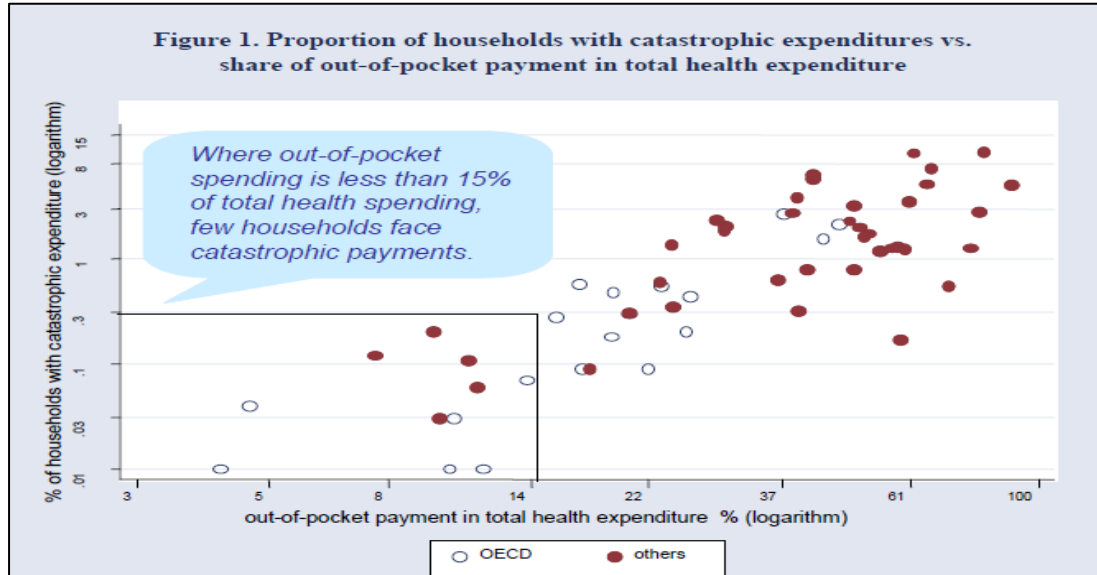
<b>Table B5: Percentage Distribution of Sampled Population – Individual Characteristics</b>		
<b>Variables</b>	<b>Percentage (%)</b>	<b>Number (N)</b>
<b>Gender of Household Head</b>		
Male	95.9	3051
Female	4.0	129
Missing Values	-	17
<b>Education of Household Head</b>		
No Education	54.3	1727
Some Education	45.6	1453
Missing Values	-	17
<b>Working status of Household head</b>		
Currently Working	78.6	2500
Not Working	21.3	680
Missing Values	-	17
<b>Total (N)</b>	<b>100</b>	<b>3197</b>

<b>Variables</b>	<b>Definitions</b>
Presence of a Child	Yes =1, No = 0
Presence of an Elderly	Yes = 1, No = 0
Household Size (Dummies)	0-5 family members is the reference category
	6-10 family members=1, Others = 0
	11+ family members=1, Others = 0
Distance to Health Facility	It is used as continuous variable
Presence of Illness/Disability in the Household	Yes =1, No = 0
Hospitalization Status of any Household Member	Yes =1, No = 0
Household Headship	Male = 1, Female = 0
Education of Household Head	Literate = 1, Illiterate = 0
Working Status of Household Head	Yes = 1, No = 0
Age of Household Head	It is used as continuous variable
Availability of Drinking water	Improved = 1, Non-improved/Not available = 0
Availability of Sanitation Facility	Improved = 1, Non-improved/Not available = 0
Region/Provinces (Dummies)	Punjab is the reference category
	Sindh = 1, Others = 0
	KPK = 1, Others = 0
	Baluchistan = 1, Others = 0
Place of Residence	Urban = 1, Rural = 0

<b>Quintiles</b>	<b>Total Expenditure per capita (Rs.)</b>	<b>Total Health Expenditure per capita (Rs.)</b>
Q1	1185.59	90.92
Q3	2390.24	162.02
Q4	3186.15	246.85
Q5	5867.83	389.94

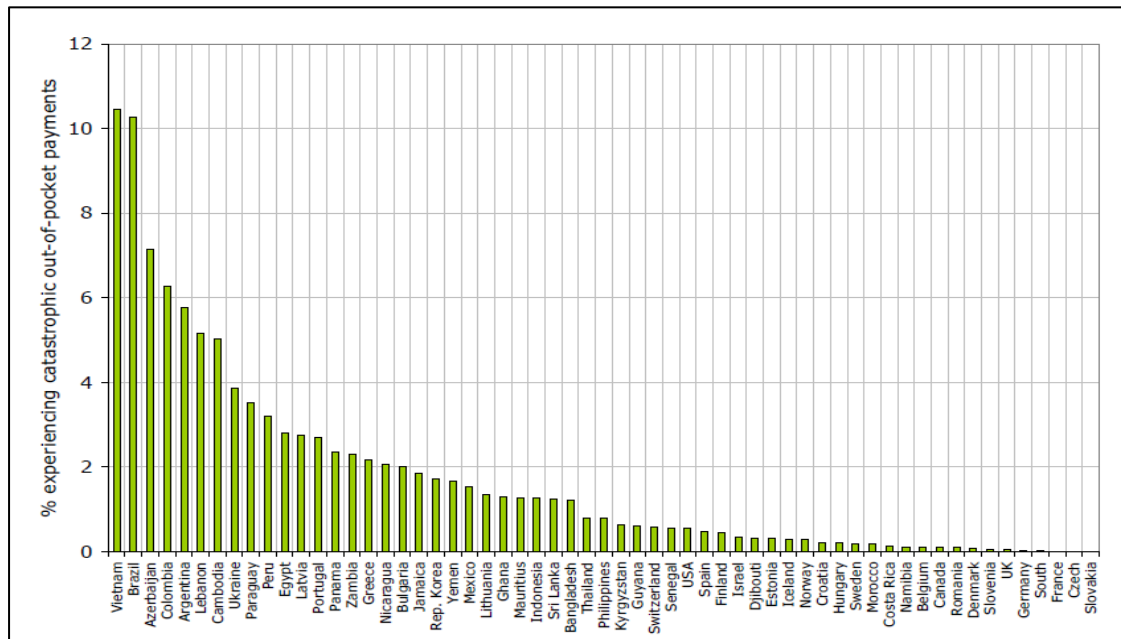
## Appendix-C: Figures

**Figure C1: Proportion of households with catastrophic expenditures vs. share of OOP payments in total health expenditure**



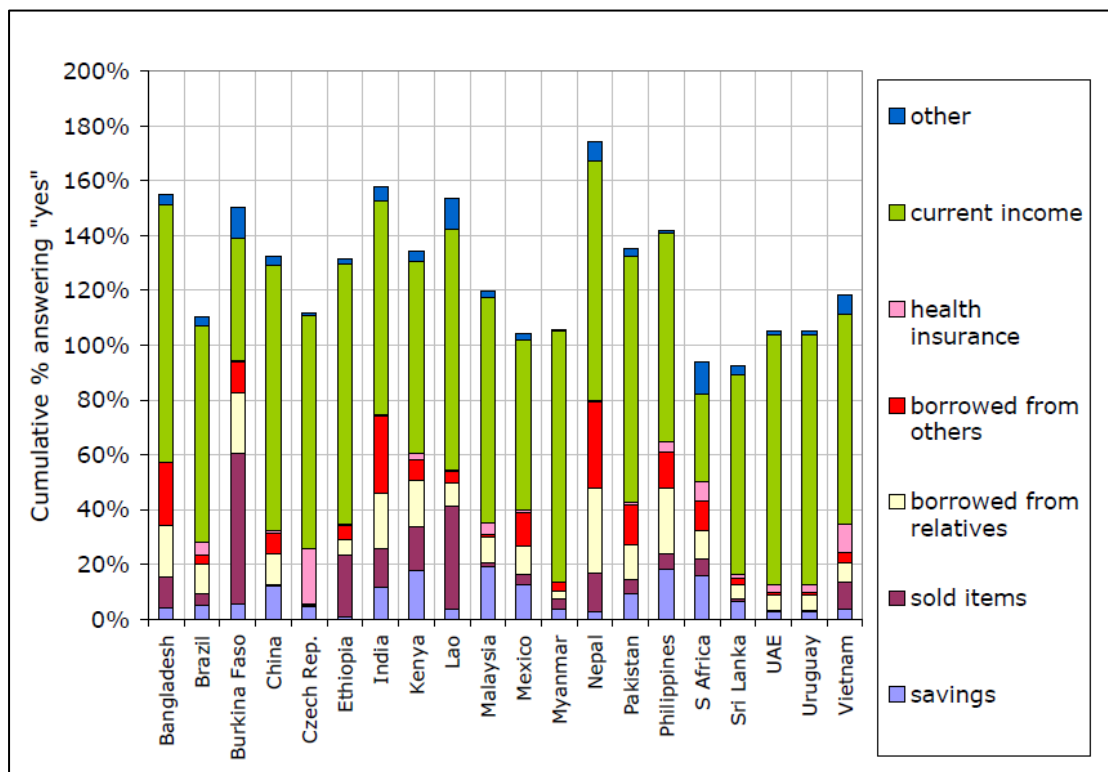
Source: WHO, 2005

**Figure C2: Incidence of catastrophic OOP payments in 59 countries (%)**



Source: Wagstaff, 2008

**Figure C3: How households finance their health expenditures, selected countries**



Source: Wagstaff, 2008

## REFERENCES

- Arif, G.M. & Farooq, S. (2012). Rural Poverty Dynamics in Pakistan: Evidence from Three Waves of the Panel Survey. Pakistan Institute of Development Economics, Islamabad. (Poverty and Social Dynamics Paper Series, PSDPS-2).
- Becker, S. & Ichino, A. (2002). Estimation of Average Treatment Effects Based on Propensity Scores. *The Stata Journal*, 2: 358–377.
- Berki, S.E. (1986). A Look at Catastrophic Medical Expenses and the Poor. *Health Affairs*, 5(4), 138-145.
- Bredenkamp, C., Mendola, M. & Gragnolati, M. (2011). Catastrophic and Impoverishing Effects of Health Expenditure: New Evidence from the Western Balkans. *Health Planning and Policy*, 26: 349-356.
- Bonu, S., Bhushan, I. & Peters, D.H. (2007). Incidence, Intensity and Correlates Of Catastrophic Out Of Pocket Health Payments In India. Manila: Asian Development Bank. EDR working paper no. 102.
- Caliendo, M. & Kopeinig, M. (2008). Some Practical Guidance for the Implementation of Propensity Score Matching. *Journal of Economic Survey*, 22:1, 31–72.
- Cavagnero, E., Carrin, G., Xu, K. & Aguilar-Rivera, A.M. (2006). Health Financing in Argentina: An Empirical Study of Health Care Expenditure and Utilization. Innovations in Health Financing. Working Paper Series 8.
- Chakraborty, S. (2011). Catastrophic Household Expenditure on Health Care in Urban Slums of Cuttack: Focus on Health Sector Reform in Odisha. *International Refereed Research Journal*, 2(2), 161-170.
- Chuma, J. & Maina, T. (2012). Catastrophic Health Care Spending and Impoverishment in Kenya. *BMC Health Services Research*, 12 (413).
- Cowell, A. (2006). The Relationship between Education and Health Behavior: Some Empirical Evidence, *Health Economics*, 15: 125-146.
- Damme, W.V., Leemput, L.V., Por, I., Hardeman, W. & Meessen, B. (2004). Out-Of-Pocket Health Expenditure and Debt in Poor Households: Evidence from Cambodia. *Tropical Medicine and International Health*, 9(2), 273-280.



- Dehejia, R. (2005). Practical Propensity Score Matching: A Reply to Smith and Todd. *Journal of Econometrics*, 125: 355–364.
- Doorslaer, E.D., Donnell O. O., Rannan-Eliya, R.P., Somanathan, A.....Zhao, Y. (2007). Catastrophic Payments for Health Care in Asia. *Health Economics*, 16(11), 1159-1184.
- Doorslaer, E.D., Donnell O. O., Rannan-Eliya, R.P., Somanathan, A.....Zhao, Y. (2006). Effect of Payments for Health Care on Poverty Estimates in 11 Countries in Asia: An Analysis of Household Survey Data. *Lancet*, 368, 1357-1361.
- Dreze, J. & Sen, A. (1989) Hunger and Public Action. Clarendon Press, Oxford.
- Dror, D.M., Putten-Rademaker, V. O. & Koren, R. (2008). Cost of Illness: Evidence from A Study in Five Resource-Poor Locations in India. *The Indian Journal of Medical Research*, 127: 347–361.
- Ekman, B. (2007). Catastrophic Health Payments and Health Insurance: Some Counterintuitive Evidence from One Low-Income Country. *Health Policy*, 83(2-3), 304-313.
- Ensor, T. & Pham, S. (1996). Access and Payment for Health Care. The Poor of Northern Vietnam. *International Journal of Health Planning Management*, 11: 69-83.
- Evans, T.G. (1995). Socioeconomic Consequences of Blinding Onchocerciasis in West Africa. *Bulletin of the World Health Organization*, 73: 495–506.
- Garg, C.C. & Karan, A.K. (2009). Reducing Out-Of-Pocket Expenditures to Reduce Poverty: A Disaggregated Analysis at Rural-Urban and State Level in India. *Health Policy and Planning*, 24: 116–28.
- Gertler P & Gruber J (2002) Insuring Consumption against Illness. *American Economic Review* 92: 51–70.
- Government of Pakistan. Social Protection Strategy, 2005. GOP: Islamabad, Pakistan; 2005.
- Grossman, M. (1972). The Demand for Health: A Theoretical and Empirical Investigation. NBER occasional paper. New York.
- Kavosi, Z., Rashidian, A., Pourreza, A., Majdzadeh, R..... Mohammad, A. (2012). Inequality in Household Catastrophic Health Care Expenditure in a Low-Income Society of Iran. *Health Policy Plan* 27: 613–623.

- Krishna, A. (2004). Escaping Poverty and Becoming Poor: Who Gains, Who Loses, and Why? *World Development*, 32(1), 121-136.
- McIntyre, D. & Thiede, M. (2003). A Review of Studies Dealing with Economic and Social Consequences of High Medical Expenditure with a Special Focus on the Medical Poverty Trap. Cape Town, South Africa: Health Economics Unit, University of Cape Town, 2003.
- Malik, A. M. (2011). Catastrophic and Impoverishment Analysis on Household Out Of Pocket Health Expenditure in Pakistan. Symposium “Bridging the gaps: Linking financing and quality of health services” 25<sup>th</sup>-26<sup>th</sup> July, 2011. The Agha Khan University, Karachi, Pakistan.
- Malik, A.M. & Syed, S.I.A. (2012). Socio-Economic Determinants of Household Out-Of-Pocket Payments on Health Care in Pakistan. *International Journal for Equity in Health*, 11:51.
- Merlis, M. (2002). Family Out-Of-Pocket Spending for Health Services: A Continuing Source of Financial Insecurity. The Common Wealth Fund Report.
- Murray, C., Xu, K., Klavus, J., Kawabata, K., Hanvoravongchai, P., Zeramardini, R., Aguilar-Rivera, A.M. & Evans, D.B. (2003). Assessing the Distribution of Household Financial Contributions to the Health System: Concepts and Empirical Application. In C. J. L. Murray, & D. B. Evans (Eds.), *Health system performance assessment: Debates, methods and empiricism*. Geneva: World Health Organization.
- Naga, R.H.A. & Lamiraud, K. (2008). Catastrophic Health Expenditure and Household Wellbeing. DARP Paper Series No. 98. London School of Economics. London.
- Narayan. D., ed. *Voices of the Poor. Can anyone hear us? Vol. 1.* 2000, New York: Oxford University Press for the World Bank, 2000.
- Nayab, D. & Arif, G.M. (2012). Pakistan Panel Household Survey: Sample Size, Attrition and Socio-Demographic Dynamics. Pakistan Institute of Development Economics, Islamabad. (Poverty and Social Dynamics Paper Series, PSDPS-1).
- O’Donnell, O., Doorslaer, E., Rannan-Eliya, R.V., Somanathan, A., Adhikari, S.R., Akkazieva, B..... Zhao, Y. (2008a). Who Pays for Health Care in Asia? *Journal of Health Economics*, 27: 460-475.

- O'Donnell, O., Doorslaer, E., Wagstaff, A. & Lindelow, M. (2008). Analyzing Health Equity Using Household Survey Data: A Guide To Techniques and Their Implementation. World Bank. 2008.
- O'Donnell, O., Doorslaer, E., Rannan-Eliya, R.V., Somanathan, A., Garg, C.C., Hanvoravongchai, P..... Vasavid, C. (2005). Explaining the Incidence of Catastrophic Expenditures on Health Care: Comparative Evidence from Asia. Equitap Project: Working Paper No. 5
- Okunade, A.A., Suraratdecha, C. & Benson, D.A. (2009). Determinants of Thailand Household Health Care Expenditure: The Relevance of Permanent Resources and Other Correlates. *Health Economics* 19(3), 365-376.
- Onwujekwe, O., Hanson, K. & Uzochukwu, B. (2012). Examining Inequities in Incidence of Catastrophic Health Expenditures on Different Healthcare Services and Health Facilities in Nigeria. PLoS One. Volume 7, Issue 7.
- Pal, R. (2010). Analyzing Catastrophic OOP Health Expenditures in India: Concepts, Determinants and Policy Implications. Indira Gandhi Institute of Development Research, Mumbai. WP-2010-001.
- Palmer, N., Mueller, D., Gilson, L., Mills, A. & Haines, A. (2004). Health Financing to Promote Access in Low-Income Settings – How Much Do We Know? *Lancet*, 364:1365-70.
- Parikh, J., Biswas, H. & Karmakar, S. (2003). Cooking with Biofuels: Risk Factors Affecting Health Impact on Rural Women. *Economic and Political Weekly*, 38(34), pp. 2681-2691.
- Peters, D., Yazbeck A., Sharma, R., Ramana, G., Pritchett, L. & Wagstaff, A. (2002). Better Health System for India's Poor: Findings, Analysis and Options. Human Development Network, Health, Nutrition and Population series. Washington DC: The World Bank.
- Pradhan, M. & Prescott, N. (2002). Social Risk Management Options for Medical Care in Indonesia. *Health Economics* 11: 431-36.
- Rahman, M.M., Gilmour, S., Saito, S., Sultana, P. & Shibuya, K. (2013). Health Related Financial Catastrophe, Inequality and Chronic Illness in Bangladesh. PLOS ONE. Volume 8, Issue 2.

- Ravallion, M. (2003). Assessing the Poverty Impact of an Assigned Programme. In F. Bourguignon, and L. P. da-Silva (eds.) *The Impact of Economic Policies on Poverty and Income Distribution: Evaluation Techniques and Tools*. New York: Oxford University Press.
- Roberts, M., Hsiao, W., Berman, P. & Reich, M. (2004). *Getting Health Reform Right: A Guide to Improving Performance and Equity*. Oxford: Oxford University Press.
- Rosenbaum, P. & Rubin, D. (1983). The Central Role of the Propensity Score in Observational Studies for Causal Effects. *Biometrika*, 70: 41–55.
- Rous, J.J. & Hotchkiss, D.R. (2003). Estimation of the Determinants of Household Health Care Expenditures in Nepal with Controls for Endogenous Illness and Provider Choice. *Health Economics*, 12: 431-51.
- Sauerborn, R., Adams, A. & Hien, M. (1996). Household Strategies to Cope With the Economic Costs of Illness. *Social Science Medicine* 43: 291–301.
- Schwartz, M., Naierman, N. & Birnbaum H. (1978). Catastrophic Illness Expense: Implications for National Health Policy in the United States. *Social Science and Medicine*, 12: 13–22.
- Sen, A. (1981). *Poverty and Famines: An Essay on Entitlements and Deprivation*. Clarendon Press, Oxford.
- Shahrawat, R., & Rao, K. D. (2012). Insured Yet Vulnerable: Out-Of-Pocket Payments and India’s Poor. *Health Policy Plan*, 27: 213–221.
- Smith, J. & Todd, P. (2005). Does Matching Overcome LaLonde’s Critique of Non-experimental Estimators? *Journal of Econometrics*, 125:1–2, 305–353.
- Su, T.T., Kouyate, B. & Flessa, S. (2006). Catastrophic Health Expenditure for Health Care in a Low-Income Society: A Study from Nouna District, Burkina Faso. *Bulletin of the World Health Organization*: 84, 21-27.
- The Network for Consumer Protection. (2005). *Health Care Financing in Pakistan*. Occasional Paper Series.
- Thuan, N.T., Lofgren, C., Chuc, N.T., Janlert, U. & Lindholm, L. (2006). Household Out-Of-Pocket Payments for Illness: Evidence from Vietnam. *BMC Public Health*. 6: 283.

- Tipping, G. (2000). The Social Impact of User Fees for Health Care on Poor Households: Commissioned Report to the Ministry Of Health, Hanoi, Vietnam; 2000.
- Uplekar, M., Pathania, V. & Raviglione, M. (2001). Private Practitioners and Public Health: Weak Links in Tuberculosis Control. *Lancet*, 358: 912–916.
- Wagstaff, A. (2008). Measuring Financial Protection in Health. Policy Research Working Paper 4554: World Bank.
- Wagstaff, A. & Lindelow, M. (2008). Can Insurance Increase Financial Risk? The Curious Case of Health Insurance in China. *Health Economics*, 27(4), 990-1005.
- Wagstaff, A. (2002a). Poverty and Health Sector Inequalities. *Bulletin of the World Health Organization*, 80: 97–105.
- Wagstaff, A. & Doorslaer, E. (2003). Catastrophe and Impoverishment in Paying for Health Care: With Applications to Vietnam 1993–98. *Health Economics*, 12: 921–34.
- Whitehead, M., Dahlgren, G. & Evans, T. (2001). Equity and Health Sector Reforms: Can Low-Income Countries Escape the Medical Poverty Trap? *Lancet*, 358: 833–836.
- World Health Organization (2000). The World Health Report 2000. *Health Systems: Improving Performance*. Geneva: World Health Organization, 2000.
- WHO (2002). The World Health Report 2002. Geneva: World Health Organization, 2002.
- WHO (2004). The Impact of Health Expenditure on Households and Options for Alternative Financing. Technical Paper. EM/RC51/4.
- WHO (2005). Designing Health Financing Systems to Reduce Catastrophic Health Expenditure: Technical Briefs for Policy-Makers, Number 2, 2005: Geneva.
- WHO (2010). Protecting the Poor against Health Impoverishment in Pakistan: Proof Of Concept of the Potential within Innovative Web and Mobile Phone Technologies. World Health Report. Background Paper, 55.
- WHO (2010). The World Health Report 2010. *Health systems financing: The path to universal coverage 2010*. Geneva: World Health Organization, 2010.
- WHO (2013). Pakistan. Country Cooperation Strategy at a glance.
- World Bank (2012). Health Equity and Financial Protection Report—Pakistan. Washington, D.C.

- Wyszewianski, L. (1986). Financially Catastrophic and High-Cost Cases: Definitions, Distinctions, and Their Implication for Policy Formulation. *Inquiry*, 23: 382–394.
- Wyszewianski, L. (1986). Families with Catastrophic Health Care Expenditures. *Health Services Research*, 21: 617–634.
- Xu, K., Evans, D.B., Kawabata, K., Zermdini, R..... Murray, J.L. (2003). Household Catastrophic Health Expenditure: A Multicounty Analysis. *Lancet*, 362: 111-117.
- Xu, K., Evans, D.B., Kadama, P., Nabyonga, J..... Aguilar, A.M. (2006). Understanding the Impact of Eliminating User Fees: Utilization and Catastrophic Health Expenditures in Uganda. *Social Science Medicine*, 62(8), 866–876.
- Xu, K., Evans, D.B., Carrin, G., Mylena, A.A., Musgrove, P. & Evans, T. (2007). Protecting Households from Catastrophic Health Spending. *Health Affairs*, 26(4), 972-983.
- Yu, H., Cao, S. & Lucas, H. (1997). Equity in the Utilization of Medical Services: A Survey in Poor Rural China. *IDS Bulletin*, 28: 16–23.