

HEALTH EXPENDITURE AND HOUSEHOLD POVERTY: EVIDENCE FROM PAKISTAN



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CERTIFICATE

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DEDICATION

I dedicated this Research to my Beloved
RESPECTED FATHER (Late)
Who did Everything for Me

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ABSTRACT

This study examines the incidence and determinants of catastrophic health expenditures and impoverishment in Pakistan. Out-of-Pocket Health expenditures are a major source of health financing in many countries. These expenditures can cause households to incur catastrophic costs. 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. The Household Integrated Income and Consumption Survey (HIICS, 2015-16) are used for measuring the incidence of catastrophic health expenditures. This study used descriptive analysis to investigate the incidence of catastrophic health expenditures and impoverishment. We define catastrophic health expenditures at two thresholds i.e. 10 percent of total household expenditure and 40 percent of household's capacity to pay based on methodologies proposed by Wagstaff and Doorslaer (2005) and Xu et al (2005). We also applied several thresholds reported in other studies to demonstrate the sensitivity of measures of catastrophic expenditures. High rates of incidence (14.76%) of catastrophic health expenditures are found for a 5% threshold, whereas 0.54% and 0.48% incidence is estimated for 40% threshold and methodologies respectively. The households were pushed into poverty due to health care payments. Both individual and household characteristics significantly affect the catastrophic health expenditures. Catastrophic expenditures and impoverishment problems were more common among the households who are located in rural areas and have children and elderly people. High out of pocket health expenditures requires equitable distribution of health services among all the groups of the society.

Keywords: Catastrophic Health Expenditure; Impoverishment; Health Expenditure; Logit Model

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CHAPTER 1

INTRODUCTION

All over the world, health care organizations make ensure to provide high-quality curative services to its population that can protect them from facing catastrophic effects of disease and suffering. Individuals with bad health and suffering from any disease become a cause of economic burden not only on their families but also on the economy. Their productive capacity is harmed by ill health, which in turn lowers households' income and the overall income of the nation, specifically in developing countries. Lower-income then results in lower welfare of the individual and households for the long term. Therefore, it is a major challenge of governments in developing economies to provide health services to everyone when needed so that may not suffer from financial burden caused by out-of-pocket health expenditures. On one hand, the expenses which are paid by the households from their pockets at the time of utilization of health care services are often compelling the person to decide basic needs e.g education, food, and housing, or to save their beloved ones from illness (Knaul et al., 2006).

In health care expenditures, the basic source of financing are the OOP payments (Choi *et al.*, 2014; Rahman *et al.*, 2013) and consequently, hinder having an equitable health financing system (WHO, 2000). These out of pocket payments become catastrophic when households have to pay a large share of their income to acquire health care. Consequently, these payments become a burden on households and can push them into poverty.

Therefore, (Baeza & Packard, 2006; Wagstaff & Doorslaer, 2003), argue that catastrophic health spending is one of the pertinent cause of poverty. On a global level, 44 million households face financial catastrophe in both resource-rich and scarce-resource countries. Health care expenses might be the predominant cause behind pushing the vulnerable

population into poverty (Gertler *et al.*, 2009; Tangcharoensathien *et al.*, 2011)). Many studies show that OOP payment is a threat to households' living standards (Van Doorslaer *et al.*, 2006; Xu *et al.*, 2006). There is no consensus on the threshold for measuring catastrophic health expenditures. According to WHO, if for any household, the share of health expenditures out of non-food expenditures exceeds 50%, then that household has a high probability of being impoverished.

Moreover, the public health spending to GDP ratio has remained low in developing countries but in particular, this ratio in Pakistan has not only remained below one percent of GDP but also declining over time. In 2000-01, the government allocated 0.72% of GDP for the health sector and this was further reduced to 0.23% and 0.35% in 2010-11 and 2012-13, respectively. Many studies have shown that public health expenditure to GDP is 2-3% on average for low-income countries and 8 to 9% for high-income countries (Musgrove *et al.*, 2002).

In Pakistan during the year 2015-16, around two-third of the expenditure on healthcare was financed by households' Out of Pocket (OOP) expenditures, 50.0% was financed by different tiers of the government and the remaining percentage of the expenditure was financed by private corporations /companies, social security fund, health insurance, local NGOs and official donor agencies, etc¹. As per consensus, the healthcare expenditure causes poverty and even exacerbates poverty based on its high share in income (Khalid & Sattar, 2016) in developing countries particularly in Pakistan. Unquestionably, the OOP payment is a major component of healthcare expenditure and as a result, causes poverty and even intensifies poverty. The high Out-Of-Pocket (OOP) payment treatment expenditure increases the risk of

¹ National Health Accounts 2015-16," Pakistan Bureau of Statistics, Government of Pakistan, Islamabad.

impoverishment. The worldwide researcher acknowledges that Out-Of-Pocket expenditure lead households and individuals toward poverty (Gupta, 2009).

Finally, as per the motivation of our study, over the past, the literature around OOP payment and the status of households in the terms of the economy has grown. The debates, evidence, and discussions around the effects of OOP payments were highly intense, particularly on health and poverty outcomes. In 2005, the Member States of WHO for the encouragement of countries to develop health-financing systems adopted a resolution. The basic aim was at providing universal coverage. This universal coverage was a system designed at an affordable cost to obtain access for all appropriate preventive, curative, promotive, and rehabilitative services. Low public health, poor health services, and insufficient health coverage spending determine the level of OOP in countries.

Our study results provide valuable insight into the effects of health financing policies and indicate that policymakers need to reduce the dependence on health payments from out-of-pocket (OOP) and provide a social health security strategy for households against informal health payments from OOP. The lack of financial risk protection in Pakistan's health system is a major problem that policymakers have address towards achieving universal health coverage (UHC) as a target of Sustainable Development Goals (SDGs).

1.1 Research Gap

Payments for health care are usually considered progressive in Pakistan, meaning that the elite class spends a higher proportion of their expenditure on health care than the poor. This is true for both taxation-based health finance as well as OOP payments (Chandrasiri *et al.*, 2012; Malik & Syed, 2012). Out of pocket, payments (OOP) are an integral and sizable portion of healthcare expenditure in both developed and developing countries including Pakistan.

However, none of the studies conducted earlier to examining the determinants and occurrence of catastrophic health expenditures and impoverishment.

1.2 Objectives

- To estimate the incidence of catastrophic health expenditures and impoverishment (to examine the poverty impacts of catastrophic health expenditures).
- To evaluate the determinants of catastrophic health expenditures
- To evaluate the determinants of impoverishment

1.3 Significance of the Study

In Pakistan, millions of people suffer annually from catastrophic expenditures due to high OOP payments, lack of insurance, and a weak health system and pushed deeper into the vicious circle of poverty. Moreover, Pakistan is also facing a double burden of disease, high fertility, and rampant poverty that puts a 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 the economic consequences of health shocks, and secondly, with regard to health financing policies it throws the light why equal distribution of services to all groups of the society is necessary.

CHAPTER 2

LITERATURE REVIEW

Out-of-pocket (OOP) payments when exceeds a certain portion of household expenditure or income are called Catastrophic health expenditures (CHE) (Berki, 1986; Russell & hygiene, 2004; Wagstaff & Doorslaer, 2003). These expenditures are considered as expenditure on health care that hinders the family's ability to finance necessities of live and to continue its normal living standards.

Households' catastrophic health payments (CHP) are defined in two ways (O'donnell *et al.*, 2007; Wagstaff & Doorslaer, 2003). The primary criterion describes the share of CHP out of total household expenditures. However, this method includes merely households having a health budget share and disregards impoverished households (unable to afford the budget share). Whereas, the second criterion describes CHP made in comparison to the overall household expenditures, excluding expenditures on food items. Wagstaff and Doorslaer (2003) term 'expenditure on essentials' as "non-discretionary expenditure" and Xu *et al.* (2006) as "affordability to pay/financial capacity". Hence, expenditures other than food items could be a better factor to analyze the wealthy and impoverished households than overall spending (O'donnell *et al.*, 2007).

Subsequently, medical care cost of 10 % out of overall household expenditure may be termed as catastrophic, and if it is 10 % of non-food expenditure than it is not considered catastrophic (O'Donnel *et al.*, 2008). A 10% factor is usually the minimum amount for catastrophic health expenditure as a portion of the whole expenditure. Whilst 40% of non-food expenditure on health care is considered catastrophic (Chuma & Maina, 2012; O'donnell *et al.*, 2007; Wagstaff & Doorslaer, 2003). Consequently, exceeding the aforementioned medical cost

levels shall coerce households to forgo their necessities and cope through selling assets, acquire loan(s) and confront poverty (Russell & hygiene, 2004; Xu *et al.*, 2006) relied on 40% of the household's "capacity to pay/financial health".

The second criterion reasons CHE as Xu (2005) explains a portion of financial capacity compressively. Thus, a household's financial capacity is the remaining amount after essentials are paid.

Prior researches reveal that CHE has been studied mostly in Latin America and Asia and a little in Africa. Xu *et al.* (2003) studied CHEs in developed countries and concluded that the proportion of households made CHE as Out-of-pocket (OOP) health expenditures differed among these countries, that is, below 0.02 % in Slovakia and the Czech Republic, and 2.72 % in Portugal.

O' Donnel *et al* (2008) through Chuma and Maina (2012) approach explained CHEs and poverty, contrary (Venkatraman *et al.*, 2006; Xu *et al.*, 2006) who relied on Xu (2005) technique. Studied incidences of incurred and prospective health care costs by considering households that might incur health care costs if health care was pursued once required be Saksena *et al* (2006). Xu *et al* (2006a) revealed that the section of household's health care cost was 4 percent among entire families compared to 10 percent among families who availed medical care. Per Saksena *et al* (2006) households incurring health care costs and the potential ones have significant differences.

Although many researches (described above) have elaborated occurrences of health care costs, merely a handful of them studied the causing factors (Akinkugbe *et al.*, 2011; Cavagnero *et al.*, 2006; Gotsadze *et al.* 2009; Knaul *et al.*, 2006; Lamiraud *et al.*, 2005; Rivera

et al., 2006; Su *et al.*, 2006; Xu *et al.*, 2006a). Catastrophic health expenditures, aforesaid, have been studied through logistic regression analysis to estimate its determinants/causes.

Prior researchers have found several significant factors of health care costs, such as impoverishment, protracted diseases, aging, financial accessibility, limited insurance cover, developed/undeveloped areas differences, socio-economic condition, disease types, the household demography, and the features of the household chief - age, gender, and education (Xu *et al.*, 2002; Kawabata, 2002 and Galarraga *et al.*, 2010).

Place of residence also impacts significantly health care costs. For instance, in Akinkugbe Botswana, *et al.*, (2011) it surfaced that families dwelling in undeveloped areas were more likely to incur health care costs compared to families living in developed areas. Urban citizen was shielded against a financial problem in Kenya (Xu *et al.*, 2006), whereas in Uganda it supported the rich but not the impoverished ones (Xu *et al.*, 2006). However, Georgia demonstrated the likelihood of town residents confronting health care costs were approximately twofold in comparison to households that availed health care in East and West Georgia (Gotsadze *et al.*, 2009). The proximity and expensiveness of advanced health care facilities inside towns are the underlying reasons for this pattern.

Family head characteristics (sex, credentials, and employment status) provide vital standpoints in illuminating health care costs. Employment status and impressive credentials may empower in managing any financial liability or transacting belongings. Mexico, for instance, Knaul *et al.* (2006b) contend that family head credential reflects the lower prospect of serious health outlays/CHEs.

Less-educated household heads, the chance of catastrophic health expenditures CHE also increased in Uganda (Xu *et al.*, 2006c). Families who are run by females and also with

educated heads were noticed to be less expected to incur CHE in Botswana (Akinkugbe *et al.*, 2011). If we look at the Argentine then there will be different results found as Argentine depicted families run by females have more chances to confront financial catastrophe compared to families run by males (Cavagnero *et al.*, 2006). The gender of the family head did not affect the possibility of catastrophic health expenditures of the poor residing in Uganda, but female-headed families had more chances to experience financial catastrophe compared to non-poor male-headed families (Xu *et al.*, 2006c). Xu *et al.* (2006a) and Cavagnero *et al.* (2006) documented that family head having higher education and working reduced the chances of catastrophic spending in Kenya and Argentina.

Su *et al.* (2006) noted that affordability or financial condition was the prime cause of emergency health costs in Burkina Faso. Likewise, Georgia showed, Gotsadze *et al.* (2009), that for the wealthiest quintile families, the likelihood of encountering catastrophic expenditures was four times less than households falling in the poorest quintile. Congruently, Tanzania reflects households with lower socioeconomic status to raise the rate of health care outlays (Brinda *et al.*, 2014).

Family features like the number of family members and their ages also affect emergency health outlays. The number of family members indicates different income levels and the individuals benefiting from medical facilities. The adolescents and elderly members of the family usually require care that is more preventive.

The three following nations raise the likelihood of health care payments on elderly and minor family members (Akinkugbe *et al.*, 2011; Knaul *et al.*, 2006b; Xu *et al.*, 2006c). In Kenya children under five years reduced the likelihood of health emergency outlays (Xu *et al.*, 2006a). Similarly, in Argentina, the study shows that catastrophic payments for the families

who have young between one to five years have low catastrophic payment risks. It was the opposite for the households with at least one or more members above 65 (Cavagnero et al., 2006).

Family structure i.e. number of individual's members in a family and its features like age differs for impoverished and wealthy families. Geda et al. (2001) study substantiated a strong correlation between the number of family members and financial conditions. One of the most relevant causes of impoverishment throughout Oyugi (2000) is the number of family members.

The proportion of dependence is calculated as the ratio of the unemployed individuals in the household (inclusive of adolescents or elderly) to the ones employed in the family members. This proportion enables quantifying the strain on employed individuals of the family. High impoverishment means an increased proportion of dependence (World Bank, 2005). The participatory approach employed by Kristjanson et al. (2010) for examining causes of families' worsening financial condition indicated that multiple unemployed family members burdened families' available possessions and correlated with 41 percent of all worsening financial conditions. Being male or female heading the family substantially affected family economic condition, and particularly, females heading families were found to be financially weaker than the ones leading by males. Research by Kabubo-Mariara *et al.*, (2006); Muyanga *et al.* (2006); Mwabu *et al.* (2000), observed differences in impoverishment levels of families led by male and females. Female-led families confronted greater impoverishment when compared to males.

In addition to income and/or consumption sources to determine whether a family is impoverished, many other financial factors affect impoverishment, most notably family work

status, and resources owned by the family. Such factors are employed as predictor factors and were substantiated even when employed in extracting impoverishment projections (Okwi et al., 2006). The family capital reflects durable goods like agricultural fields with its equipment, livestock, machinery, buildings, domestic appliances, and its liquid resources. Such factors demonstrate families' economic status and influence their cash flows. Besides, some families particularly in remote territories may appear impoverished when their income is noted but affluent when their assets are taken into account (World Bank, 2005). Muyanga *et al.*, (2006) research substantiated that impoverishment decreased when the mean value of tangible resources and agricultural land was calculated.

While analysing impoverishment, the predictors employed to describe credentials include education level of family individuals (primary or advanced education level); educational facilities accessibility like nearness to elementary or higher educational institutions (Kabubo-Mariata *et al.*, 2006; Muyanga *et al.*, 2006) and usage of these facilities by the individuals of impoverished and wealthy families. The widely applied approaches to study usage by impoverished and wealthy families include students registered in school, drop out data age-wise and gender and its causes, the proportion of students who started school late in life, and average education cost on every child registered (World Bank, 2005).

Health care outlays and impoverishment researches notes important impacts through which OOP propagates impoverishment. Whitehead, Dahlgren, and Evans (2001) describe three important ways whereby healthcare outlays influence poverty. First untreated diseases, which affect most people unable to afford healthcare costs—the health of such people might suffer gravely. The second factor is caring for accessibility limitations. Researches depict that high healthcare outlays result in an uneven reduction in healthcare accessibility. Asingwire

(2000) established that imposing user-fees on health care services throughout Uganda limited HIV/AIDS-affected families availing healthcare facilities. Non-affected households in comparison to affected households, also bear higher health care costs, however, their medical needs were not severe compared to affected households. The findings indicate that impoverished people do not timely avail medical care until their condition health deteriorates due to financial constraints (Lucas, and Tipping *et al*, 2000). Consequently, they have to bear more treatment that is expensive at the hospital than the health clinics. The negative effects of OOP expenses, however, are two-fold, i.e. poorer health and increased medical expenditures (Whitehead, Dahlgren, and Evans 2001). The final category is emergency health outlays and impoverishment in the longer term. People do not compromise on health care even if their durable income is compromised.

CHAPTER 3

MODELS, DATA AND METHODOLOGY

3.1 Models for Analyzing Poverty Effects of Catastrophic Expenditures

This section briefly discusses the methodologies commonly used for analyzing the association between catastrophic health expenditures and impoverishment (for detailed, see Wagstaff and van Doorslaer (2002); O'Donnell *et al.* (2008) and Xu (2005)). In these methodologies, the incidence of catastrophic payments is defined as OOP expenditures exceeding a threshold budget share. The two commonly used thresholds are 10 percent of total income or 40 percent of non-food income. Xu uses 40 percent of capacity to pay.

3.1.1 Wagstaff and van Doorslaer's Methodology

To calculate catastrophic expenditure headcount ratio which is the percentage of households incurring catastrophic expenditures.

A household is said to have incurred catastrophic payments if T_i/x_i , or $T_i/[x_i - f(x)]$ exceeds a specified threshold, z . T_i is defined as out of pocket health expenditures for household i , x_i is the total expenditures for household i and $f(x)$ represents food expenditures.

The headcount is then given by;

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

Let sample size be N and E_i , equals 1 if T_i/x_i or $T_i/(x_i - f(x)) > Z$ and zero otherwise.

3.1.2 The Xu Methodology

This methodology requires the gathering of data on OOP health payments, household expenditure on consumption (exp), payments made for food (food), the impoverishment level (pl), family's outlays on essentials (se), and the family's medical care affordability (ctp).

Household consumption expenditure comprises of home-made products consumed in monetary value, in-kind transactions, and disbursements on all products and utilities. It is noteworthy to mention that health care services are not included in household consumption expenditure.

Household food expenditure covers the household's food items payments and the price of the family's subsistence products utilized inside the house. Nevertheless, Household food expenditure does not account for family dining outs (e.g. hotels and restaurants), alcoholic beverages, and tobacco.

Mean value of food expenditures lying in 45-55 percentile ranges of share of food expenditures out of total expenditures is used for measuring the poverty line and computation of subsistence spending. This is the basic outlays per (equivalent) person, also referred to as the impoverishment level (pl);

$$pl = \frac{\sum w_h * eqfood_h}{\sum w_h} \quad (1)$$

Where w_h denotes the equivalized individual family members in the 45th to 55th percentile range and $eqfood_h$ represents equivalized food expenditure. Thus, basic outlays/costs for each family (se_h) is derived by;

$$se_h = pl * eqsize_h \quad (2)$$

A family shall be categorized as poor ($poor_h$) when its entire expenditure is below its basic/essential outlays.

$$Poor_h = 1 \text{ if } exp_h < se_h \quad \text{and} \quad Poor_h = 0 \quad \text{if} \quad exp_h \geq se_h \quad (3)$$

Household payment capacity is the household non-subsistence spending. Expenditure on non-food items is used as a non-subsistence expenditure.

$$ctp_h = exp_h - se_h \quad \text{if} \quad se_h \leq food_h \quad (4)$$

$$ctp_h = exp_h - food_h \quad \text{if} \quad se_h > food_h \quad (5)$$

Healthcare spending load is termed as the OOP expenditures as the proportion of a family's financial capability.

$$ooctp_h = oop_h / ctp_h \quad (6)$$

A supposed variable for catastrophic health expenditure is valued as 1 if incurred catastrophic expenditure and valued 0 if it is not incurred.

$$cata_h = 1 \quad \text{if} \quad oop_h / ctp_h \geq 40\% \quad (7)$$

$$cata_h = 0 \quad \text{if} \quad oop_h / ctp_h < 40\% \quad (8)$$

An economically sound family financial health deteriorates by incurring health expenditures, availing health services. The impoverishment ($impoor_h$) established dummy variable is quoted as 1 as family payment is equivalent to or surpasses disbursements on minimum household food requirement. However, its value equals 0 if the basic outlay is lower than the total of OOP medical care outlays.

$$impoor_h = 1 \text{ if } exp_h > se_h \quad (9)$$

3.1.3. Catastrophic Expenditures and impoverishment

Poverty herein reflects the level of health disbursements driving individuals economically vulnerable (Wagstaff, 2008). The economic vulnerability caused by bearing medical care costs is generally computed as the difference between impoverishment level projections extracted from the family belongings prior deduction of medical care costs, i.e. gross OOP payments and after deduction i.e. net OOP expenses (O'Donnel *et al.*, 2008; Wagstaff & van Doorslaer, 2002).

$$PI^H = H_{pov}^{post} - H_{pov}^{pre} \quad (10)$$

3.2 Data

Household Integrated income and consumption Survey (HIICS) for the year 2015-16, conducted by the Pakistan Bureau of Statistics (PBS), is employed in this research. Prior 2015-16 (*HIICS*), six HIICS surveys were conducted in the past i.e. during 2004-05, 2005-06, 2007-08, 2010-11, 2011-12, and 2013-14. Foregoing in view, 24,238 households were surveyed in the present HIES and useful insights were obtained, i.e. expenditures on various health components and consumption expenditure at the national and provincial levels with urban/rural breakdown. These components of health expenditures are added to obtain total expenditures. Total food expenditures, nonfood expenditures, and total consumption expenditures are derived easily from the consumption module.

Information on individuals and household characteristics is extracted from the roster of this survey.

3.3 A Logit Model for determinants of Catastrophic Expenditure

Following other studies in the literature (Xu *et al.*, 2006a; Xu *et al.*, 2006c; Knaul *et al.*, 2006b; Akinkugbe *et al.*, 2011; Cavagnero *et al.*, 2006; Rivera *et al.*, 2006; Gotsadze *et al.*, 2009; Su *et al.*, 2006; Lamiraud *et al.*, 2005 and Brinda *et al.*, 2014), the logistic regression model is applied to the analysis of determinants of catastrophic health expenditure. The unit of (cata) defined as 1 when the household faces catastrophic health payments, and 0 otherwise. Based on the logistic distribution function, the probability of a household facing catastrophic expenditure is:

$$\Pr(cata = 1|X) = F(X'B) = e^{X'B} / (1 + e^{X'B}) \quad (1)$$

In the event of individual level data, the probability of experiencing catastrophic health expenditures is determined by an underlying latent variable, y^* , with a dichotomous realization on the dependent variable. The dependent variable, *cata*, is measured as follows:

$$y_i = \begin{cases} 1 & \text{if } y_i^* > 0 \\ 0 & \text{if } y_i^* \leq 0 \end{cases} \quad (2)$$

y^* is expressed below by a regression relationship.

$$y^* = \sum X'_i \beta + \varepsilon_i \quad (3)$$

Empirical Equation

$$CHE_i = \alpha_0 + \alpha_1 AR_i + \alpha_2 HS_i + \alpha_3 NOLD_i + \alpha_4 NC_i + \alpha_5 EHH_i + \alpha_6 ESHH_i + \alpha_7 MSH_i + \mu_i$$

The dependent variable is catastrophic health expenditure CHE_i and independent variables are area of residence (AR), Households size (HS), number of old people (NOLD), number of children (NC), Education of household head (EHH), employment status of household head (ESHH) and marital status of household head (MSHH).

3.3.1 Determinants of catastrophic health expenditures

A review of the literature identifies some important determinants of catastrophic expenditures as poverty, aging, chronic illnesses, low levels of insurance coverage, financing system, rural/urban differences, socio-economic status, types of illness, demographic composition of the household, and the characteristics of household head such as age, sex, and education, (Galarrga *et al.*,20010; Kawabata, 2002; Xu *et al.*, 2003).

Area of residence: has also been confirmed as a significant determinant of catastrophic health expenditures. For instance, throughout Botswana, Akinkugbe *et al.* (2011) research reveal that emergency medical care outlays for families living in towns have less likelihood of confronting emergency medical care payments compared to families living in remote areas.

Household characteristics: Such as their number and age, groups do also play a strong role in demonstrating emergency medical outlays. The number of family members indicate various income levels and availing health services. The elders and adolescents of the family usually require more medical care than other members.

Characteristics of the household head: Sex, credential, and employment help in better exploring the emergency health disbursement. Sound credentials with employment empower the family head better to cope up with financial vulnerabilities like money borrowing, or managing resources as required be.

Table 3.1: Description of the Variables

Name of the variable	Measurement
Area of residence	1 If household is located in an urban area; 0 otherwise
Household Size	Total number of members in a household
No of Old People	Number of members in a household aged 65 years and above
No of Children	Number of children aged five years and below
Education of HH	Completed years of Education
Gender of HH	1 if the head of household is a male; 0 otherwise
Employment Status of HH	1 if the head of household is working; 0 otherwise
Marital Status of HH	Married=1, otherwise, 0

3.4 Impoverishment determinants

Impoverishment occurrence is represented as a dependent variable and valued 1 once the family becomes economically vulnerable and 0 otherwise.

This research subsequently (Van Doorslaer *et al.*, 2006) presupposes that the likelihood of being economically vulnerable or well off depends on the variable y_i (response variable) which provides a clear financial status of a person. The analysis herein specifies a Probit framework by supposing a *normal cumulative distribution* of ε in F.

$$y_i = \sum X'_i \beta + \varepsilon_i \quad (1)$$

where $\beta = \beta_1, \beta_2, \dots, \beta_K$ and $X'_i = 1, X_{i2}, X_{i2}, X_{i3}, \dots, X_{iK} \dots$

And we show the observation and ε stands for a deviation. X represents cumulative independent variables and y_i is a latent variable, thus unobservable. Observable event denoted through a supposed variable y_i defined by:

$$y_i = \begin{cases} 1 & \text{if } y_i > 0 \\ 0 & \text{if } y_i \leq 0 \end{cases} \quad (2)$$

Therefore, $y = 1$ implies that positive values were observed whereas the expression one is derived.

$$Pr(y_i = 1|X) = Pr(y_i > 0|X)$$

or equally

$$Pr(y_i = 1|X) = Pr(X_i\beta + \varepsilon > 0|X) \quad (3)$$

Replacing the structural framework and organizing terms yields

$$Pr(y_i = 1|X) = Pr(\varepsilon < -X_i\beta|X) \text{ or } Pr(-\varepsilon < X_i\beta|X) = F(X_i\beta) \quad (4)$$

Where F stands for the *cumulative distribution function* (cdf) for ε . Equation (4) means that the distribution of the error ε alters probability. Supposedly ε is distributed normally with $\text{Var}(\varepsilon) = 1$ and an average of 0, results in Binary Probit Framework. The Probit framework as shows conditional probability:-

$$\phi(X_i\beta) = \int_{-\infty}^{X_i\beta} \phi(z) dz \quad (5)$$

Where $\phi(\cdot)$ stands for prevailing cdf with derivative $\phi(z) = \left(\frac{1}{2\pi}\right) \exp \exp(-z^2/2)$, which is *standard normal density function* (Cameron & Trivedi, 2005), that objectively, due to no major difference of estimated likelihood from Probit or Logit framework so, any of them can be employed. Also, often, similarities were found in Logit and Probit frameworks for the fitted log-likelihoods, inferring minor advantages for employing any of the aforementioned frameworks. The function of likelihood is inscribed as such:-

$$L(\beta) = \sum_{i=1}^N F(X_i\beta)^{y_i} (1 - F(X_i\beta))^{1-y_i} \quad (6)$$

Through the highest likelihood (ML) criterion, equation (5) is projected and equation (1) presents the probability of being impoverished or not.

Empirical Equation

$$EM_i = \alpha_0 + \alpha_1 SHH_i + \alpha_2 ES_i + \alpha_3 EHH_i + \alpha_4 HS_i + \alpha_5 NC_i + \alpha_6 NO_i + \alpha_7 R_I + \mu_i$$

The dependent variable is impoverishment (EM) and independent variables are gender of household head (SHH), employment status (ES), education of the household head (EHH), household size (HS) number of children (NC), number of old people (NO) and region (R).

3.4.1 Determinants of Impoverishment

Sex of household head

Household head of Gender and significant effects of household impoverishment, and specifically, households headed by women are poorer and more prone to impoverishment than those headed by men.

Employment status of head

The working status of the household significantly affects the impoverishment. The more ahead of the household earns, will better the standard of living (Chaudhry *et al.*, 2009) and more he can afford to pay for health services. The relationship of the employment status with the impoverishment is expected to be inverse. The variable is categorized as working (1) and non-Working as (0) as a dummy variable.

Education level of the household head

Educated workers have attractive employment offers characterized by high wages, pension coverage, and opportunities for advancement because they are assumed to be more productive as compared to low-educated workers who in turn only have access to the jobs which lack work contract and low dismissal costs. This in turn effects the impoverishment status of households through low earnings.

Household size and Dependency

The poverty situation of the household depends upon household size and the dependency ratio in the family. It directly and strongly affects the poverty situation of the

household and they change the per capita income of the household. The above-mentioned factors are expected to increase the likelihood of being impoverished.

Region

Place of the residence has a significant impact on poverty (Kimani, 2014). The household living in rural areas are expected to spend more on health care because of having lesser facilities and services and travel costs as compared to urban households. Place of residence has been categorized into two parts Urban (1) and Rural (0). Place of residence is expected to be inversely related to impoverishment.

Table 3.2: Description of the Variables

Name of the variable	Measurement
Sex of household head	Male=1, otherwise, 0
Education of HH	Completed years of Schooling
Employment Status of HH	Employed=1, otherwise, 0
Marital Status of HH	Married=1, otherwise, 0
Household size	Total members member of the house
Number of old people in a household	Number of old people age equal and greater than 65
Number of children	Number of children age less than 6
Region	Rural=1, otherwise, 0

CHAPTER 4

ESTIMATION RESULTS

Empirical results and discussions are given in this chapter. The analysis begins with an average of values Out-Of-Pocket (OOP) health expenses made by households on either inpatient or outpatient services. Afterward, the incidence of catastrophic health payments and its impoverishment effects is presented. In the end, determinants of OOP health expenditures and impoverishment are explored by employing logistic regression.

4.1 Catastrophic Effect of Out-of-Pocket Health Expenditure

Table 4.1 shows the amount of out-of-pocket health (OOP) expenditures made by a household (among the households who paid for health care during the last 12 months before the survey dates). The overall statistics suggest that on average, all the households spend Rs 2068.499 on inpatient and Rs 335.2879 on outpatient facilities, whereas the overall OOP payments are Rs 1711.869. Similarly, the average household's expenditure in the urban and rural areas on inpatient is Rs 2066.142 and Rs 2069.602, on out-patient Rs 309.8043 and 348.4877, and overall OOP payments are Rs 1392.878 and Rs 1872.048, respectively. As most of the urban population goes to private sector hospitals to not compromise on quality of the services they received. The households living in urban areas prefer to spend more on healthcare services to get better quality of life.

Among provinces, on average, a household in Punjab spend Rs 2538.802 on inpatients services, Rs 318.2698 on outpatient services, and their total payments are Rs 1888.462. Similarly, the average household expenditure in the KP and Balochistan on inpatient is Rs 1934.624 and Rs 3043.955, on outpatient Rs 436.8808 and 348.0037, and overall OOP

payments are Rs 2431.792 and Rs 1369.722, respectively. The household expenditure in Sindh on inpatients is Rs 993.2259, on outpatient is Rs 276.6137, and OOP payments are Rs 927.4314. The overall OOPs payments and individual inpatient and outpatient health expenditures are higher in Punjab as compared to other provinces. The major reason could be that it is the most prosperous province of Pakistan and the people living in it has higher awareness in terms of health and other social indicators. Punjab has better healthcare service provision and development indicators.

Furthermore, the average households expenditure of the first and second quintiles on inpatient are Rs 49.15215 and Rs 382.3283, on out-patient Rs 52.90986 and Rs 119.4744, and overall OOP payments are Rs 112.0533 and Rs 323.387, respectively. Similarly, the households in the third quintile, spend Rs 927.2785 on inpatient and Rs 203.1867 on outpatient facilities, whereas the overall OOP payments are Rs 653.1266. Finally, the average households expenditure of the fourth and fifth quintiles on inpatient are Rs 1934.405 and Rs 7064.986, on out-patient Rs 350.8716 and Rs 984.4235, and overall OOP payments are Rs 1331.314 and Rs 6140.16, respectively. The quintiles are made according to total expenditures of the households. As, we move from lower to upper quintile, the incidence of health payments increases for instance the upper quintiles show the people belong to richer class and they spend more on their health.

The two methods are generally used in measuring catastrophic health expenditures. The first one is estimating catastrophic health expenses as a share of total consumption expenditures and non-food expenditures whereas the second is taking the ratio of households OOP expenditures to households' capacity to pay. We have employed both methods for comparison purposes.

Table 4.1: Average OOP Health Payment made by Households (Rs. per month)

	Inpatient	Outpatient	OOP
Overall	2068.499	335.2879	1711.869
Rural	2066.142	309.8043	1392.878
Urban	2069.602	348.4877	1872.048
Kp	1934.624	436.8808	2431.792
Punjab	2538.802	318.2698	1888.462
Sindh	993.2259	276.6137	927.4314
Balochistam	3043.955	348.0037	1369.722
Ist Quintile	49.15215	52.90986	112.0533
2 nd Quintile	382.3283	119.4744	323.387
3 rd Quintile	927.2785	203.1867	653.1266
4 th Quintile	1934.405	350.8716	1331.314
5 th Quintile	7064.986	984.4235	6140.16

In table 4.2, the OOP payments are shown as the ratio of total expenditure, non-food expenditure, and households' capacity to pay. The overall share of OOP in total expenditure is 3.03%, while it is 5.23% and 5.57% in nonfood and capacity to pay, respectively. Nevertheless, the urban and rural share of OOP in total expenditure is 3.52% and 2.78, while it is 6.68% and 4.51% in nonfood, and 6.82% and 4.75% incapacity to pay, respectively. Similarly, for the KP, the share of OOP in total expenditure is 3.23%, while it is 5.85% and 6.14% in nonfood, and capacity to pay, respectively. Further, the Punjab and Sindh share of OOP in total expenditure is 3.29% and 2.47, while it is 5.39% and 4.64% in nonfood, and 7.83% and 4.88% incapacity to pay, respectively. For the Baluchistan, the share of OOP in total expenditure is 2.84%, while it is 4.75% and 5.39% in nonfood, and capacity to pay, respectively.

Table 4.2: OOP Health Payment as a Share of Household's Total Household Expenditure and Capacity to Pay (%)

	OOP/TEXP	OOP/nonfood	OOP/CTP
Overall	3.03	5.23	5.57
Rural	3.52	6.68	6.82
Urban	2.78	4.51	4.75
Kp	3.23	5.85	6.14
Punjab	3.29	5.39	7.83
Sindh	2.47	4.64	4.88
Baluchistan	2.84	4.75	5.39
Ist Quintile	3.29	5.86	0.88
2 nd Quintile	3.11	5.62	2.12
3 rd Quintile	2.91	5.18	3.67
4 th Quintile	2.95	4.87	6.13
5 th Quintile	2.88	4.66	9.12

Note: OOP/EXP: OOP as a share of total household expenditure; OOP/CTP: OOP as a share of household capacity to pay.

Additionally, for the first and second quintiles, the share of out-of-pocket in total expenditure is 3.29% and 3.11%, while it is 5.86% and 5.62% in nonfood, and 0.88% and 2.12% incapacity to pay, respectively. For the third quintile, OOP in total expenditure is 2.91%, while it is 5.18% and 3.67% in nonfood and capacity to pay, respectively. For the fourth and fifth quintiles, the share of OOP in total expenditure is 2.95% and 2.88%, while it is 4.87% and 4.66% in nonfood, and 6.13% and 9.12% inability to pay, respectively.

Table 4.3: Incidence of Catastrophic Health Expenditure (%)

Threshold	Head Counts*	Threshold	Head Counts**	Threshold	Head Counts**
5%	14.76	15%	5.84	10%	13.66
10%	4.51	25%	2.00	20%	3.53
15%	1.94	40%	0.45	30%	1.32
25%	0.54	---	----	40%	0.48
Poverty Headcounts					
	Gross Health Payment	Net of Health Payments		Impoverishment	
Wagstaff Method	23.28%	24.68%		1.4%	
Xu Method	21.38%	25.85%		4.47%	

*Head counts are measured taking the ratio of health expenditures to total expenditures

** Head counts are measured taking the ratio of health expenditures to non-food expenditures

*** Head counts are measured taking the ratio of health expenditures to household's capacity to pay

The incidence of catastrophic health payments is reported in table 4.3 at thresholds ranging between 5% to 20% for household's total expenditure, 15% to 40% for household's non-food expenditure, and 10% to 40% for household's ability to pay. These thresholds are based on different studies and under different methodologies (Kimani, 2015). With the increase in the threshold incidence of catastrophic health expenditures decreases. For instance, at the threshold of 5% of total consumption expenditure, the catastrophic headcount ratio was at 14.76%. This decreased to 4.51% at a 10% threshold of total consumption expenditure, while only 0.54% of households incur catastrophic health payments at a 25% threshold.

Furthermore, at a 15% threshold of non-food expenditure, 5.84% of households incurred catastrophic health payments. This decreased to 2.0% at a 25% threshold of non-food expenditure. Only 0.45% of households incurred OOP health payments in excess of 40% of non-food expenditure. Moreover, at the 15% threshold of household's capacity to pay, 13.66% of the households incurred catastrophic health payments while only 0.48% of households are incurring catastrophic health payments at a 40% threshold. It can be seen that results are not different at the 40% threshold both for nonfood expenditures and the capacity to pay.

Using the poverty line Rs.3250, 23.28% of households are to be estimated in poverty (based on total consumption expenditure gross of health payment), whereas it stands at 24.68% when out of pocket health payment is excluded from total consumption expenditures. The difference between these measures shows that 1.4% of households who are not considered to be poor but could be pushed to poverty when OOP health payments are netted out from total consumption expenditures. Poverty is estimated to be 21.38% with gross of health payments when we have applied the Xu method and measures it through the household's capacity to pay. It raises to 25.85% after excluding health payment from the household's capacity to pay to

show an increase of 4.47%. It indicates out of pocket health expenditures impoverish households.

4.2 Determinants of Catastrophic Health Payments

Table 4.4 presents the results of logistic/probit regression analysis of the determinants of catastrophic health expenditure and Impoverishments.

Table 4.4: Determinants of Catastrophic Health Expenditures and Impoverishment

	Wagstaff Method		XU Method	
	Cat10percent	Impoverishment	Cat40percent	Impoverishment
Education	-0.0306*** (0.00681)	-0.0555*** (0.0120)	-0.0415 (0.0289)	-0.0567*** (0.00675)
Gender	-0.514*** (0.127)	-0.708*** (0.264)	-0.365 (0.462)	-0.382*** (0.141)
Family size	-0.0767*** (0.0136)	0.177 (0.221)	-0.674** (0.341)	-0.206* (0.111)
Children<6	0.124*** (0.0320)	0.125** (0.0516)	0.170 (0.123)	0.0570* (0.0301)
Age>=65	0.319*** (0.0571)	-0.0305 (0.0216)	-0.112** (0.0548)	-0.0131 (0.0123)
Marital Status	-0.307*** (0.101)	0.0703 (0.108)	0.306 (0.215)	-0.0539 (0.0662)
Emp of HH	-0.275*** (0.0890)	-0.0458 (0.168)	0.0858 (0.371)	0.134 (0.0998)
Urban	-0.282*** (0.0687)	-0.404*** (0.116)	-0.811*** (0.262)	-0.269*** (0.0666)
Punjab	0.415*** (0.0833)	0.212 (0.148)	1.207** (0.475)	0.130 (0.0880)
Sindh	-0.809*** (0.120)	-0.141 (0.175)	0.0372 (0.556)	0.164* (0.0965)
Balochistan	-0.194 (0.141)	0.172 (0.208)	0.328 (0.677)	0.428*** (0.115)
Constant	-1.232*** (0.274)	-2.736*** (0.528)	-3.358*** (1.070)	-1.962*** (0.295)
Observations	24,168	24,168	14,068	24,168

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

For exploring the determinants, we have estimated catastrophic health expenditures by applying both Wagstaff and Doorsaler (2003) and Xu (2005) methodology. The households incurring catastrophic health expenditures are assigned the value 1, otherwise 0 (both at 10% and 40% threshold).

Regarding the factors correlated with catastrophic health expenditures and impoverishment, the household head's education is 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 (Pal, 2010). The results are found to be significant only for the 10% threshold. The higher the number of elder members in the family, the higher are the catastrophic health expenditures. The elder members in their old age require more medical care and they are dependent on household head. The sign of the elder members in case of threshold 40% is opposite to the theory. This could be due to difference in distribution of elderly members in case of both the thresholds.

The households, which are headed by the female, are less likely to make catastrophic payments than the households, which are headed by the male. In our culture, mostly the families are headed by males whether the females are working or not. Only females head those families where the males are not present due to any reason (dead or divorced) and face financial hardships. These families are less likely to spend more on health due to above mentioned reason.

We also observed that the families that have a higher number of members significantly prefer to make lower health catastrophic expenditures. In the literature, the family size is taken as a proxy for family support. The higher members of the household show higher support and

less risk of getting the chance to seek medical care. So, with higher family support, a household is less likely to spend more on healthcare services. These findings are compatible with the prior studies such as Halliday & Park, (2009) and World Health Organization e Regional Office for Western Pacific (2011a). This suggests that people living in higher households could provide care to other members of the family and could prefer to avail less utilization of health care. Furthermore, households with a higher number of members could extract more resources at the time of requirement, for instance like illness times, from the already developed social network. Furthermore, catastrophic health expenditure is significantly high among families with more elder members. Since the elder population needs more and expensive health care for their survival.

In addition, the families, which are having children of age less than 6 years significantly and more likely to make catastrophic health expenditures. The effect is significant only for a 10% threshold. The reason could be children have higher probability of getting ill than elder. Therefore, higher the number of times children got ill, the higher will be health care utilization. As a result, out of pocket health spending will be higher in that family. The effect of children on catastrophic health expenditures is found to be insignificant at a threshold level of 40%.

The coefficient of marital status was negative and highly significant at 1%. It shows that if the household head is married then that household is less likely to incur catastrophic health expenditure. As the married individual has support of his wife, in terms of care and income cases earning too. Therefore, the chances of falling ill of that individual will be low and out of pocket payment will be lower.

Household head's employment status and catastrophic health expenditures are negatively and significantly associated with each other. It means if the household head is

employed then that household is less likely to incur catastrophic health expenditure. The effect is significant only for a threshold level of 10%.

The location of the households also matter. The households that are located in the urban areas make lower payments in terms of catastrophic expenditure as compared to those living in rural areas. To put it differently, households in rural areas prefer to make more catastrophic health expenditure and impoverishment problems than dwellers in the urban. Alike finding has been documented by the studies in Thailand (World Health Organization e Regional Office for Western Pacific, 2011b) and India (Bonu, Bhushan, Rani, & Anderson, 2009). Since rural households face challenges with regard to the provision of health care, they are more concentrated in urban areas. The cost of travel also increases their spending on wellness. The risk of catastrophic spending is therefore greater for households in rural areas.

This finding predicts the significance of health care policy for the people residing in rural areas. Hence, the ways of financial security for the assessment in rural areas should be an integrated art of developmental policies in the rural areas

Among the four provinces in Pakistan, Punjab has higher catastrophic health expenditures compared to KP, whereas Sindh has lower catastrophic health expenditures. The major reason could be that it is the most prosperous province of Pakistan and the people living in it has higher awareness in terms of health and other social indicators. Punjab has better healthcare service provision and development indicators.

4.3 Determinants of Impoverishments

The main findings on the correlates of the impoverishment problem reveal that except for the elderly, marital status, and employment status of the household head all other factors are significantly related to impoverishment.

The coefficients of education are negative and statistically significant at 1 % for both thresholds that is 10% and 40%, indicating households with high education levels have a lower probability to become impoverished if they are incurring catastrophic health expenditures.

As it is estimated that male-headed households are less likely to incur catastrophic payments compared to female-headed households therefore the probability of that household becoming impoverished is lower than that household head by a female.

The impact of family size on impoverishment is found to be insignificant for a 10% threshold level but significant for 40% thresholds. The most suitable explanation for this outcome is that as family size goes up, the capacity to spend more on health diminishes and thus the portion of these expenditures. On the other hand, the small size of members qualifies family to obtain healthiness's inputs such as high-quality food, sanitation, nutrition supplements, and prevention and therefore maintaining better health.

Although the coefficient of marital status is positive but insignificant both for 10% and 40% threshold. However, the positive sign indicates if the household head is married then that household is more likely to be impoverished. Similarly, the working or employment status of the household head is insignificantly correlated with impoverishment.

Households located in urban areas had a significantly lower probability of becoming impoverished due to catastrophic health expenditures compared to people residing in rural areas.

Among the four provinces in Pakistan with the reference to KP, a household in Baluchistan is more likely to become impoverished, although the probability of Balochistan to incur catastrophic health expenditures is lower than KP but insignificant. Similarly, SINDH

has a high probability of becoming impoverish than KP, although he is incurring lower catastrophic health expenditures.

CHAPTER 5

CONCLUSION AND POLICY IMPLICATIONS

In most of the countries, the main expenditure consider in the health care system are the out of pocket (OOP) payment and considered as a major barrier in achieving an equitable health system. These payments may cause households to incur catastrophic costs. Health expenditures become catastrophic when people prefer to spend on health expenditures as compared to basic needs. As a result, some of them being slipped into poverty and others remain without treatment. Therefore, this study examines the effects of out of pocket (OOP) health expenditures on poverty incidence in the country and examines the factors associated with the risk of catastrophic health expenditures and impoverishment in Pakistan. To strengthen the insight of the findings obtained, the analysis of OOP expenditures is also executed for different methodologies and different thresholds. The study uses nationally representative HIICS data (2015-16) which is carried out in four provinces of Pakistan. The analysis includes all the households having health expenditures during the last year while those who have no expenditure are excluded.

The results of the study revealed that there is a high incidence of catastrophic health expenditures in Pakistan. However, the incidence is higher when catastrophic health expenditures are defined at a 5% threshold level and as a share of total expenditures. The incidence is found to be 5.84% using a 15% threshold level and defining catastrophic health expenditures as a share of non-food expenditures. Moreover, at a 40% threshold and taking the catastrophic health expenses as a ratio of both nonfood and ability to pay, the incidence is found to be low i.e. 0.45% and 0.48%, respectively.

Almost 1.4% of households might become impoverished due to paying out of pocket health expenditures when applying Wagstaff and Doorslaer (2003) methodology. In addition to this, Xu et al (2005) methodology demonstrates 4.47% impoverishment brought about by out-of-pocket health expenditures.

The results of the determinants of OOP health expenditures reveal that households' educational level, household size, number of household's members over 65 years, and below 6 years have a positive and significant impact on health expenditure for a 10% threshold level. These findings are according to expectations as both children, older members are more prone to different diseases, and this can cause large spending on health care.

Different in catastrophic health expenditures are observed for urban and rural areas. In rural areas, the probability of incurring catastrophic health expenditures and being impoverished is found to be higher than in rural areas.

Our study results provide valuable insight into the effects of health financing policies and indicate that policymakers need to reduce the dependence on health payments from out-of-pocket (OOP) and provide a social health security strategy for households against informal health payments from OOP. The lack of financial risk protection in Pakistan 's health system is a major problem that policymakers have address towards achieving universal health coverage (UHC) as a target of Sustainable Development Goals (SDGs).

We need to note some limitations of this study. First, the cross-sectional nature of the data limited our ability to study the long-term impacts of household direct out-of-pocket payments. Secondly, we were not able to study coping strategies of the households once they faced catastrophic health expenditure and impoverishment problems.

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