Determinants of Out-of-Pocket Health Expenditure in Pakistan: Empirical Insights from Micro-level Data

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ABSTRACT: Out-Of-Pocket (OOP) health expenditure is an internationally recognized measure of health expenditure at household level, especially in middle income countries. This study explores various socio-economic and demographic determinants of OOP health expenditure in Pakistan. The descriptive analysis and regression type results using Variance-Weighted Least Squares (VWLS) method were generated to find out the nature of impact and the significance of various determinants of health expenditures. As per the findings, the average yearly OOP disbursement on household health was around RS. 13,897 (nearly 3% of household consumption expenditure). The impact of factors like household size, smoke consumption, the number household-dependents, average household education, and consumption expenditure was found statistically significant while having positive effect on OOP health expenditure in the estimated model. Households with the facilities of piped water, proper sanitation and garbage disposal system were having less spending on health. The results have shown that in rural Baluchistan, gas connection was having low impact and number of under-five children had highest impact on OOP health expenditure, while in urban Baluchistan piped water had lowest impact on health spending. The signs of the variables used in this study were in line with the dominant view of the literature.

Keywords: Out-of-Pocket health expenditure, Household, VWLS, Pakistan

1. Introduction

Household spending patterns are being influenced by a host of factors and some categories of such expenses are important for academicians, corporations, politicians and policy makers alike. One of the most important categories of household expenditures, especially in the developing countries, is argued to be the health expenditure, because of its

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unavoidable and imperative nature as a distinctly different type of expense. The main sources of health expenditures include public and private healthcare expenses. OOP health expenditure is a globally recognized measure of household health expenditure & a dominant source of private health expenditure in many developing countries. According to World Health Organization (2017), payments made at time of receiving any type of treatment, from any type of provider, for any type of disease or health problem are called OOP health expenditures. Such payments exclude any reimbursement by a third party such as the government, a health insurance fund or a private insurance company. According to Pakistan Bureau of Statistics (2018), OOP health expenditure is defined as direct payments for health services from income or saving of households. However, such payment might be compensated later by employers or by health insurance.

According to the report of National Health Accounts (NHA) 2019-20, total health expenditure is comprised of current and capital health expenditure. Capital health expenditure is, sometimes, also known as development expenditure. Only direct health expenditures are incorporated in current health expenditure while indirect expenses like health related expenditures on medical education, training & research are excluded from the total health expenditure.

The report of NHA 2019-20 indicates that out of total health expenditures in Pakistan, 39.8% were made by general government and the rest by private sources. OOP health expenditures constituted 52.8% of total health expenditures in 2019-20. Private expenditures constituted 59.7% of total health expenditures in Pakistan, out of which 88.6% were OOP health expenditures (i.e. 52.8% of total health expenditure) in 2019-20. The breakup of the government health expenditure remained as follows: 26.6 % share of federal and provincial government, 7.2% share of district or Tehsil government, 3.7% of military health expenditure, 0.5% share of development partner or official donor organizations, and 1.2% of social security funds in total health expenditures. The estimates of National Health Accounts 2019-20 also indicate that OOP expenditures on health in Punjab has the highest share (i.e. 53%) while Baluchistan

(63.97%) has the lowest share of OOP health payments (Pakistan Bureau of Statistics, 2022).

Many researchers have studied the factors affecting OOP healthcare expenditures and investigated their catastrophic effects. Bedado et al. (2022) used multiple variable logistic regression model in a cross-sectional study to find out determinants of OOP health expenditures. The results have shown that OOP health expenditures were significantly associated with various factors like family size, income, residence and status of education. Alemayehu et al. (2023) focused on understanding the patterns and the determinants of OOP health expenditures among adult patients with hypertension to analyze economic challenges faced by patients with such health issues. They used multiple linear regression model and identified that factors like wealth index, gender, distance from the hospital, and frequency of visit to hospital resulted in high OOP health expenditures.

1.1 Significance of the Study

World Health Organization (2017) highlights the significance of OOP health payments in Sustainable Development Goals (SDGs) by setting target number 3.8 for the achievement of universal health coverage which is one measure of performance for SDG 3 about good health and well-being. Moreover, SDG indicator 3.8.2 "Proportion of large household health expenditures on health as a share of total household expenditure" focuses on OOP health expenditures. SDG 3 aims to strengthen health systems of all the countries because there are deteriorating conditions of health financing systems in many countries that might lead towards high OOP health expenses, prompting financial hardship.

According to the report of World Health Organization (2019), OOP expenditures are a major source of health financing in middle income countries as compared to low and high income countries. In low income countries, financial barriers could be the reason of low OOP payments whereas high income countries might be facing financial hardship due to OOP expenses on medicines (World Health Organization,

2019). Around 57.6% of total health expenditure have been paid by individual households as OOP payments in 2015-16 where annual per capita health expenditure of Pakistan is 45US$ and the ratio of total health expenditure to GDP is 3.1% (Pakistan Bureau of Statistics, 2018).

1.2 Research Gap

There are many factors that affect the OOP health expenditure in Pakistan. A lot of research has been conducted, around the globe, to evaluate the patterns and determinants of such expenses. However, little attention has been paid towards this issue in Pakistan. One study of Muhammad Malik & Azam Syed (2012) has focused on determinants of OOP payments by extracting data from Household Integrated Economic Survey (HIES) 2004-05 and employing OLS technique. Rehman et al. (2014) have descriptively gathered and analyzed primary data to see the pattern of OOP health expenditure of under-five children in slum areas of Islamabad. Another study by Khalid & Sattar (2016) has done descriptive analysis to examine the pattern of OOP expenditures by pooling six HIES surveys from 1998-2011. Datta et al. (2019) have used logistic regression on data of HIES (2015-16) to check the relationship between medical cost and diseases and to see the critical trends of health expenditure in Pakistan. They have considered only two diseases (blood pressure and diabetes) to understand how these are linked with financial hardship in Pakistan. However, in previous literature of Pakistan, determinants of OOP payments have not been inspected by using the most recent data of HIES in Pakistan. This research was needed to analyze the pattern of OOP health expenses and to find out the important household determinants of such expenditures in Pakistan.

In addition, this study has shown the impact of various factors like smoke consumption and average household education on OOP health expenditure via different econometric models. In the literature, it was either taken as a dummy variable or as the expenditures on smoke. This research, however, modified the 'smoke' variable as the quantity (in units) of smoke consumed by households. Moreover, regarding education, the existing literature focused mainly on household head's education or on spouse education. This study, however, has analyzed the impact of

average education of the household instead of just focusing on the education of household head or spouse.

Hence, this study has examined the pattern of OOP expenses on health as well as probed significant causes of OOP health expenditures by using the most recent data of Pakistan Social and Living Standards Measurements (PSLM)/ Household Integrated Economic Survey (HIES) 2018-19.

1.3 Problem Statement

There is a huge burden of health expenditure at household level where households have different capacity to endure or avoid such expenses. Therefore, it is important to know the circumstances that might affect burden of health expenditure as measured by OOP payments. Keeping this in mind, this study aims at exposing household characteristics for their expected and observed effects on OOP health expenditure in Pakistan.

1.4 Objectives of the Study

This study aimed at exposing household characteristics for their expected and observed effects on OOP health expenditure. Likewise, it explored the nature and significance of numerous factors that might influence OOP expenditures at household level.

The key objectives of this research are:

• To systematically assess nationwide household OOP health disbursements in Pakistan.

• To explore the determinants of OOP health expenditure in Pakistan.

2. Literature Review

Many researchers have elucidated the causes of high OOP health expenditure. Most of the studies have either focused on characteristics of household head like age, gender, marital status, education and employment status; or on characteristics of other household members such as age group, household size, household income and expenditure. Other

conditions of household like wealth status, living condition and nature of residence have also been probed for comprehensive exploration of this issue.

Household size has remained an important determinant of OOP health payments that represents total number of members of household. Many studies have found out positive association between OOP health expenditures and size of household, implying that larger households would be prone to have more spending on health [Mamun et al. 2018; Paul et al. 2018; Sekyi & Domanban, 2012; Pal, 2010; Costa-Font et al. 2007; Rous & Hotchkiss, 2003; Rubin & Koelln, 1993]. The results of Brinda et al. (2014) showed that households having more than five members incur more OOP expenditures. According to Oudmane et al. (2019), more than seven members in a household were positively related to OOP health expenditure. In contrast, Minh et al. (2013), da Silva et al. (2015), and Lee et al. (2019) explained the negative relationship between household size and OOP payments, depicting that larger households would spend less. Yardim et al. (2010) found out in their study that household size had no effect on catastrophic health expenditure and Mugisha et al. (2002) also found it insignificant in their study.

The age group of household members secures a central position in the discussion of moderators of OOP health expenditures. Some studies have also explored the effect of age of household head. More OOP expenditures in household were exposed due to increasing age (Mugisha et al. 2002; and Pannarunothai & Mills, 1997) especially above 65 years (You & Kobayashi, 2011), while household head was negatively related to OOP spending on health (Brinda et al. 2012; Pal, 2010; Rous & Hotchkiss, 2003). The positive effect of age was explained by many researchers. According to Farahat et al. (2018), for women between 18-40 years and men between 40-60 ages had positive relationship with OOP payments. OOP expenditures were higher for age of household members with ages 15 years or above, however, smaller for household members with ages between 10-14 years (Rous & Hotchkiss, 2003).

While analyzing the household characteristics affecting OOP health expenditure, children and elders were mostly considered as vulnerable members of a household and were given more attention. The

results of Hailemichael et al. (2019), Paul et al. (2018), Amaya-Lara (2016), Minh et al. (2013), Muhammad Malik & Azam Syed (2012), and Pal (2010) revealed that the households with vulnerable members had positive relationship with OOP health expenditure because they were likely to have more health needs. Households having preschool children were estimated to have high OOP expenditures on health (Kumara & Samaratunge, 2016). However, there was a negative association between OOP health expenditure and vulnerable age group found by Mamun et al. (2018) and it was also found this of a household that has at least one child and no elderly by Muhammad Malik & Azam Syed (2012). According to Oudmane et al. (2019), Njagi et al. (2018), and Yardim et al. (2010), presence of young children had the negative affect while presence of the elderly people in the household was having a positive effect on OOP health expenditure. The results of Molla et al. (2017) found no significant impact of the presence of under-five children and elderly members on OOP health payments.

Education and employment status are essential in order to analyse the impact of household characteristics on OOP health expenditures. The results of Kumara & Samaratunge (2016), da Silva et al. (2015), Muhammad Malik & Azam Syed (2012), You & Kobayashi (2011), Okunade et al. (2010), and Yardim et al. (2010) demonstrated that education of household head was a positive predictor of OOP health expenditures. In contrast, Oudmane et al. (2019), Njagi et al. (2018), Molla et al. (2017), Brinda et al. (2014), Costa-Font et al. (2007), Rous & Hotchkiss (2003), and Pannarunothai & Mills (1997) explained the negative relationship between household head education and OOP health expenses. The possible reason considered was that more educated people might have better exposure of heath perils. According to Pal (2010), female education, especially in rural areas, reduced OOP health payments. Older and highly educated household heads were also negatively associated with OOP health payments (Rous & Hotchkiss, 2003). According to Sen & Rout (2007), household head's education had insignificant positive relationship with OOP health payments. Moreover, Muhammad Malik & Azam Syed (2012) considered education of

household head spouse to be an important factor which had a positive impact of such payments as well.

Profession of head of household was used by some authors. There was a negative relationship of OOP health expenditures with white collar jobs (Muhammad Malik & Azam Syed, 2012) and with households working as manual labor (Brinda et al.2014). According to Sekyi & Domanban (2012), Oudmane et al. (2019), and Yardim et al. (2010) employment status was considered to be the positive predictor of such expenses where they assumed that employed persons had high opportunity cost of illness as well more capacity to pay for health care resulting in higher OOP health expenditures. However, Njagi et al. (2018), and Amaya-Lara (2016) found negative relationship between OOP health payments and employment showing that there might be more number of working members in household that reduced OOP health payments. Moreover, negative association was considered due to the duration of occupation (Okello & Njeru, 2015) and formal employment (Buigut et al. 2015).

Household income and expenditure play a vital role while studying health spending. Household income is a good indicator of household capacity to spend whereas expenditures show households' tendency to spend. Income is usually measured by expenditure due to lack of income data of households in many developing countries. And it was having negative relationship with OOP health payments [Sekyi & Domanban (2012), Oudmane et al. (2019), Pannarunothai & Mills (1997)]. In contrast, Mamun et al. (2018), Molla et al. (2017), Amaya-Lara (2016), Okello & Njeru (2015), da Silva et al. (2015), You & Kobayashi (2011), Okunade et al. (2010), Sen & Rout (2007), Rous & Hotchkiss (2003), Rubin & Koelln (1993) have explicated positive relationship between household income and OOP health expenditure.

Among other household head characteristics gender also gets attention. According to Oudmane et al. (2019), Molla et al. (2017), Sekyi & Domanban (2012), You & Kobayashi (2011), Okunade et al. (2010), Pannarunothai & Mills (1997), gender of household head had a negative impact on OOP health expenditures. Male household head experienced less OOP health expenses (Muhammad Malik & Azam Syed, 2012)

whereas households with male head incurred more OOP health expenses found by Mamun et al. (2018), Rous & Hotchkiss (2003), and Brinda et al. (2012). Furthermore, many studies had considered a positive relationship between household head's gender and such payments [Pal (2010), Mugisha et al. (2002), Costa-Font et al. (2007), Brinda et al. (2014)]. Njagi et al. (2018) extensively reviewed previous literature and concluded that different studies displayed diverse effects of gender but, on the whole, women were exposed to incur more health spending.

According to Pal (2010), method of cooking, household asset index and the access to electricity negatively predicted OOP expenditures on health. Method of cooking and household's access to electricity indicate household's capacity to make expenses. Safe cooking methods have two dimensional relations as it showed more wealth as well as better health. In addition, household asset index also depicted the well-being of households. According to the study of Pal (2010), Household asset index consisted of various indicators i.e., radio, television, air conditioner, air cooler, sewing machine, refrigerator, bicycle, motorcycle, car. Rubin & Koelln (1993) reported a positive association between asset index and such expenses for non-elderly members. According to Okunade et al. (2010), wealth index was positively associated with OOP expenditures on health.

The study of You & Kobayashi (2011) considered good toilet facility and good sanitation as negative predictors while good water as positive predictor of OOP health payments. According to Muhammad Malik & Azam Syed (2012), OOP health expenditures had a positive relationship with unhygienic toilet and unsafe water. There was negative relationship between OOP health expenditure and water [Mamun et al. (2018)] and with lack of plumbed toilet [Brinda et al (2012), Brinda et al. (2014)]. Additionally, OOP health expenditures were negatively associated with piped water, good sanitation and good garbage disposal system (Rous & Hotchkiss, 2003). According to Mamun et al. (2018), access to sanitation was positively associated with OOP health expenses. Moreover, a positive relationship between travelling cost to health facility and OOP health payments, depicting that households far from health facility were likely to incur more OOP health expenses, was found by

Muhammad Malik & Azam Syed (2012), and Njagi et al. (2018). In contrast, Kumara & Samaratunge (2016) explained that less distance to government was linked with more OOP health payments.

Consumption of smoke has also serious effects on health. In the literature, it was either taken as a dummy variable or as the expenditures on smoke. This research, however, modified the variable as the quantity of smoke consumed by households. Costa-Font et al. (2007) Rous & Hotchkiss (2003) found out positive impact of smoke on OOP health expenditures, stating that households with consumption of smoke were making more spending on health. Some studies reported that households living in rural areas have high OOP spending [Njagi et al. (2018), Amaya-Lara (2016), Minh et al. (2013), You & Kobayashi, (2011), Yardim et al. (2010)]. According to Rous & Hotchkiss (2003), OOP health expenditure was negatively associated with households residing in urban areas.

Besides the determinants of OOP health expenditures, there were some studies measuring the catastrophic effects of OOP expenditures as well. According to Dorjdagva et al. (2016), catastrophic health expenditures were higher in richer households who had more capacity to pay. Xu et al. (2011), and Xu et al. (2003) analyzed health expenditures of multiple countries with results of cross country analysis showing that there were disparities in catastrophic health expenditures of different countries. The catastrophic OOP health expenses fall the poor segment of society into poverty trap. To curb the catastrophe arising as a result of high OOP health expenditures, policy implications are needed by the researchers.

From this literature review, it was found that household level socio-economic variables were worth exploring determinants of OOP health expenditure in various countries around the globe. Mainly, micro level studies, employing cross-sectional survey data, were conducted to study household OOP health expenditures. In addition, various econometric methods (mostly Simple Least Squares) were employed by researchers. It is learnt from an erudite discussion that almost all studies, while exploring determinants, have performed regression analyses by using different econometric techniques.

3. Methodology

The model of demand for health, constructed by Grossman (1972), was used for the theoretical understanding of this study. Grossman's model of health demand brought a great development in the field of health economics. The data for this study was extracted from PSLM/HIES 2018-19. This survey was conducted by Pakistan Bureau of Statistics (PBS).

Since the data used in this research was cross-sectional in nature, the Variance-Weighted Least Squares (VWLS) regression model was employed which resolves the problem of heteroscedasticity. The problem of heteroscedasticity is common in cross-sectional data. In the presence of heteroscedasticity, OLS estimators become inefficient. In order to get homoscedastic variance (i.e. efficient results) it is favorable to use VWLS regression. Mostly, VWLS is helpful in case of data related to scientific measurements, having errors of measurement with known sizes. Further, it can also be used in case of categorical analysis of data (data with categorical independent variables and continuous/discrete dependent variable).

VWLS regression can be fitted in the following type of econometric model:

$$y_i = X_i b + \varepsilon_i$$

Where
y_i denotes dependent variable
X_i denotes a list of independent variables
ε_i denotes error term with normal distribution as mentioned below:

$$\varepsilon_i \sim N(0, v_i)$$

VWLS regression follows the assumption (mentioned in equation 2) that the estimates s_i^2 for the variance v_i are already in the regression model: the error variance is not needed to be estimated). VWLS regression estimates large standard error errors for the coefficients in the regression analysis. However, it should be noted that VWLS cannot be appropriately used if only the relative proportion of the error variance of y_i is estimated.

3.1 Model Specification

The general model employed to see the impact of different variables on OOP health expenditure is as follows:

$$OOP = \beta_0 + \beta_1 HHSIZ + \beta_2 HHEXP + \beta_3 SMOKE + \beta_4 EDU + \beta_5 CHILD + \beta_6 ELDER + \beta_7 WATER + \beta_8 SANI + \beta_9 GARB + \beta_{10} ELEC + \beta_{11} GAS + \varepsilon$$

Where

OOP:	Out-Of-Pocket Health Expenditure
HHSIZ:	Household Size
HHEXP:	Household Consumption Expenditure
SMOKE:	Smoke Quantity
EDU:	Average Household Schooling
CHILD:	Number of Under-5 Children
ELDER:	Number of Elders (65y or Above)
WATER:	Piped Water
SANI:	Proper Sanitation
GARB:	Proper Garbage Disposal
ELEC:	Electricity in Household
GAS:	Gas in Household
ε:	Error Term

The impact of these variables on OOP health payments was seen in all the estimated models. The details about coefficients, their signs and significance, has been presented in section 4 (Results and Discussion).

In 2018-19, average education of household decreased to 2.8 years ranged from 0 to 21 years. Looking at the variable of smoke quantity, on average 323 units of smoke were consumed per household ranged from 0 to 18300 units. These statistics can be seen in table 1 and table 2.

Table 1

Summary Statistics of Variables

Variables	Mean	SD	CV
OOP	13897	30061	216.3
HH Expenditure	411815	375099	91.1
Under-5 Children	0.85	1.1	126.4
65y or Above Elders	0.25	0.53	209
HH Size	6.5	3.23	50
Average HH Schooling	2.8	2.9	105.9
Smoke Quantity	323	611	188.9

Table 2

Summary Statistics of Dummy Variables

Variables	Mode	Skewness	Kurtosis
Electricity (lighting fuel)	0	0.54	1.3
Gas (cooking fuel)	1	-2.49	7.2
Piped Water	0	1.63	3.7
Sanitation	0	1.28	2.6
Garbage	0	1.1	2.1

4. Results and Discussion

The results of estimated model have shown the impact of various factors on the household OOP health expenditure in Pakistan. Moreover, ten sub-samples of the model were estimated to explain the impact of these factors in urban and rural settings separately. As the anthropological, economic, social and climatic distribution vary distinctly across provinces in Pakistan, therefore, besides aggregate sub-samples of OOP health expenditure for data were estimated for rural and urban settings, disaggregated sub-samples were also estimated for each of the four provinces.

Each sub-sample shows the impact of eleven different variables on OOP health expenditure of Pakistani households. All the estimated coefficients of all the selected variables in the model and the sub-samples were statistically significant at 99% confidence. The variance inflation factor (VIF) was estimated to detect the problem of multi-collinearity in the estimated model and its sub-samples. VIF value was less than 1.5 in the estimated model and all of its sub-samples, predicting no issue of multi-collinearity. Moreover, the problem of heteroscedasticity was resolved after using VWLS method. Since this study used cross sectional data, other data issues like autocorrelation or stationarity were not relevant. The strategy adopted to explain the model and its sub-samples was to discuss the impact of each of the eleven variables at aggregate as well disaggregate levels to compare the influence of each of the eleven variables on OOP health expenditure in Pakistan at household level for all the selected categories of analysis. The complete model and sub-sample summaries are shared in the Appendix.

4.1 Findings of the Study

The impact of **household size** was found positive of household OOP health expenditure in the estimated model, resulting into an increase in household OOP health expenditure due to increase in household size. The highest impact was in rural KP while the lowest was in urban Sindh. On average, for an increase of one household member there was an increase in household OOP health expenditure of RS. 60.9 in the rural households while that of RS. 63 in the urban areas. There was an increase

in OOP health expenditures of RS. 68 in rural KP and RS. 50 in urban Sindh.

There were two other variables that had a positive impact on household OOP health expenditure, namely, **the number of under-five children** and **elderly** in household. Both these variables were constructed to see the impact of number of dependents in the household on its OOP health expenditure, assuming the household members in each of these two groups to be the dependents. The number of under-five children in household had positive impact on OOP health expenditure, explaining the increase in OOP health payments for an increase of one under-five child in household.

Just like the number of under-five children, the number of elderly members in household also had a positive impact on OOP health expenditure. Among provinces, the impact was highest in urban Punjab and smallest in rural KP. On average, for an increase of one elderly member in the household there was an increase in household OOP health expenditures of RS. 2642 in urban Pakistan and RS. 2654 in rural Pakistan. In addition, the impact was estimated to be RS. 2647 in rural KP and RS. 6822 in urban Punjab.

Average **education** of household had positive impact on household OOP health expenditure whereby an increase in one year of education of household caused increased OOP health expenditure. The rationale for such an impact could be better realization of health-related expenditure to be carried out for improved human capital formation, as a consequence more education. The impact was highest in rural KP and smallest in urban Baluchistan. In the estimated model, the impact on average was more in the rural households than in the urban households (perhaps the difference between more and less educated person, in terms of realization of health expenditures' importance, is more in rural areas than in the urban areas). On average, for an increase of one year of education of household there was an increase in household OOP health expenditures of RS. 167 in in urban Baluchistan and nearly RS. 298 in rural KP.

There was a positive impact of **household expenditures** on household OOP health expenditures in Pakistan whereby an increase in overall household expenditures caused increased household OOP health expenditures in the estimated model. The impact was highest in rural Punjab and smallest in urban Baluchistan. In the estimated model, the impact was greater in rural settings than in the urban settings. On average, for an increase of RS.10000 in household consumption expenditure, there was an increase in OOP health expenditures of RS. 233 in urban Baluchistan and nearly RS. 305 in rural Punjab while all the other settings were within this range of rural and urban Punjab.

The quantity of **smoke consumption** had also positive impact on household OOP health expenditures in Pakistan where an increase in smoke consumption resulted in an increase in household OOP health expenditures in the estimated model. The impact was highest in urban Sindh and smallest in rural Punjab. On average, for an increase of RS.1000 units of smoke consumption there was an increase in household OOP health expenditures of RS. 1394 in Pakistan, RS. 1448 in urban Sindh, and RS. 1350 in rural Punjab.

The impact of all the other variables, including piped water, sanitation, garbage disposal, and gas, was negative on household OOP health expenditure in Pakistan in the estimated model. The negative impact of **piped water** on household OOP health expenditure depicted that households with piped water facility enjoyed better health conditions and therefore required less health expenditure. The urban households of Baluchistan with piped water facility spent around RS. 805 less than other households who were not having that facility, while the rural households of KP incurred nearly RS. 960 less than the other households.

There was a negative impact of proper **sanitation** in household on OOP health expenditures in Pakistan. The negative impact showed that households who had the facility of proper sanitation system spent less household OOP health expenditures in the estimated model than those households that did not have that facility. Households of urban Baluchistan with proper sanitation system spent around RS. 3461 less than the other households.

There was negative impact of proper **garbage disposal** system on OOP health expenditure in the estimated model. The impact explained that households with proper garbage disposal system had spent on average less on OOP health expenditures than those households who did not have proper garbage disposal system in the estimated model, the scale of this impact varied widely across the categories, however. In the urban areas of KP, the households having proper garbage disposal system spent around RS. 2858 less than the other households.

The impact of household **gas connection** was found negative of household OOP health expenditure. The negative sign indicated that households with gas connection had spent on average less on OOP health expenditure than those households that did not have gas connection whereas positive sign depicted that households that use gas as cooking fuel had spent on average more than the other households. The rural households that used gas as cooking fuel disbursed less OOP health expenditures than the other households. Among rural areas, the impact was highest in Baluchistan while smallest in Punjab. In rural Baluchistan, the households with gas paid nearly RS. 1980 less than the other households, while in rural Punjab the impact was RS. 2073 less than the other households. In urban areas, the impact of gas on OOP health payments for the whole country was found negative than its estimated impact on urban households of all the four provinces. On average, households using gas as cooking fuel spent RS. 2042 less than those households that did not use gas for cooking purposes. When the impact was seen specifically for urban households of provinces, contrarily, households using gas as cooking fuel had spent on average more than the other households. The households who used gas for cooking purposes on average spent RS. 494 more in urban Punjab and RS. 707 more in urban Baluchistan.

Electricity had a positive impact on household OOP health expenditures, explaining that households with electricity connection spent more on OOP health expenditures those households who did not have electricity connection. The results showed positive sign with the exception of rural Baluchistan. The results showed an increase in the health expenditure for the households with electricity connections. The impact

was more in urban settings than in the rural settings. The rural-urban gap was widest in the case of KP where the impact was almost twice as much as was in the case of rural KP.

4.2 Discussion

In this study, the sampling unit of analysis of this research was household with the recall period of one year. The OOP health expenditure of households with one-year recall period usually revealed fewer zero values (Muhammad Malik & Azam Syed, 2012). The findings of different variables used in this this study confirmed the results of previous research.

The variable '**household size**' was expected to have a positive impact on household OOP health expenditure as presented by the existing literature, specifying that larger households would incur more OOP health expenditure [Mamun et al. 2018; Paul et al. 2018; Sekyi & Domanban, 2012; Pal, 2010; Costa-Font et al. 2007; Rous & Hotchkiss, 2003; Rubin & Koelln, 1993]. In contrast, Minh et al. (2013), Silva et al. (2015), and Lee et al. (2019) explained the negative relationship between household size and OOP payments. Contrary to the studies showing negative impact, the results of this research were aligned with the positive impact of household size on OOP health payments. In addition, the positive effect of **smoke consumption** by households was also studied in the literature. The findings of this research were supported by Costa-Font et al. (2007) Rous & Hotchkiss (2003) who found out increased OOP health expenditures as a result of smoke.

While analyzing the household characteristics affecting OOP health expenditure, **children** and **elders** were mostly considered as vulnerable members of a household. The results of these two variables carried the positive sign, consistent with the literature, and were statistically significant also. These findings were in line with the results of Hailemichael et al. (2019), Paul et al. (2018), Amaya-Lara (2016), Minh et al. (2013), Muhammad Malik & Azam Syed (2012), and Pal (2010) revealing that the households with vulnerable members had positive relationship with OOP health expenditure because they were likely to have more health needs.

Education was also essential to analyze the impact of household characteristics on OOP health expenditures. The findings of this study were based on the fact that more educated people take greater care of their health. This study analyzed the impact of average education of the household instead of just focusing on the education of household head or spouse. The existing literature focused mainly on household head's education. The positive and significant relationship between education and OOP health expenditures was corroborated by the findings of Kumara & Samaratunge (2016), Silva et al. (2015), Muhammad Malik & Azam Syed (2012), You & Kobayashi (2011), Okunade et al. (2010), and Yardim et al. (2010), demonstrating that education of household head was a positive predictor of OOP health expenditures. The findings of Muhammad Malik & Azam Syed (2012), however, showed education of household head's spouse to have a positive impact on OOP health expenditures. In contrast, Oudmane et al. (2019), Njagi et al. (2018), Molla et al. (2017), Brinda et al. (2014), Costa-Font et al. (2007), Rous & Hotchkiss (2003), and Pannarunothai & Mills (1997) held a different view, explaining the negative relationship between household head education and OOP health expenses.

Household income and **consumption expenditures** have been interchangeably used in the existing literature of health spending. Household income is a good indicator of the capacity of household to spend whereas expenditures show households' tendency to spend. To discuss the variable of interest, namely, household consumption expenditures, it could be seen that its impact on OOP health expenditure was positive and statistically significant in this research. These results were consistent with the study of Yardim et al. (2010) which concluded the positive relationship between per capita household expenditure and OOP health payments.

The negative sign of the coefficient for dummy variables like **piped water**, **sanitation** and **garbage disposal** indicated a negative impact of these variables on household OOP health expenditure whereby households with facilities of piped water, proper sanitation and garbage disposal system had spent less on health than those households that did not own such facilities. The results for each of these variables carried the

expected signs (negative sign) and were also statistically significant. The findings of You & Kobayashi (2011) have corroborated the negative impact of proper sanitation but opposed the finding of piped water as a negative predictor of OOP health payments. The negative impact of piped water was in line with the findings of Mamun et al. (2018), Muhammad Malik & Azam Syed (2012), and Rous & Hotchkiss (2003). Additionally, the negative sign of proper sanitation and garbage disposal system was consistent with the findings of Rous & Hotchkiss (2003). However, the findings of Mamun et al. (2018) provided a different view regarding sanitation stating that households having access to sanitation had spent more OOP health expenses.

Household's access to **gas** and **electricity** indicates household's capacity to make expenses. However, methods of cooking have two dimensional relations as it indicates more wealth as well as better health. The findings of this research observed the positive impact of electricity in Pakistan. There was a negative sign of gas for all the estimated model and all the sub-samples with the exception of urban dwellings of four provinces, which observed positive impact of gas on OOP health expenditures. The study of Pal (2010) has corroborated the negative impact of gas on OOP health expenditures. On the contrary, the positive sign of electricity was not matched with the study of Pal (2010) that concluded electricity to be negatively affecting OOP health expenditures.

Unlike Rahman et al. (2020) Datta et al. (2019) Lee et al. (2019) Brinda et al. (2018) Farahat et al. (2018) Njagi et al. (2018) Paul et al. (2018) Kumara & Samaratunge (2016) Brinda et al (2012) You & Kobayashi (2011) Pannarunothai & Mills (1997) this study could not analyze the impact of diseases on OOP health expenditures due to some limitations of data.

From this detailed discussion of the estimated results, it was concluded that the research hypothesis could not be rejected. The coefficients of different socio-economic and other variables have indicated the significant impact on household OOP health expenditure in Pakistan. The comparison of these results with the earlier research would not be conclusive in itself as these comparisons find constraints in terms

of differences in nature of data, econometric models, and estimation techniques. Some significant differences in the time period of data and unit of analysis were also revealed while reviewing the previous studies.

5. Policy Implications

Healthcare system directly affects the economy of a country. Pakistan is a struggling economy with poor health indicators in the region. By investing in health through a health sensitive budget, Pakistan could not only be saving lives and promoting human rights, it can also further its economic interests strategically for a safer, healthier and wealthier Pakistan.

Understanding the determinants of OOP health expenditures can help policymakers develop possible strategies to reform the overall healthcare system. Regarding the policy implications, targeted financial support could be provided to vulnerable groups to alleviate the financial burden of healthcare expenditures. Further, regulating healthcare cost including consultation fee, diagnostic tests and other healthcare expenditures can prevent healthcare providers from overcharging pateints. There is a dire need for investment in health education and preventive programs to promote a healthier lifestyle. Moreover, continuous monitoring and evaluation of policies could also play a vital role in improving the overall performance of healthcare system.

6. Conclusions

From this study, the research hypothesis, providing the basis of the argument that various factors influence spending on health, was proved. The coefficients of different socio-economic and other demographic variables have indicated the significant impact on household OOP health expenditure in Pakistan. Surprisingly, the signs of many variables used in this study were in line with the dominant view of the literature. The impact of factors like household size, smoke consumption, the number of under-five children and elderly in household, average household education, and consumption expenditure was found positive and statistically significant of OOP health expenditure in all the estimated

models. Households with the facilities of piped water, proper sanitation and garbage disposal system were having less spending on health.

As per findings of **Sindh** data, <u>household size</u> had relatively *low* impact while <u>smoke consumption</u> was having ***highest*** impact on OOP health expenditure in *urban* Sindh.

The results of **Punjab** showed that there was ***highest*** influence of <u>consumption expenditure</u> and <u>gas</u> on OOP health payments, and ***lowest*** impact of <u>smoke consumption</u> and <u>garbage disposal</u> in *rural* Punjab. In *urban* Punjab, the <u>number of elderly members</u> in household had ***highest*** impact on OOP heath spending.

In *rural* **Baluchistan**, <u>gas connection</u> was having ***low*** impact and <u>number of under-five children</u> had ***highest*** impact on OOP health expenditure. In *urban* Baluchistan <u>piped water</u> had ***lowest*** impact in both times. The province-wise results showed that there was ***less*** influence of <u>number of under-five children</u>, <u>consumption expenditure</u>, <u>average household education, piped water</u>, and <u>proper sanitation</u> in *urban* Baluchistan.

The results of **KP** described that the households with <u>electricity</u> and <u>elderly members</u> had ***lowest*** effect on OOP health expenses and households with <u>piped water, proper sanitation</u> were having ***highest*** influence in *rural* KP. In *urban* KP, households with the facility of <u>electricity</u> and <u>garbage disposal</u> had ***highest*** impact on OOP health spending.

The comparison of these results with the earlier research might not be conclusive in itself due to many constraints (like differences in data, estimation techniques). However, the results of this study are hoped to be useful in policy analysis for household support in dealing with health expenses.

7. Limitations and Scope for Future Research

There is two-dimensional effect of health-related expenditures. On one hand, health expenditures affect health status, while, on the other hand, health status influences health expenses. This causal relationship between OOP expenditure on health and status of health was not analyzed in this study. Further, as the data used for this research was survey-based, it could have some implications of recall bias (some respondents might not easily recall expenses). In addition, supply side factors of health care (such as healthcare providers) were not considered due to the unavailability of such information in data used in this research. Hence, there can be further improvements in this study if household surveys add some other health related aspects in data. For future research in this area of study, researchers can explore OOP health expenditure by using different nature of data, unit of analysis, econometric models, or estimation techniques.

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APPENDIX

Table A1:

Results of Pakistan- Overall and Urban-Rural Settings

APPENDIX

Table A1:

Results of Pakistan- Overall and Urban-Rural Settings

Dependent: OOP	Overall		Rural		Urban	
	Model		*Sub-Sample 1*		*Sub-Sample 2*	
Independent Variables	**Beta**	**Sig**	**Beta**	**Sig**	**Beta**	**Sig**
HH Expenditure	.030427	0	.0304319	0	.0303772	0
Under-5 Children	877.5881	0	878.4679	0	867.3958	0

65y or Above Elders	2653.805	0	2654.234	0	2642.038	0
HH Size	61.01735	0	60.91316	0	63.22367	0
Average HH Schooling	288.9416	0	288.7465	0	288.6243	0
Lighting Fuel	691.697	0	692.0428	0	728.7589	0
Cooking Fuel	-2058.57	0	-2059.691	0	-2041.909	0
Piped Water	-942.6708	0	-942.0367	0	-936.7148	0
Sanitation	-4906.587	0	-4907.477	0	-4898.246	0
Garbage	-414.6661	0	-452.828	0	-409.8563	0
Smoke Quantity	1.393464	0	1.39163	0	1.401101	0
_constant	-137.6436	0	-137.609	0	-188.5489	0
Observations	24748		15891		8857	
Model chi2	35700000	0	27500000	0	7895932.7	0
Goodness of fit (chi2)	24732.97	0.5042	15875.61	0.5061	8831.97	0.5370

Table A2:

Results of Rural Setting of Provinces

Dependent : OOP	KP		Punjab		Sindh		
	Sub-Sample 3		*Sub-Sample 4*		*Sub-Sample 5*		
Independent Variables	**Beta**	**Sig**	**Beta**	**Sig**	**Beta**	**Sig**	**Beta**

HH Expenditure	.0303674	0	.0304976	0	.0303663	0	.029849
Under-5 Children	860.9394	0	875.7332	0	876.9628	0	881.0382
65y or Above Elders	2646.926	0	2648.409	0	2654.395	0	2668.829
HH Size	68.41486	0	58.05587	0	61.81554	0	62.37787
Average HH Schooling	297.6826	0	288.2137	0	289.6099	0	245.3905
Lighting Fuel	676.4292	0	706.0808	0	694.5681	0	772.2756
Cooking Fuel	-2037.987	0	-2073.153	0	-2059.873	0	-1979.44
Piped Water	-959.4863	0	-943.9692	0	-958.4311	0	-778.889
Sanitation	-4912.355	0	-4902.494	0	-4880.947	0	-4738.79
Garbage	-584.6178	0	-448.0648	0	-555.1222	0	-1819.85
Smoke Quantity	1.396904	0	1.349599	0	1.393604	0	1.439121
_constant	-150.6519	0	-136.456	0	-132.4718	0	-130.666
Observations	3018		7809		3497		1567
Model chi2	1189052.9	0	14700000	0	7313406.48	0	176440.2
Goodness of fit (chi2)	3002.51	0.515	7791.03	0.5169	3483.99	0.502	1497.19

Dependent: OOP	KP		Punjab		Sindh		Baluchistan	
	Sub-Sample 7		*Sub-Sample 8*		*Sub-Sample 9*		*Sub-Sample 10*	
Independent Variables	Beta	Sig	Beta	Sig	Beta	Sig	Beta	Sig
HH Expenditure	0.0237708	0	0.0237	0	0.0238503	0	0.0232827	0
Under-5 Children	268.4715	0	240.5963	0	246.5654	0	231.7789	0
65y or Above Elders	6744.372	0	6822.006	0	6756.597	0	6535.386	0
HH Size	67.23922	0	50.47659	0	50.07166	0	65.45829	0.003
Average HH Schooling	209.5333	0	202.0646	0	199.9442	0	166.6908	0
Lighting Fuel	1346.229	0	1117.973	0	1153.853	0	1219.405	0
Cooking Fuel	507.3909	0	493.9815	0	499.6378	0	707.1999	0
Piped Water	-890.4142	0	-883.0648	0	-870.9697	0	-805.0481	0
Sanitation	-3492.222	0	-3640.591	0	-3661.616	0	-3460.66	0
Garbage	-2858.289	0	-2849.108	0	-2844.468	0	-2798.247	0
Smoke Quantity	1.385684	0	1.437752	0	1.447566	0	1.370195	0
_constant	-1020.156	0	-695.2751	0	-742.3578	0	-908.9857	0.009

Observations	1446		3938		2715		758
Model chi2	1857719.3	0	3176338.36	0	2385499.05	0	25929.24	0
Goodness of fit (chi2)	1429.84	0.526	3921.82	0.5158	2697.95	0.524	737.17	0.584

Table A3:

Results of Urban Setting of Provinces