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Title: Determinants of Out-of-Pocket (OOP) Expenditures on Three Categories of Health Care Services in Households in Turkey: A Multivariate Probit Approach

Running title: Determinants of Out-of-Pocket (OOP) Expenditures

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Conflicts of interest

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Abstract

This study identifies the driving forces that contribute to the probabilities of incidence of out-of-pocket (OOP) expenditures by households in Turkey. Factors affecting the probability of OOP expenditures on medical products/devices/supplies (MP), outpatient services (OTS), and inpatient services (ITS) are examined using the Household Budget Survey (HBS) data gathered by the Turkish Statistical Institute in 2018. The study applies the multivariate probit model to account for the possible relationship across the three categories of healthcare expenditure. The incidence of OOP spending varied with 48.9% of the households reporting OOP expenditure on MP, 22.4% on OTS, and 25.4% on ITS. The largest probability changes were associated with the household income, household type and size, age category, and having private health insurance. Gender and marital status also influenced expenditures on some categories. Lifestyle choices had small and mixed effects, with smoking and alcohol consumption lowering the probability of OOP spending. From a policy standpoint, households with the lowest incomes, large households and those where the household head was unemployed or had a condition preventing working seemed to report the OOP expenditures less frequently and may have chosen not to received healthcare services leading to the need for more healthcare services later.

Keywords: Out-of-pocket expenditures, outpatient services, inpatient services, multivariate probit, Household Budget Survey.

1. Introduction

The acquisition of healthcare services commonly requires payment [1]. Both public and private schemes provide healthcare financing. The purpose of healthcare financing is to ensure access to private and public health services by providing the right financial incentives [2]. Public financing methods include taxes and social insurance contributions, and the mechanism varies

across countries. Private financing includes purchase of health insurance and out-of-pocket (OOP) payments [3].

A well-planned health care system financing protects society against financial risks. The costs of healthcare services are increasing rapidly due to the growing elderly population, chronic diseases, and technically more complicated costly treatments [4]. The way health systems are designed, managed, and financed affects the lives and livelihoods of individuals [2]. The threat of out-of-pocket (OOP) payments to the household living standard is increasingly considered in health financing [4]. The out-of-pocket payment is the dominant form of financing health services in developing countries [5]. In those countries, including the Middle East and North Africa (MENA), the majority of the healthcare service expenses are OOP expenditures of patients or their families [6]; [7, 8]. Providing financial protection against excessive OOP is an important policy for the health system. In the absence of such a policy, a household may face a high burden of spending on treatment and medical bills and allocate time to caring for of family members. OOP expenditures are the issue that policymakers focus because of their consequences for the patients, households, and society [9].

In the 21st century, the OOP expenses constitute an important obstacle in access to health services [10]. Access to health services depends on the economic status of individuals or households. If the health service cost is not affordable, it prevents receiving the needed care [5]. Borrowing money, selling assets, or using other funds to receive healthcare services are some approaches used by households. Households may choose least-cost care or completely forgo the healthcare services they need [11]. Therefore, the OOP payments are considered unfair [12]. One of the main purposes of both national and international health policy is to replace OOP payments with alternative forms of financing. In this context, knowing the predictors of the probability and levels of OOP expenditure is essential to assure that no one is left without healthcare services and maintain universal healthcare coverage [13]. The role of socioeconomic,

lifestyle, environmental, and geographic factors, among others has been documented to determine health and health-seeking behavior [2, 14].

OOP spending on health care is the primary source of financing next to public health expenditures in terms of the amount and percentage of total expenditures in most countries [15]. OOP expenditures, referring to the payments made by households to receive healthcare services, have been increasing in the last two decades in Turkey [16]. OOP payments for treatment, pharmaceuticals, and other services and supplies reached 28.655 billion TL, increasing by of 19.4% in 2018 alone. The share of OOP payments in total health expenditures was 17.3% in Turkish households in 2018 [17]. Most studies analyzing the determinants of OOP expenditures in developed and developing countries have focused on spending levels or separate probabilities for outpatient and inpatient services [13, 18]. However, the likelihood of household spending on medical products, outpatient and inpatient treatment, and the possibility of the simultaneous occurrence of those services has been ignored. The monthly OOP spending on, for example medical products, undoubtedly affects other healthcare services. Therefore, studies that neglected the relationship between the spending amount or probabilities of incurring such expenses can compromise important statistical results due to the limitations of the estimation method.

This study recognizes that the health care involves a number of services and supplies and distinguishes the OOP spending on three categories, the expenditures on medical products, supplies, and materials (MP), outpatient treatment services (OTS), and inpatient treatment services (ITS). The methodological approach considers the realities faced by the patient and his household by adopting the simultaneous modeling framework that allows for the relationship across the three categories of OOP expenditures. The application of the multivariate probit regression (MPR) analysis accommodate the likelihood of the OOP expenditures in one category being influenced by those involving another category of health care service. The

approach allows the identification of factors influencing the expenditure in each category from the large pool of socio-demographic and economic characteristics of the household and the household head providing superior insights applicable in the formation of healthcare policies. The practical recommendations for policy makers are generated from the calculation of the marginal effects of regressors derived from the joint probabilities. The quantified measures, i.e., the probability changes that expenditures in a specific category took place, are a meaningful guide for health practitioners and decision-makers in redesigning health expenditures and their fair redistribution across the country.

2. Literature Review

The amount of household OOP expenditures differs depending on the complexity and quality of healthcare services. It is believed that differences in demographic and socio-economic household features are the most important factors determining OOP spending [4, 5, 19, 20]. OOP expenditures are of particular concern to both households and policy-makers in developing countries such as Turkey and countries with a similar level of development. OOP spending affects the inclination to use healthcare services, ultimately affecting the individual health status. Decision-makers need to know the factors that influence households to incur such expenses.

Household OPP expenditures for healthcare services account for 23% of total global health expenditures and 45% of health expenditures in developing countries [21]. The large OOP spending is a burden for poor households when it restricts other basic household needs contributing, for example, to malnutrition because of the obligation to pay for treatment. As a result OPP expenditures are an important social problem and of great concern for policymakers due to the consequences for sick family members, households, and society [9, 22]. Household OPP expenditures are the most important form of financing health services in many developing countries. Information about household health expenditures is essential for creating an effective

healthcare system financing policy for any country [4, 23]. For this reason, it is essential to identify the key factors that influence OOP expenditures in any of the three categories and possibly differentiate the probability changes that a household incurs such expenditures [19, 24, 25].

The literature on the subject identified demographic, socio-economic, and location factors as relevant to OOP spending. Among the demographic characteristics are those characterizing the household head, such as gender [5, 26, 27], age [28-30], and marital status [31, 32]. Also, the household size [33-35] and composition indicated by the presence of children and elderly [5, 36, 37] affect OPP expenditures.

The socio-economic factors such as the household head educational attainment level [38, 39] have been identified as important determinants of OOP spending. Furthermore, household income [4, 19, 25, 40], employment status [24, 41], insurance status [16, 42, 43], and occupation [20, 29] also have affected OPP expenditures. The place of residence has been reported to affect the OOP expenditures and should be taken into consideration in policy formulation [25, 44]. Additionally, OOP spending has been influenced by factors such as the nature of the disease [38, 45-47], type of healthcare facility visited [24], and affinity to service providers [41].

The study of adult and elderly populations in Tanzania indicated that obesity increases OPP expenditure for adults [29]. In a study conducted on the determinants of OPP expenditure in Sri Lanka, [30]) found that proximity of state hospitals, number of hospital beds, and presence of dentists in state hospitals reduce the burden of OOP expenditures. In a study conducted in Pakistan, non-food household expenditures were found to be the most important determinant of OPP spending [5]. In a study conducted on the elderly living in rural areas in Odisha, India, the savings or bank balance, mobility status, hearing status, smoking, and multiple morbidities were found to be important factors associated with OPP expenditures [48]. Likewise, diabetes, tuberculosis, malaria, respiratory disorders, gastrointestinal diseases, dementia, depression, and disability were found to be associated with higher OPP spending of the elderly living in rural

areas in India as compared to those not afflicted by such diseases [49]. A study of a psychiatric clinic in Turkey revealed that the patients diagnosed with schizophrenia and other psychotic disorders paid more for their treatment than other patients [16].

Overall, numerous studies in lesser developed countries confirmed the association of demographic and socio-economic characteristics and OOP expenditures. Household location and nature of the affliction also influenced OOP spending and are worthwhile considerations in the empirical examination quantifying the probability of OOP spending on the three categories of healthcare services. The current study uses nationally representative data in identifying the statistically significant factors determining household OOP expenditures for three service categories (MP, OPS, and IPS) in Turkey.

3. Data and Methods

3.1. Household Budget Survey

The study applies data from the Household Budget Survey (HBS) conducted in 2018 by the Turkish Statistical Institute (TSI). The survey sample is representative of the overall society. The HBS provides information about socioeconomic characteristics, standard of living, and consumption of households. All settlements within the borders of the Republic of Turkey were included in the HBS geographical scope. Also, all members present in every household were included, but those qualified as institutionalized persons and the nomadic population were omitted. The sample was determined by the stratified two-stage cluster sampling method [50]. Approximately one thousand families with the same socio-demographic characteristics were replaced each month by the TSI in order to eliminate the influence of seasonal effects.

3.2. Choice of estimation approach

The study focuses on quantifying factors associated with OOP expenditures on the three distinct categories of healthcare services. Classification of the services is based on the discernable character of the services such as medication or outpatient treatment, but the study recognizes

that household use of services implies a simultaneous or nearly simultaneous incidence of their

purchase.   The multivariate probit regression (MPR) technique is preferred when dependent

variables are related to each other and has been selected for the estimation. When some of the

dependent variables are interrelated through the same set of explanatory variables, the MPR

results are more robust than binary logit or probit results obtained using a separate equation for

each dependent variable [51] or one of the categories of healthcare services. The general

specification for the trivariate probit regression is [52]:

$$y_{im}^* = x_{im}'\beta_m + \varepsilon_{im}$$
$$y_{im} = 1 \ if \ y_{im}^* > 0 \ and \ 0 \ otherwise \quad for \ i = 1,...,N \ and \ m = 1,2,3.$$
$$E[\varepsilon_m \mid x_m] = 0, \ Var[\varepsilon_m \mid x_m] = 1, \ Cov[\varepsilon_j\varepsilon_m \mid x_m] = \rho_{jm} \ and \ (\varepsilon_1,\varepsilon_2,\varepsilon_3): \ N[0,R]$$

(1)

where y_{im}^* is a latent dependent variable for each m, while y is its observed counterpart. A set

of independent variables is x and assumed to be the same in each equation, β is a set of the

associated regression coefficients to be estimated, and ε_m is an error term for each equation. R

is the variance-covariance matrix with values of 1 on the leading diagonal and correlations ρ_{jm}

= ρ_{mj} as off-diagonal elements. Log-likelihood function for a sample of N independent

households:

$$\log-L = \sum_i \log \Phi_3(\mu_i; R),$$

where $\Phi_3(\mu_i; R)$ is standard trivariate normal cumulative distribution function (CDF), where

$K_{im} = 2y_{im} - 1$ for each i, m=1,2,3. If the remaining dependent variables (say, y_2 and y_3) are

equal 1, then the conditional expectation of the other dependent variable (say, y_1) is given:

$$E[y_1 \mid y_2 = 1 \ and \ y_3 = 1] = \frac{\text{Prob}(y_1 = 1,...,y_3 = 1)}{\text{Prob}(y_2 = 1, y_3 = 1)},$$ where the numerator is the trivariate CDF,

while the denominator is bivariate CDF. The remaining two conditional expectations can be

constructed likewise. The effect of any regressor on the conditional probability is calculated by differentiating such conditional probability with respect to the corresponding regressor. If Σ is the asymptotic covariance matrix for the coefficient estimates, then the variance of the predictor of marginal effects (ME) is obtained as the mean square deviation of 100 random draws from the distribution of the underlying slope parameters [53].

3.3.   Outcome variables and covariates

The dependent variables in the current study include OPP expenditures for three healthcare service categories: medical products/supplies/materials (MP), outpatient treatment service (OTS), and inpatient treatment service (ITS). Each dependent variable is binary, i.e., coded as "1" if the household incurs any OPP expenditures for a specific category, otherwise coded "0".

The MP category includes the probability of spending on pharmaceutical products, pregnancy tests, contraceptive mechanical devices, medical products not classified elsewhere, corrective eyeglasses and contact lenses, hearing aids, repair of therapeutic instruments and equipment, and other therapeutic instruments and equipment. The second category, OTS, considers the likelihood of household OOP spending on general practitioners, specialist physicians, dental services, medical analysis laboratory and x-rays, spa services, corrective gymnastic treatment, ambulance services, leasing of therapeutic equipment, and other paramedical services. Finally, the ITS category, considers expenditures on hospital stays.

The explanatory variable selection stems whenever possible from the results of studies reviewed earlier as well as variables considered relevant in predicting the likelihoods of the household OOP expenditures in each category. Demographic and socioeconomic factors, factors related to household lifestyle choices, and housing were included among the explanatory variables (Table 1). It is noted that because the relationship between the probability of OOP expenditures and risk factors has been widely discussed in the literature [8, 24, 25], it would have been redundant to discuss it here.

4. Results and Discussion

4.1. Summary statistics

The sample based on the HBS and used in the current study shows that 48.9%, 22.4%, and 25.4% of households, respectively, reported the OPP expenditures for MP, OTS, and ITS category. Interestingly, the spending incidence on MP category is roughly twice that of the other two service categories accounting for patient treatment. The spending frequency on the OTS and ITS categories were similar.

Table 1 shows the frequency and percentage of demographic, socioeconomic, lifestyle, and housing factors in the HBS sample.

To reduce the risk of potential estimation problems, Table 1 shows the VIF values calculated for each characteristic intended to be used in the estimation of equations modeling the likelihood of incidence of OOP expenditures in the three categories. Variables with a VIF value of 5 but less than 10 are considered to indicate a moderate degree of multicollinearity, while those with a VIF value of 10 and higher are to show a high degree of multicollinearity [54]. None of the variables included in the modeling has a VIF value of 5 or higher (Table 1) showing that the moderate or severe multicollinearity is absent between the selected regressors.

4.2. The MPR estimation results

Table 2 shows parameter estimates of the maximum likelihood function, along with their statistics and marginal effects (ME) for each likelihood of the household OPP expenditures in the three categories, MP, OTS, and ITS. The choice of the estimation approach using the multivariate probit model is confirmed by the statistically significant correlation coefficients. The correlation coefficients indicate, a positive relationship between the dependent variables and justifies the estimation of a single model. The null hypothesis that the correlation coefficients were simultaneously zero was rejected (Likelihood Ratio (LL) test value =2737.48 with 3 (df) and p<0.001). Also, the LL test revealed that all explanatory variables used in the

three-equation system are simultaneously nonzero, and the regressors jointly explain each probability decision (LL =972.67, df =147, and p<0.001). From policy standpoint, that result establishes that there is interaction across the three equations and that the incidence of spending on one of the three categories can be associated with expenditures on the remaining two categories.

Most of the demographic and socio-economic characteristics affect the probability of the OOP health expenditures in each of the three categories (Table 2). Specific effects have distinct magnitude and sign in each category of the OOP expenditure. The estimated coefficients lack practical interpretation until they are converted into measures of probability change in the incidence of the OOP expenditure on a given category of health care services. The individual marginal effects (ME) of explanatory variables on OOP health expenditure are interpreted assuming all other variables are constant. The MEs in Table 2 are discussed in detail in the next section.

4.3. Discussion

Male-headed households are less likely to incur OOP expenditures for all categories of healthcare services. This result coincides with earlier findings that women have higher health expenditures [5, 27, 29]. Women consume additional healthcare services due to pregnancy. Women also tend to spend more on all three categories than men because of concerns about the health of family members, including children [27]. Considering household income, households in the lowest quartile are covered by the government general health insurance, but additional programs could protect that group from OOP expenditures.

The educational attainment level may affect the OOP expenditure decision in a specific category because education shapes health-related behavior. In this study, the probability of more education increasing OOP expenditures on the MP, OTS, and ITS categories is low where the household head reported having high school or university education as compared to those

without a school diploma. However, the effect is statistically significant only in the case of MP expenditures. The results differ from earlier findings in other countries [5, 30, 38, 39, 55] because OTS and ITS expenses can be covered by the family health insurance. The positive link between education and OOP health expenditures was common in previous studies [5, 30, 38, 39, 55]. On the other hand, one could expect that the higher the education level, the lower the probability of spending by category, given that those with more education make healthier lifestyle choices [56], and have more knowledge to better cope with illnesses or injuries [13].

Household heads in four age categories (ranging from 25 years to 64 years of age) were less likely to make OOP expenditures for both the MP and OTS categories. A similar tendency is shown for OOP spending on ITS services for those in age groups 45-54 and 55-64 as compared to households headed by those 65 years old or older. The probability of OOP spending decreases as the household head age falls between 45-54 years of age, and the probability decrease is lowest for those 25-34 years of age as compared to those 65 years of age and older. Among the three categories, health expenditure for MP has the highest probability, while spending on the ITS category is the lowest. It is plausible that the ITS expenditures are covered in full or in part by the family health insurance. However, a fully-fledged financial protection mechanism should be developed and implemented to limit the OOP expenditure for low-income families. Families who save on OOP spending may have an opportunity to improve nutrition once they are able to redirect purchases due to improved coverage by aid programs. Providing households with assistance to cover healthcare expenses early could mean lower healthcare costs borne by the government in the future.

The household head's age is one of the main demographic characteristics. The age variable may represent age-related healthcare needs. The increased comorbidity and mortality rates due to chronic diseases are mostly observed in the elderly population [57]. Moreover, large

healthcare expenditures are attributed to declining health as people age, increased injury frequency in later stages of life, and chronic diseases associated with aging [35].

Assuming that age may affect the use of healthcare services differently, its effect may not have a linear relationship with the likelihood of incurring health expenditures. The non-linearity could also result from the access and use of healthcare services related to socioeconomic conditions in later stages of life [58]. For example, the low-income elderly tend to be in poorer health but use less health care services than those with more income, irrespective of age [59]. Earlier studies reported that as the age of the household head increases to a certain level, the likelihood of making OOP expenditures decreases. Households with a household head 65-years-old and older frequently make OOP expenditures. An aging population is also the main driving force of increasing healthcare expenditures. Elderly individuals are a vulnerable community that significantly increases healthcare expenditures [30, 60]. The current study results support previous findings that healthcare expenditures increase with advancing age, especially after the age of 65 [19, 29].

Marital status affected the probabilities of OOP spending. In this study, never-married household heads are less likely to report OOP expenditures on all healthcare service categories than those married. In general, married household heads are likely to have higher OOP expenditures due to healthcare needs for themselves, spouses, and children than household heads that are not married [27]. Also, insurance that provides access to healthcare is obligatory for those who do not have sufficient financial resources [61]. The OOP spending varied depending on whether the household had health insurance. As expected, households without health insurance have high OOP expenditures. However, there is some evidence that households that are covered by health insurance also have high OOP expenditures [16, 19, 24, 42]. The current study confirms that households with compulsory and private health insurance have higher OOP spending on all three categories of services as compared to households lacking insurance.

However, as expected, the probability values in the case of private healthcare expenditures are higher than those when a household has mandatory health coverage. The likely reason behind this finding is that households with a large number of uninsured individuals tend to use fewer healthcare services due to financial constraints and thus are less likely to spend OOP on the three categories of services. Such families may be less likely to spend OOP on public and private healthcare providers that adopt integrated management and cost-sharing programs. In contrast, households with more insured individuals may be less price-conscious about health expenditures and seek healthcare services [19].

The current study confirms the importance of occupation for the incidence of OOP expenditures. Households where the household head was a professional or an artist are more likely to spend on the MP category, while household heads with white collar jobs and those with jobs for unskilled laborers are unlikely to spend on OTS. Studies showing that households headed by an employed worker had a higher likelihood of making OOP expenditures [24] but that unemployment is also an important determinant of OOP expenditures [41] is supported by the current study findings. On the other hand, households where the head was disabled are more likely to have OOP expenditures. The finding is consistent with previous reports [45, 47, 62]. Individuals with chronic diseases or conditions tend to need regular checkups and treatment more frequently than other household members [46]. Considering the probability of such families being poor and the incidence of some poorer households postponing a treatment because they cannot afford OOP expenses, modifying the financial protection programs by providing the needed care and equitable distribution of healthcare services throughout the country would be more efficient in assuring good health of the population.

Previous studies established that income is one of the main triggers of OOP expenditures. In the current study, compared to families with the lowest income (e.g. lowest quartile), all higher income quartiles have higher probabilities of OOP expenditures on the MP

and OTS categories. In particular, as household income increases, the probability of incurring MP expenditures increases by about 14% for the 2nd and 3rd quartile and more than 16% for the highest income group (Tale 2). The probabilities of having OTS expenditures are larger and amount to 14% for the 2nd quartile, 18% for the 3rd quartile and a whopping 26% for households with the highest incomes. The results suggest that the use of OTS is strongly influenced by household income, and, presumably, implies better health conditions of household members in the higher income groups as compared to households with less income. It appears that OOP spending on ITS services is more equal since the calculated probabilities of having OOP costs for the 2nd and 3rd income quartile are small (Table 2), and even negative for the highest income group. The results likely reflect the existing government healthcare programs and possibly having private insurance in the case of households with highest incomes. Those findings echo previous results [4, 25, 40]. As incomes rise, the likelihood of spending on all categories increases, reflecting the tendency to use more healthcare services, more expensive or specialized treatment services [63].

Household type has a varying effect on the probability of OOP expenditures in any of the three categories of services (Table 2). The probability of OOP spending on the MP category decreases for households of singles by nearly 44% and for a single parent raising children by almost 26%. It also decreases in households of childless couples, but only by about 10%. (Table 2). In the case of the OOP spending on OTS, the probability of such spending decreases only in the case of a single parent raising children by about 13%. It is possibly associated with the special government programs providing health care for children. Households of nuclear families with other persons (possibly multigenerational households), the probability of OOP expenditures on OTS services increases by more than 12% (Table 2). This is also the only household type associated with an increasing probability of having OOP expenses on the ITS category, although the increase is only about 5%. Households classified as other types, except

for childless couples, have a lower probability of OOP spending on the ITS category of 11% or less. An increasing household size (a continuous variable in Table 2) lowered the probability of OOP expenditures but by a decreasing amount across the three categories: by almost 10% in the case of MP, nearly 6% on OTS, and under 4% in the case of ITS. Overall, results coincide with the findings of previous studies linking household size to OOP spending [24, 35, 56].

Having private health insurance increases the probability of OOP spending on all categories (Table 2). The magnitude of the probability is largest in the case of MP services, 19%, about 14% in the case of OOP spending on OTS, and considerably smaller but still positive (more than 3%) in the case of ITS services. Because private health insurance is voluntary it is believed to be more prevalent among households with high incomes. The demand for private insurance is affected by various economic, social, and demographic factors [64]. Additionally, high Gross Domestic Product (GDP) per capita, health expenditures, and level of education are the strongest determinants of the use of private insurance [65].

Having a credit card increases the probability of OOP spending as compared to households not using that method of payment, but the increases range from small to marginal (Table 2). The probabilities associated with the MP and OTS categories have more pronounced effects because payments for those services are, as expected, easier with a credit card.

To deal with the cost of illness, households either use their savings and income or rely on constrained means of financing such as the depletion of household assets, loans, and family and friend support [66]. The main reason for making fewer health service purchases is a lack of money or savings [48]. However, one of the interesting results of the current study is that households with savings have a lower probability of OOP spending on the MP (nearly 6%) and OTS (almost 7%) categories than those without savings.

Variables associated with lifestyle choices have a mixed effect on OOP expenditures on the three categories of services. The probability of having OOP expenditures are smaller in

households using tobacco (about 8%) and alcohol (about 7%) on MP services and on IPS in the case of tobacco use (almost 3%). The latter result could be associated with the government healthcare program covering ITS when some tobacco users may require hospital stays. Families that report eating out had a markedly higher probability of having OOP expenditures on the MP category (more than 17%) and on ITS services (nearly 7%). Households frequenting cinemas or sports events had a slightly smaller probability, about 5%, of OOP expenditures on ITS services (Table 2), while playing games of chance increased the probability of OOP expenditures on the MP category by nearly 6%.   If visiting coffee houses, cafes, or lounges was a part of a household lifestyle, the probability of OOP expenditures on the MP and OTS categories increased by about 5% and 3.5%, respectively. Shopping at open-air markets or online tend to increase OOP expenditure probability on all three health service categories, except for the spending on the ITS category in the case of online purchases (Table 2). It appears that lifestyle choices matter in the incidence of OOP payments, but the effects measured as the probability changes on any of the three categories varied in their direction and magnitude. It is likely that dynamically changing lifestyles could lead to more changes in OOP expenditure and may have to be tracked more accurately.

5. Conclusion

The accessibility of healthcare services, expanding their use, and reducing the potentially catastrophic effect of healthcare expenses on households are of paramount importance to governments. In Turkey, those overarching measures, including fair and efficient distribution of healthcare services are a major focus of government programs, especially the reduction of risk of impoverishing a household as a result of OOP expenditures.

The investigation of factors influencing the probability of OOP expenditures on three categories of healthcare services involves a nation-wide sample of households from the HBS in Turkey. The approach recognizes the possible relationships across the three categories of

services, i.e., MP, OTS and IPS, and applies the multivariate probit (MP) modeling. The suitability of multivariate probit model is confirmed by statistical testing. The examination of healthcare expenditure categories as a system of three equations does not compromise key statistical properties such as efficiency of parameter estimates. The calculated correlation coefficients in the MP model are positive and statistically significant suggesting a decrease in the probability of OOP spending in one category when the value of any explanatory variable increases the probability of OOP expenditure on another healthcare service category.

The key practical findings have to do with the marginal effects that measure changes in probability of OOP expenditures on the specific healthcare service category in response to a change in a specific explanatory variable. Results show that particularly large changes in the probability of OOP spending are associated with gender, several age categories, and marital status in the case of spending on MP services. Overall, the probability changes were particularly large in OOP spending on MP services and were increasing for some household types, all but the lowest income quartile, and having private insurance. Similar in direction (increasing or decreasing) but somewhat lower in magnitude were the changes in the probability of OOP expenditures on the OTS category. As in the case of the MP category, the spending on the OTS category was particularly strongly affected by age, marital status, all income categories except for the lowest quartile, selected household types, and having private insurance. The calculated probability changes associated with OOP spending on the IPS category followed a pattern similar to the other healthcare service categories but the effects were markedly smaller. The latter result is likely associated with the existing government healthcare programs and a system of government-managed hospitals.

For policymakers, the study results provide important insights into increasing the effectiveness of healthcare policies and the determination of a fair financial burden of expenditures on healthcare. The likelihood of OOP expenditures by households in the lowest

income quartile is low but still present. It is plausible that low-income households chose not to receive any healthcare services due to the lack of funds. For this reason, at-risk, low-income households require policy makers to consider suitable mechanisms for assuring healthcare service accessibility. The government of Turkey covers certain healthcare expenditures for all households, but some households purchase private health insurance to cover others. Therefore, the possibility of healthcare expenditures having a catastrophic effect on a household varies and ear of such costs may affect behavior in seeking needed healthcare services.

Households headed by someone unemployed have a lower probability of being faced with OOP expenditures, possibly indicating that the lack of income may delay seeking medical care. Improving healthcare access for the unemployed will also reduce the unregistered unemployment. Households indicating a member with a condition preventing work are more likely to incur OOP expenditures. It appears that policies addressing specific needs of citizens with work-preventing conditions by improving their access to healthcare services will reduce household OOP expenditures. The disabled may have special needs including equipment, non-prescription medication, and physical therapy services not commonly sought by other types of households and having access to those services will improve their life quality and help integrate them into society at large.

Finally, large households seem to have a lower probability of OOP spending on any of the three categories of healthcare services. It is not clear whether the lower probability is linked to the demographic composition of the household. For example, households with many young children may benefit from special government programs already addressing their needs. A future study may explore that aspect together with the presence of elderly in a household.

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Table 1. Descriptive statistics of all variables.

Variables	Frequency (n=11,828)	Percent	VIF
Discrete Variables			
Demographic characteristics			
Gender:			
Female (Reference group)	1826	15.4	-
Male	10002	84.6	2.65
Education Levels:			
Incomplete primary school (Reference group)	1317	11.1	-
Primary school	4976	42.1	3.35
Secondary school	1720	14.5	2.55
High school	2041	17.3	2.98
College	1774	15.0	3.68
Age categories:			
15-24 years	122	1.0	1.22
25-34 years	1578	13.3	2.81
35-44 years	2765	23.4	3.40
45-54 years	2825	23.9	2.83

55-64 years	2345	19.8	1.94
65 + (Reference group)	2193	18.5	-
Marital status:			
Never married	479	4.0	2.29
Married (Reference group)	9662	81.7	-
Divorced/Widowed	1687	14.3	4.27
Occupation categories:			
Manager	561	4.7	1.39
Professional occupation groups	676	5.7	1.89
Technicians/administrative assistant	431	3.6	1.32
Office service employee	377	3.2	1.27
Service/sales staff	1338	11.3	1.62
Skilled agriculture/forestry/aquaculture workers	1482	12.5	1.54
Artists/professionals	1211	10.2	1.65
Facility managers/machine operators/installers	956	8.1	1.54
Occupations with no skill requirement	884	7.5	1.41
Unemployed (Reference group)	3912	33.1	-
Work preventing condition:			
Yes	824	7.0	1.14
No (Reference group)	11004	93.0	-
Socioeconomic characteristics			
Income quartiles:			
1st quartile (Reference group)	2957	25.0	-
2st quartile	2957	25.0	1.76
3st quartile	2957	25.0	2.18
4st quartile	2957	25.0	3.08
Household type:			
Single-person household	1149	9.7	4.34
Nuclear family of spouses only	2228	18.8	1.98
Nuclear family of spouses and children (Reference group)	5884	49.7	-
Nuclear family of single parent and children	837	7.1	2.77
At least one nuclear family and other persons	1544	13.1	1.53
Consisting of more than one person without a nuclear family	186	1.6	1.63
Second-home ownership:			
Yes	995	8.4	1.06
No (Reference group)	10833	91.6	-
Compulsory health insurance:			
Yes	11219	94.9	1.05
No (Reference group)	609	5.1	-
Private health insurance:			
Yes	1532	13.0	1.37
No (Reference group)	10296	87.0	-
Credit card:			
Yes	5935	50.2	1.48
No (Reference group)	5893	49.8	-
Savings:			
Yes	4540	38.4	1.44
No (Reference group)	7288	61.6	-
Household lifestyle choices			
Smoke:			
Yes	6186	52.3	1.18
No (Reference group)	5642	47.7	-
Drink alcohol:			
Yes	667	5.6	1.11
No (Reference group)	11161	94.4	-
Eat out:			
Yes	6241	52.8	1.43
No (Reference group)	5587	47.2	-
Cinema, theater, sports, games, etc.:			
Yes	1006	8.5	1.21

No (Reference group)	10822	91.5	-
Play games of chance:			
Yes	513	4.3	1.06
No (Reference group)	11315	95.7	-
Frequents coffeehouse, cafe, lounge, etc.:			
Yes	3311	28.0	1.16
No (Reference group)	8517	72.0	-
Shops at market:			
Yes	7502	63.4	1.09
No (Reference group)	4326	36.6	-
Shops online:			
Yes	1208	10.2	1.29
No (Reference group)	10620	89.8	-
Housing			
Residential status:			
Homeowner (Reference group)	7184	60.7	-
Tenant	2764	23.4	1.41
Detached house	187	1.6	1.09
Not a homeowner but not paying rent	1693	14.3	1.16
Housing type:			
Detached house (Reference group)	5086	43.0	-
Apartment	6742	57.0	1.46
Continuous Variables			

	Mean	**Standard dev.**	**VIF**
Equivalent household size	2.06	0.73	2.84
Number of rooms in residence	3.56	0.85	1.16

Table 2. Maximum likelihood estimates and marginal effects (ME) of multivariate probit model

Variables	MP		OTS		ITS	
	Estimates (se)	ME*100	Estimates (se)	ME*100	Estimates (se)	ME*100
Constant	0.197[c] (0.120)		-0.864[a] (0.138)		-0.633[a] (0.137)	
Discrete Variables						
Demographic characteristics						
Gender	-0.264[a] (0.054)	-15.590[a]	0.003 (0.064)	-0.853	-0.112[c] (0.061)	-1.388[c]
Education Levels:						
Primary school	0.052 (0.043)	0.899	0.007 (0.050)	-0.608	-0.006 (0.048)	-1.107
Secondary school	0.114[b] (0.053)	7.420[b]	0.023 (0.061)	1.913	0.055 (0.059)	0.697
High school	0.124[b] (0.053)	-0.857[b]	0.048 (0.061)	-1.564	-0.054 (0.060)	-4.840
College	0.138[b] (0.063)	-2.556[b]	0.101 (0.070)	-0.281	-0.083 (0.070)	-6.923

Age categories:						
15-24 years	-0.191 (0.129)	-8.353	-0.214 (0.160)	-9.555	-0.031 (0.146)	3.402
25-34 years	-0.203[a] (0.058)	-1.016[a]	-0.177[a] (0.065)	-3.511[a]	0.064 (0.064)	7.696
35-44 years	-0.236[a] (0.051)	-13.164[a]	-0.176[a] (0.057)	-8.981[a]	-0.080 (0.057)	1.408
45-54 years	-0.257[a] (0.047)	-23.064[a]	-0.216[a] (0.051)	-15.633[a]	-0.196[a] (0.052)	-3.367[a]
55-64 years	-0.227[a] (0.041)	-20.523[a]	-0.141[a] (0.045)	-11.472[a]	-0.178[a] (0.045)	-3.668[a]
Marital status:						
Never married	-0.235[a] (0.090)	-31.265[a]	-0.408[a] (0.115)	-29.888[a]	-0.296[a] (0.105)	-6.564[a]
Divorced/widowed	-0.041 (0.070)	-4.450	-0.008 (0.083)	-1.633	-0.043 (0.078)	-1.318
Occupation categories:						
Manager	-0.054 (0.065)	-7.455	-0.003 (0.070)	-2.618	-0.077 (0.071)	-2.795
Professional occupational groups	0.135[c] (0.070)	2.347[c]	-0.066 (0.075)	-5.657	-0.010 (0.076)	-1.845
Technicians/assistant professional occupational groups	0.088 (0.072)	9.456	0.070 (0.078)	5.987	0.087 (0.077)	2.147
Office service employee	-0.054 (0.074)	2.269	-0.168[b] (0.084)	-5.445[b]	0.056 (0.081)	5.051
Service/sales staff	0.006 (0.047)	-3.061	-0.038 (0.053)	-3.644	-0.039 (0.052)	-1.554
Skilled agricultural/forestry/aquaculture workers	-0.062 (0.044)	-8.103	-0.062 (0.050)	-5.584	-0.079 (0.049)	-2.220
Artists/professionals	0.123[b] (0.050)	5.451[b]	-0.079 (0.056)	-4.309	0.034 (0.055)	0.525
Facility managers-machine operators/installers	-0.035 (0.053)	-6.278	-0.087 (0.060)	-6.587	-0.063 (0.059)	-1.619
Occupations with no qualification requirement	0.048 (0.053)	4.646	-0.123[b] (0.063)	-4.789[b]	0.051 (0.059)	2.862
Work preventing condition	0.193[a] (0.049)	25.423[a]	0.111[b] (0.054)	13.551[b]	0.253[a] (0.051)	8.008[a]
Socioeconomic characteristics						
Income levels:						
2st level of income	0.117[a] (0.036)	13.717[a]	0.207[a] (0.042)	14.087[a]	0.124[a] (0.040)	2.125[a]
3st level of income	0.108[a] (0.040)	13.768[a]	0.289[a] (0.047)	18.330[a]	0.122[a] (0.044)	1.408[a]
4st level of income	0.178[a] (0.047)	16.441[a]	0.469[a] (0.054)	26.490[a]	0.122[b] (0.052)	-1.338[b]
Household type:						
One-person household	-0.441[a] (0.084)	-43.828[a]	-0.148 (0.099)	-18.307	-0.404[a] (0.095)	-11.073[a]
Nuclear family of spouses only	-0.145[a] (0.042)	-9.679[a]	0.006 (0.046)	-0.853	-0.076 (0.047)	-1.504
Nuclear family of single parent and children	-0.297[a] (0.077)	-25.822[a]	-0.160[c] (0.093)	-13.299[c]	-0.221[a] (0.085)	-4.505[a]
At least one nuclear family and other persons	0.151[a] (0.043)	19.434[a]	0.130[a] (0.048)	12.466[a]	0.189[a] (0.047)	5.441[a]
Consisting of more than one person without a nuclear family	-0.175 (0.119)	-25.833	-0.170 (0.147)	-17.147	-0.261[c] (0.145)	-8.062[c]
Second-home ownership	0.071 (0.043)	6.072	0.119[a] (0.046)	7.040[a]	0.047 (0.047)	0.024
Compulsory health insurance	0.042 (0.055)	15.391	0.051 (0.066)	9.486	0.179[a] (0.063)	7.306[a]
Private health insurance	0.188[a] (0.041)	19.054[a]	0.190[a] (0.044)	14.149[a]	0.169[a] (0.043)	3.358[a]
Credit card	0.056[c] (0.028)	5.929[c]	0.061[c] (0.032)	4.583[c]	0.053[c] (0.031)	1.105[c]

Making savings	-0.070[b]	-5.770[b]	-0.113[a]	-6.609[a]	-0.044	0.069
	(0.029)		(0.033)		(0.032)	
Household lifestyle choices						
Smoking	-0.050[b]	-7.800[b]	-0.023	-3.866	-0.081[a]	-2.857[a]
	(0.025)		(0.029)		(0.028)	
Drinking alcohol	-0.115[b]	-6.916[b]	-0.064	-3.595	-0.047	0.112
	(0.054)		(0.060)		(0.059)	
Eating out	0.103[a]	17.359[a]	0.047	8.629	0.184[a]	6.686[a]
	(0.028)		(0.031)		(0.030)	
Cinema, theater, sports games, etc.	-0.013	-6.942	0.078	0.462	-0.089[c]	-4.729[c]
	(0.046)		(0.050)		(0.050)	
Playing games of chance	0.160[a]	5.673[a]	0.099	3.400	0.014	-2.648
	(0.059)		(0.063)		(0.065)	
A coffeehouse, cafe, lounge, etc.	0.083[a]	5.453[a]	0.061[b]	3.562[b]	0.039	0.020
	(0.028)		(0.031)		(0.030)	
Shopping at the market	0.109[a]	11.052[a]	0.101[a]	7.769[a]	0.099[a]	2.060[a]
	(0.025)		(0.029)		(0.028)	
Shopping online	0.131[a]	6.859[a]	0.084[c]	4.107[c]	0.039	-0.890
	(0.044)		(0.047)		(0.047)	
Housing						
Residential status:						
Tenant	0.036	-0.878	0.043	0.609	-0.025	-2.140
	(0.033)		(0.037)		(0.036)	
Detached house	0.116	19.373	0.070	10.487	0.204[b]	7.206[b]
	(0.097)		(0.108)		(0.104)	
Not a homeowner but not paying rent	0.053	3.127	0.020	1.150	0.021	0.012
	(0.036)		(0.041)		(0.039)	
Housing type:						
Apartment	-0.053[c]	-6.826[c]	-0.024	-3.356	-0.068[b]	-2.185[b]
	(0.029)		(0.032)		(0.031)	
Continuous Variables						
Equivalent household size	-0.049[c]	-9.522[c]	-0.039	-5.603	-0.102[a]	-3.712[a]
	(0.027)		(0.030)		(0.031)	
Number of rooms in the house	-0.006	0.145	-0.030[c]	-1.200[c]	0.006	0.641
	(0.015)		(0.017)		(0.017)	
Correlation Coefficients						
MP			0.403[a]		0.639[a]	
			(0.015)		(0.012)	
OTS					0.375[a]	
					(0.016)	
Log Likelihood Value			-19.178.261			

Note: Standard errors in parentheses; [a]p<.01; [b]p<.05; [c]p<.10