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FACTORS THAT AFFECT NON-PRESCRIPTION MEDICINAL USE IN TURKEY: A MICRO ANALYSIS OF EXPENDITURES ON PHARMACEUTICALS*

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ABSTRACT

Drug use without prescription has been a major health care utilization issue in Turkey. Non-prescription drug use can lead to adverse health effects and increase health expenditures in the short and long-run. In an effort to better analyze non-prescription drug use, this study provides a model of drug use and expenditures, and it empirically analyzes the factors that influence the probability of non-prescription drug use in Turkey. Utilizing data from the 2008 and 2012 runs of Turkey Health Survey (THS), the study finds that gender, urban/rural difference, age, employment status, insurance status, education level, health status, and year effects are the significant determinants of the decision to use non-prescribed drugs. Particularly, the significance of urban/rural differences, age, and insurance status indicates that improvements in the accessibility to formal care of rural population via alternative channels of provision of medical care can help reduce the use of non-prescribed drugs. The study also suggests that future THSs should include detailed questions about drug sharing among individuals and use of drugs that were prescribed for a previous disease or medical condition.

Key Words: *Health expenditures, pharmaceutical expenditures, non-prescription medicine use, health reforms, health policy, Turkey.*
JEL Classification: *H51, I11, I12, I18.*

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1. INTRODUCTION

Expenditure on pharmaceuticals[1] constitutes a significant share in Turkey's GNI and total health expenditures. Non-prescription drug use can lead to an unnecessary increase in drug and health expenditures through short-term and long-term adverse health effects. Therefore, exploring individuals' choice of non-prescription drugs and implementing appropriate policies can be welfare-improving for an economy.

Between 2008 and 2013[2], the annual average expenditures on drugs in Turkey was around 15.62 billion Turkish Liras [1.23% of Gross National Income (GNI)]. In the same period, the share of expenditures on drugs in total health expenditures was 23.48% [estimated using data from Turkish Statistical Institute (TÜİK); see Appendix I-E, F]. Also, while the share of drug expenditures in GNI remained stable, it continuously declined after an increase between 2008 and 2009 (Appendix I-G). Within the course of seven years between 2008 and 2014, Turkey's average annual per capita sales of pharmaceuticals was approximately $200 at purchasing power parity (PPP). This amount corresponds to 48.5% of the select OECD countries' average per capita annual sales of $411 at PPP in the same period (see Appendix I-A), showing that Turkey spent significantly less[3] than OECD countries on pharmaceuticals on a per capita basis (the rate is 27.5% when per capita expenditures at exchange rates are used). Another notable difference between OECD's and Turkey's average is that while OECD average per capita sales at PPP showed a slight increase, Turkey's annual per capita sales of pharmaceuticals declined between 2009 and 2012 and leveled off after that (see Appendix I-C; I-D for a comparison at exchange rate; and, I-E for changes in the share of Turkey's spending at PPP and exchange rates). In this study, we are unable to provide information on the share of expenditures on non-prescription drugs in Turkey's GNI due to the lack of information on second-hand use and use of previously prescribed drugs as explained below.

Budgeting and administrative policies that ignore micro-behavioral dynamics of drug use usually result in short-living and often faulty solutions because long-term

[1] Pharmaceuticals, drugs, medicinal, and medicine will be used interchangeably throughout the study.

[2] We include the period of 2008-2013 for descriptive measures as it represents the timespan of the empirical analysis.

[3] It should be noted here that spending less in monetary terms compared to the other countries may not mean less quantities of (real) consumption. For quantity comparisons, one needs to compare quantities (usually, measured in boxes) sold or consumed.

solutions require devising appropriate incentive mechanisms to alter and guide the behavior of patients and providers for desired policy outcomes. Therefore, successful policy proposals and applications should incorporate allocative, administrative, and behavioral dynamics and solutions in a complementary fashion. In this context, understanding the behavioral patterns of non-prescription drug use can have implications for private and public expenditures on pharmaceuticals, in particular, and health expenditures, in general.

It is common that pharmaceuticals are measured in boxes and in monetary (expenditure or revenue) terms. Allowing for storage (saving) and lending (borrowing), a single-period individual drug use in boxes can be specified as follows:

$$Q_i = \sum_{j=1}^{J} r_j \cdot R_j + \sum_{s=1}^{S} s_s \cdot S_s + \sum_{b=1}^{B} B_b + \sum_{o=1}^{O} o_o \cdot O_o + \sum_{k=1}^{K} k_k \cdot K_k \quad (1)$$

where Q_i is i^{th} person's total quantity (boxes) of drug use in a given period of time; r_j is the shares of prescribed drugs that are consumed from a prescription; s_s is the shares of someone else's prescribed drugs; o_o shares of the over-the-counter (OTC) drug that is used; $k_k$is the share of someone else's OTC drugs; $R_{i,r}$ own use of prescribed drugs (including the ones that are administered at health facilities); $S_{i,s}$ is the amount obtained from someone else's prescription drug; $B_{i,b}$ is the amount of drugs that are used in this period but were prescribed to the same person for something else in the past period; $O_{i,n}$ is the use of drugs that were purchased OTC; and $K_{i,k}$ is the amount of OTC drugs that are obtained from someone else. For simplicity, there is no OTCs used from past periods. Using (1), the non-prescription drug use can be specified as:

$$U_i = \sum_{s=1}^{S} s_s \cdot S_{i,s} + \sum_{b=1}^{B} B_{i,b} + \sum_{o=1}^{O} o_o \cdot O_{i,o} + \sum_{k=1}^{K} k_k \cdot K_{i,k} \quad (2)$$

As in (3), total quantities of non-prescription drug use consists of the borrowed amount of drug that was prescribed to someone else; the use of previously prescribed drugs; drugs that are purchased and used over-the-counter; and the amount of OTC's that are obtained from someone else.

Using (1) and (2) and assuming full out-of-pocket payment, individual expenditures on drugs can be specified as follows:

$$E_i = \sum_{j=1}^{J} P_j \cdot R_j + \sum_{s=1}^{S} s_s \cdot P_s \cdot S_s + \sum_{b=1}^{B} P_b \cdot B_b + \sum_{o=1}^{O} P_o \cdot O_o + \sum_{k=1}^{K} k_k \cdot P_k \cdot K_k \qquad (3)$$

where E_i is the i^{th} person's expenditure on drugs, P_j is the price of the j^{th} prescribed drug; P_s is the price, if any, of the sth drug that was obtained from someone else; P_b is the price of prescription drug that was prescribed for a previous condition (for simplicity, we assume that the purchase of previously prescribed drug occurred in the past, i.e., $P_b = 0$; or, it can be specified as annualized share of expenditures); P_o is the price of the *OTCs*; and, P_k is the price of OTCs that are obtained from someone else. Note that prices do not have individual subscript because it is realistic to assume that all individuals pay the same price for the same drug.

Individual drug use can further be summarized as use of prescribed and OTC's:

$$Q_i = T_i + OTC_i \qquad (4)$$

where, T_i is the of individual use of prescribed drugs in boxes and OTC_i is the boxes of OTCs as follows:

$$T_i = \sum_{j=1}^{J} r_i \cdot R_{i,j} + \sum_{s=1}^{S} s_i \cdot S_{i,s} + \sum_{b=1}^{B} B_{i,b} \qquad (5)$$

and

$$OTC_i = \sum_{o=1}^{O} O_{i,o} + \sum_{k=1}^{K} K_{i,k} \qquad (6)$$

Then, for a health system, the aggregate drug expenditures can be written as:

$$E = \sum_{i}^{1} P_S \cdot R_i + \sum_{j=1}^{N-1} P_S \cdot S_j + \sum_{i}^{1} P_{OTC} \cdot OTC_i + \sum_{j=1}^{N-1} P_{OTC} \cdot OTC_j \qquad (7)$$

where E is the overall expenditure on drugs of a health system (or, market or industry) where there are N *(=i+j,* where *j=1,….N-1)* individuals; P_T is the average price of prescription drugs; and, P_{OTC} is the average price of OTCs. Expenditures on *B* are not included as they occurred in the past period. Although aggregate terms in (7) are not affected by non-prescription use, the use of non-prescription drugs can potentially affect expenditures on drugs through adverse health effects and increased demand of those who were non-prescription drugs were obtained from, assuming they continuously need the drugs that shared or

sold to others. As this decomposition of drug use can help, a more reliable analysis of the effects of *S* and *B* on *E*, i.e., $\frac{\partial E}{\partial S}$, $\frac{\partial E}{\partial B}$, requires better data on *S* and *B*.

As it estimates the probabilities of non-prescription drug use, this current study can be instrumental in estimating the total non-prescription drug use, U, and aggregate expenditures. Its findings can also be used to estimate change in probability of using non-prescription drugs. The commonly available data are usually available on *OTCs* (*O* and *K*) as in boxes and dollar expenditures. Estimated probabilities can be used approximating the amounts of *S* and *B* within *U*. The Turkey Health Survey (THS) does not ask detailed questions about drug sharing, *S*, and use of previously prescribed drugs by the same person, *B*. This is a common issue with drug sales and use data globally. Therefore, drug sales data, especially, in monetary terms, must be approached cautiously that data sources mostly report only the *OTCs* as 'non-prescribed' and it is very hard to know the amount of 'self-medication' items of *S* and *B* within *T* and *U*.

According to Ministry of Health of Turkey (MoH)'s Drug Tracking System, the share of *OTCs* (direct sales to patient) in total sales was 9.74% in 2012 and 14.17% in 2013 (MoH, 2014). To our best knowledge, however, there is no reliable information on the quantities or monetary values of *S* and *B* in Turkey as *S* and *B* can pose more health threats and be more costly than *OTCs*. Most of the related studies (Çakır et al. 2014; Hatipoğlu and Özyurt, 2016; Uğrak et al. 2015; İlhan et al. 2014; Gül et al. 2014; Akıcı et al. 2004) only show the percentage share of the respondents who indicated use of non-prescription drugs, which is not helpful in obtaining the quantity of non-prescription use in a reliable fashion.

Non-prescribed medication can be very costly individually and from a society's perspective despite some cost-savings such as, elimination or reduction of doctor's fee, travel costs, and information cost. Therefore, rational use of pharmaceuticals can be crucial for long term overall health expenditures. This study is to investigate the determinants of non-prescription drug use in Turkey utilizing data sets from the 2008 and 2012 THS. With or without prescription, drug use is a complex health issue that is commonly encountered in any health system. Given its complexity, understanding the patterns of non-prescription drug use can help patients, policy-makers, pharmaceutical companies, and medical care providers make better decisions and increase appropriate, i.e., rational, use of medication.

Rational drug use can be defined as the one that produces the maximum possible health outcome at the least possible cost. Rational drug use requires collecting and

processing information, planning, implementing, and monitoring processes that eventually enable effective, safe, and efficient medical treatment with medicine. There are five main criteria for rational drug use: (1) right diagnosis, (2) right drug, (3) right patient, (4) right information, and (5) proper follow-up (Sürmelioğlu et al. 2015; Toklu et al. 2010).

From prescription to utilization, drug use is a result of a joint-decision between patients, providers, and third-party payers, to some extent, under a certain regulatory environment. Thus, subject to the problem of asymmetric information, the process of drug utilization is simultaneously influenced by two major actors, supply-side actors, demand-side actors; and, institutions. Supply-side actors mainly consist of physicians, nurses, pharmacists, and drug makers. Demand-side actors consist of consumer–patients and insurance companies. Institutions are the written and unwritten rules that govern the choices and responsibilities of all parties on the supply, demand, and government agency sides.

As providers, the supply-side actors play a dual role as providers and advisers. They induce and influence drug use by providing prescription, advice, opinion, recommendation, and information on the effects and dosage of drugs.

Patients, on the other hand, influence provider decision by providing complementary information about their condition and disease and by negotiating their preferences with providers. Their choices and level of adherence affect the quantity and type of medication they consume and the quality of clinical outcome. Institutions limit the behaviors of supply-side and demand-side actors by providing signals and various incentives and disincentives for certain choices. For instance, while providers cannot prescribe certain opioids freely without certification in many countries, patients cannot purchase antibiotics and certain drugs without a prescription. Institutions can regulate the type and quantity (dosage) of medication that can be prescribed and utilized.

This study explores the factors that are associated with medicine use without prescription within the market mechanism and rational decision-making framework that were briefly outlined above. In addition to prescribed medicine, patients or individuals with a disease or condition can utilize non-prescribed commercial medicine through two major channels, over-the-counter drugs and drug sharing. We assert that the level of information and knowledge of the provider and patient-consumer, relative prices, elasticity of demand, elasticity of substitution between the prescription and non-prescription drug, and elasticity of supply play major roles for one’s decision to use nonprescription drugs. Patients may prefer to treat themselves by consuming over-the-counter drugs or second-

hand drugs that were prescribed to a family member or friend. The expected costs of systematic utilization of these informal channels for treatment by medicine can overweigh the expected benefits and can be deemed as “irrational” utilization of drugs. Irrational drug use may cause several negative side effects such as increasing morbidity and mortality due to decreasing quality of treatment with medicine as it is partially responsible from increasing overall medical expenditures, increasing medical treatment costs as a result of resistance to drugs, and unexpected side effects (Sürmelioğlu et al. 2015; Toklu et al. 2010).
Potential problems of non-prescription drug use have forced many countries to develop rational drug use policies. It is essential to implement these policies in a coordinated manner by collaborating the efforts of physicians, pharmacists, other health professionals, patients, and general public. In this context, the purpose of this study is to analyze the patterns of non-prescription medicine use and to estimate the factors that affect the probability of consuming medication without prescription in the case of Turkey. The study also aims to evaluate the effects of government regulations on non-prescribed drug use in Turkey over time by incorporating data from the 2008 and 2012 runs of the THS.

2. NON-PRESCRIPTION DRUG USE IN TURKEY

Drug use without prescription or without consulting a medical professional and lack of adherence are commonly observed with Turkish medicine users (Yapıcı et al. 2011; Baybek et al. 2005). Prescription habits of physicians and patient behavior and attitudes have been studied as crucial aspects of self-medication and irrational drug use in Turkey (Akıcı et al. 2004), Leblebicioğlu et al. 2002). Particularly, inappropriate antibiotic prescription and use have been studied not only in Turkey but also in other countries (Abu-Helalah et al. 2015; Salem, 2015; Biswas et al. 2014; Asseray et al. 2013; Goossens et al. 2005). Turkish people have been found to have a tendency to store drugs for future health needs. Painkillers and antibiotics are the most common drug groups stored (Baybek et al. 2005; İlhan et al. 2014).

In coping with non-prescription drug use, increasing awareness among the supply-side and demand-side actors has been one of the major goals of national drug use policies. Turkey has prepared its plan called “Rational Drug Use: National Act Plan 2014-2017” in achieving these goals. In this plan, strategic goals and implementation process were determined for demand and supply side of pharmaceutical markets. The plan has a special focus on pharmacists on the supply-side as they play crucial roles in the distribution of drugs to the patients and consumers. ‘Prohibition of the sale of non-prescribed drug selling, especially

antibiotics, and monitoring the sale of non-prescribed drug by incorporating e-prescription' are the two major components within the plan to achieve its goals. Altering the behavior of general public by increasing awareness on rational drug use is also another important goal that was set in Turkey's Rational Drug Use Plan. For instance, informing the public about negative effects of self-prescribed drug use was set as an appropriate strategy to increase awareness about rational drug use by using mass and social media effectively (MoH, 2016).

MoH and Social Security Institution (SSI) play very active role in determining the prices and reimbursement rules for drugs in Turkey. There have been various attempts to lower drug costs and the share of drug expenditures in overall health expenditure in the past decade. Reference pricing system, global budgets, discounts for reimbursed drugs, and the promotion of generic-equivalent drugs have been main interventions to lower drug expenditures (Gürsoy et al. 2014; Atun et al. 2013). There have been regulations that describe how to prescribe drugs and how to get reimbursed for drugs for both providers and patients. These regulations include but not limited to limiting the number of drug items on a prescription (quota); requiring additional fixed charge after 3 items on a prescription (co-pay); asking for a fixed charge for outpatient visits made to health care facilities or family physicians (co-pay); and, not reimbursing the drugs that were prescribed by a health care facility that does not have service contract with Social Security Institution (SSI) as an example of exclusive dealing (SUT, 2016).

The changes in reimbursement scheme and schedules, measures taken towards rational drug use in primary care have been effective in increasing the use of medicine with prescription. However, the problem has not been solved completely since access to non-prescribed medicine is still relatively easy. The SSI has changed reimbursement rules, required prescription for some medicine categories, including antibiotics, imposed user charges, and limited the number of prescribed medicine. Many of these financial and administrative limitations have aimed to reducing irrational drug use among Turkish population by increasing the effective price of medicine. However, it is observed that those who have relatively lower income have difficulties to access to formal health care facilities and providers have a higher tendency to use medicine without prescription because the relative effective price of medicine with prescription is higher due to user charges and bureaucratic formalities.

3. METHODOLOGY, DATA, AND DATA ANALYSIS

We analyzed the factors that influence the probability of using drugs without a prescription and evaluate the effects of change of policy over time within a

retrospective cross-sectional analysis. For this, we utilized data from the 2008 and 2012 THS of Turkey. The THSs collect information on health indicators and utilization of health services in a nationally representative fashion. The sample size of these nationally representative surveys was estimated by using strata and two-phase cluster sampling method. The 2008 THS collected data from over 14,000 individuals in 7,910 households. The 2012 THS included data from over 33,000 individuals in 14,400 households (TÜİK, 2012; TÜİK, 2008). Written permission to use both data sets was obtained from the TÜİK. We drew a subsample of those who used medicine with or without prescription and were at the age of 15 and above. The 2008 and 2012 data sets were merged, and a year dummy variable was created to capture the effects of government regulations and other policy shifts from 2008 to 2012. The merged data set consists of 10,404 respondents from 2012 THS and 6,062 respondents from 2008 THS, totaling 16,466 observations.

The THSs have a section that is allocated for drug use. Summary statistics about medicine use and respondents' characteristics were provided in Appendix II-A and Appendix II-B. According to Appendix II-A, 28.9 percent of the respondents in 2008 used medication with no prescription, but this rate decreased to 22.4 percent in 2012.

3.1. Study Variables

Dependent variable of this study is whether a respondent to the THS utilized non-prescription drug or not within the past two weeks of the survey administration date. Social, demographic and economic characteristics of respondents and their health care utilization patterns were used as independent variables.

3.2. Data Analysis

We deployed a logistic regression estimation on the pooled sample of the 2008 and 2012 THS data in order to explore the association between the probabilities of drug use without prescription and related supply-side, demand-side, and institutional factors. We tested the relationships between non-prescription drug use and various social, demographic and economic characteristics of respondents by using the Chi-squared analyses (the results were not provided in separate tables to save space). Health care utilization patterns of respondents were not included in logistic regression model since there was a close relationship between self-reported health status and health care and drug utilization. Among the independent variables, self-reported health status came out to be the dominant factor that affects the behavior of health care consumption and non-prescribed drug use.

3.3. Results

Social, demographic and economic characteristics of the respondents in our 16,466-observation subsample were provided in Appendix II-B. Descriptively, the majority of the respondents in the subsample of this study for the years of 2008 and 2012 were residing in urban areas, were female, married, having primary education, and not worked in an income-generating work in the last week on the day of interview. The elderly, those who were over 65 years old, composed of about 20 percent of the subsample in 2012. From 2008 to 2012, there was a decrease in the rate of respondents declaring that they had at least one chronic disease (76.6 percent in 2012 while 78.8 percent in 2008), and there was almost 4 percent decrease (a decrease from 52.7 percent in 2008 to 48.9 percent in 2012) in the rate of respondents who had more than one chronic disease. The rate of those who had income less than 750 TL in 2008 decreased in 2012. Also, the percentage of respondents reporting their health status as bad and very bad decreased from 18.3 percent in 2008 to 14.5 percent in 2012 (Appendix II-B).
Painkillers, antibiotics, and high blood pressure medication were the most used medicine groups with or without prescription in both years (see, Appendix II-C).

Although the non-prescribed antibiotics use rate decreased from 32.4 percent in 2008 to 16.7 percent in 2012, antibiotics took up the highest share of non-prescription drug use in 2012 despite particular attempts to reduce it.

Consultation with formal health care providers is expected to have decreased non-prescribed medicine use because of increased awareness. The bivariate relationship for whether or not health care services utilization from different formal health care providers decreased non-prescribed medicine use for both years was tested by using the Chi-squared test. According to the results, the rate of non-prescribed medicine use was significantly higher ($\chi2=191.67$; $p=0.000$) among those who did not visit formal health care providers even their family doctors (40.89%) in the past 12 months. The results of chi-square analyses suggest that non-prescribed medicine use decreased even if the consultation was made to a dentist (21.26%) compared to those who did not consult with a dentist (31.47%).

The results showed that prescribed and non-prescribed medicine use differed according to social, demographic and economic characteristics of the respondents in the 2008 and 2012 samples of the THS. Compared to the rate (27.51%) among respondents residing in urban areas, the rate of non-prescribed medicine use among those residing in rural areas was found to be higher (31.75%) and statistically significant in 2008 THS ($\chi2=15.32$; $p=0.000$). However, non-prescribed and prescribed medicine use did not differ statistically ($\chi2=3.55$;

p=0.169) in the 2012 THS, although the non-prescribed medicine use was slightly higher among urban habitants (22.93%) compared to rural habitants (21.23%). The relationship between increasing age and medicine use with or without prescription was statistically significant in both 2008 THS ($\chi 2$=15.32; p=0.000) and 2012 THS ($\chi 2$=89.10; p=0.000). The rate of non-prescribed medicine use among those who were relatively younger respondents (45.73% in 2008 THS and 38.59% in 2012 among respondents in the age group of 15-24) compared to older people over 75 (10.86% in 2008 and 4.80% in 2012) was higher. This result leads to the discussion that non-prescribed medicine use is common and higher among those who are healthier. This finding is consistent with other findings of the study that lower health status may increase formal interaction with the health care providers. Compared to the 2008 THS, the rate of non-prescribed medicine use in the 2012 THS fell among all respondents. However, the rate of non-prescribed medicine use was still higher and statistically significant among those who were working in an income generating work (34.51%), who did not have a chronic disease (44.64%), and who were in very good health status (46.08%) compared to those who were not working (16.79%), had at least one chronic disease (15.70%), and were in bad and very bad health status (around 7%) in the 2012 THS.

For the year of 2012, non-prescribed medicine use was found to be higher among male (26.96 %), single (37.53%) and with high and higher education level (around 28%) compared to female (19.61%), married (21.77%), and never schooled (12.11%). The findings regarding education level should be interpreted cautiously because of the fact that most of the never-schooled might be the elderly with poor health status. The results also showed that the rate of non-prescribed medicine use was higher and statistically significant among self-insured respondents in both the 2012 THS (43.49%) and the 2008 THS (51.22%) compared to other respondents that had other health insurance types. The relationship between increasing income level and the rate of non-prescribed medicine was found to be statistically significant, and those who had higher income had a tendency to use more non-prescribed medicine in both years.

Based on the initial bivariate analyses of the variables, we conducted a Logistic regression estimation. The results of the Logistic regression estimation are presented in Table 1. In Table 1, holding everything else constant, female respondents were found to be more likely to use non-prescribed drugs than males. Specifically, for each male reported non-prescribed drug use, there were 1.24 female who reported use of non-prescribed drug use. That is, the expected odds of using non-prescription drug for females is 1.24 times of males. Those who lived in urban areas had a higher probability of non-prescribed drug use relative to rural

areas, everything else being equal. Specifically, for each rural respondent reported use of non-prescribed medicine, there were 1.31 urban residents who used non-prescribed medicine, everything else being equal. That is, the expected odds of non-prescription drug use for urban residents is 1.31 times of the rural residents.

Table 1. The Results of Logistic Regression Analysis on the Determinants of Medicine Use without Prescription

Variables	Coeff.	S.E.	p>	OR	95% C.I.for OR	
Gender – Female (Ref: Male)	0.21	0.05	0.000	1.24	1.13	1.35
Residential Area – Urban (Ref: Rural)	0.27	0.05	0.000	1.31	1.20	1.43
Age (Ref: 75+)			0.000			
15-24	1.68	0.14	0.000	5.34	4.08	7.00
25-34	1.52	0.14	0.000	4.59	3.52	5.98
35-44	1.43	0.13	0.000	4.18	3.21	5.43
45-54	1.03	0.13	0.000	2.81	2.17	3.64
55-64	0.50	0.14	0.000	1.64	1.26	2.15
65-74	0.14	0.15	0.351	1.15	0.86	1.53
Employed in the past week–Yes (Ref: No)	0.49	0.05	0.000	1.64	1.49	1.80
Self Insured–No (Ref: Yes)	-1.05	0.08	0.000	0.35	0.30	0.41
Education (Ref: Higher ed.)			0.089			
Never Schooled	0.20	0.09	0.023	1.22	1.03	1.44
Primary Education	0.17	0.07	0.016	1.18	1.03	1.35
High School	0.12	0.08	0.120	1.13	0.97	1.31
Self Reported Health Status (Ref: very bad)			0.000			
Very Good	1.95	0.25	0.000	7.04	4.32	11.47
Good	1.48	0.24	0.000	4.40	2.75	7.04
Moderate	0.99	0.24	0.000	2.69	1.68	4.30
Bad	0.28	0.25	0.260	1.32	0.81	2.16
Year 2008 (Ref: 2012)	0.29	0.04	0.000	1.34	1.24	1.45
Constant	-2.95	0.29	0.000	0.05		
-2 Log likelihood						15437.65
Cox & Snell R Square						0.14
Nagelkerke R Square						0.20

Also, those worked in the past week at the time of survey had 1.64 times higher expected odds of using non-prescribed drugs relative to those who did not work,

holding all others constant. As age categories increased, the probability of the use of non-prescribed medicine declined relative to the age category 75 and above, holding everything else constant. For each respondent who reported use of non-prescribed drug among the age group 75+, there were 5.34 (in ages 15-24), 4.59 (in ages 25-34), 4.18 (in ages 35-44), 2.81 (in ages 45-54), 1.64 (in ages 55-64), and 1.15 respondents (in ages 65-74) who reported use of non-prescribed drugs. However, the age group of 65-74 did not have a significant effect relative to the age group of 75+. Those who were self-insured had a higher odds of using non-prescribed drugs relative to those who had formal health insurance, holding everything else constant. For the categories of education, the odds of non-prescribed drug use for those who never had any schooling was 1.22 times of those who had higher education, everything else being equal. In other words, for each respondent with higher education, there was 1.22 respondents whom were never schooled and reported use of non-prescribed drugs. For self-reported health status categories, those who had very good health status relative to very bad health status had significantly higher expected odds of non-prescribed drugs, holding everything else constant. As health status increased, the probability of non-prescribed medicine use declined. Only the category of "bad" health did not have any significant impact on the odds of non-prescribed medicine use. The odds ratio for the year dummy indicates that respondents in the 2008 THS was 1.32 times of those were interviewed in the 2012 THS, holding other variables constant. This indicates that policy changes from 2008 to 2012 have significantly lowered the odds of using non-prescription drug use. Since 2003, Turkey has been trying to ease the negative effects of social, economic and geographic factors by taking serious reforms and policy changes under Health Transformation Process (HTP). Universal health insurance coverage, introduction of family physicians in primary care level, and expanding the benefits of green card, which is a government-controlled welfare program, to cover health expenditures of the poor are some examples of these attempts. The significance of year dummy shows that there has been a significant reduction in non-prescription drug use from 2008 to 2012. This can partially be explained by the positive effects of HTP efforts that started in 2003 to induce healthier behavior.

4. CONCLUSION

In this study we have analyzed the determinants of non-prescription drug use as a health and economic issue in Turkey. Utilizing the 2008 and 2012 THS, we found that gender, urban/rural difference, age, employment status, insurance status, education level, health status, and time (or policy shift) are significantly associated with the decision to use non-prescribed drug. Our findings are in

conformity with the existing literature and expectations as they suggest that policies that aim to minimize the use of non-prescription medicine should consider gender, urban/rural differences, employment, education level, and health status of patients. Particularly, the significant impacts of urban/rural difference, age, and insurance indicate that improvements in the accessibility to formal and convenient care of the rural population through alternative channels of delivery such as, telemedicine, mobile clinics, and community health workers, can help reduce use of non-prescribed drugs.

We also suggest that the future runs of the THS should incorporate detailed questions about the use of drugs that were prescribed to someone else and prescribed to the same person for a previous disease or medical condition. As the study showed, currently available data on non-prescription drug use are mostly limited to OTC sales and they fail to capture all aspects of non-prescription drug use and limit the empirical studies.

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APPENDICES

APPENDIX I. OECD COUNTRIES PER CAPITA PHARMACEUTICAL SALES

A. OECD Countries per Capita Pharmaceutical Sales ($ at exchange rate and $ PPP)*

	2008		2009		2010		2011		2012		2013		2014	
	$ PCX	**$ PPP**	**$ PCX**	**$ PPP**	**$ PCX**	**$ PPP**	**$ PCX**	**$ PPP**	**$ PCX**	**$ PPP**	**$ PCX**	**$ PPP**	**$ PCX**	**$ PPP**
Australia	335.1	270.1	329	292.7	407.8	295.8	473.8	304	471.7	295.8	447.6	319.8	411.3	310.4
Belgium	768.3	600.4	741.8	622	714.9	632.4	754.1	645.9	685.8	642.8	706.2	652.2	702.1	644.4
Chile	94.2	143.4	93.1	147.8	108.2	154.4	121.9	169.5	130.6	182.9	137.8	187.5	131.9	200.4
Cz.Republic	406.3	486.4	402	551.1	407.2	557.8	435.8	575.6	407	595.3	387.4	587.4	371.1	593.4
Denmark	719.5	457.8	699.9	478.9	678.6	492.4	686.8	485.3	631.6	480.8	647.6	490.1	675.9	506.9
Estonia	209.8	261.3	197	270.2	193.2	278.4	214.1	293.8	215.4	319.2	232.7	330	252	352
Finland	522.6	388.8	487.2	388.2	466.9	387.3	500.5	396.6	470.2	401	496.4	409.5	514.7	420
France	607.1	469.8	586.2	490	562.7	496.2	589.1	501.9	534.1	489.9	541.2	497.8	N/A	N/A
Germany	475.9	400.3	483.4	429.9	481.4	456.7	505	463.3	486.3	481.8	519	502.9	549.9	534.1
Hungary	249.6	331.9	235.4	379.2	239.6	397.3	257	414	199.1	352.5	194.4	343.9	193	345
Iceland	736.1	551.3	662.8	655.5	643.3	596.9	705.1	606.8	605.2	550.8	657.9	591.7	619.7	523.9
Ireland	674.2	483.7	666.1	537.4	595.4	533.6	594.3	513.8	572.8	538.7	565.8	519.8	549.9	499.9
Italy	618.1	534.9	606.1	559.7	586.2	567.7	614.2	574.7	543.4	560.3	572.3	577.8	573.3	577.2
Japan	500.1	442.3	569.3	461.2	603.1	474.2	685.1	508.8	685.7	524.7	554.9	527.1	488.6	494.4
Korea	322.7	452.6	299.7	464	355.8	489.3	399.8	518.4	385.9	508.5	410.2	515.4	445.7	532.2
Luxembourg	585.3	440.9	558.5	443.1	524	429.2	542.1	435.9	503.8	433.8	508.8	429.2	489.7	413.5
Mexico	196.6	293	165.5	301	179.9	296.5	169.6	274.6	178.3	298.7	180.4	287.4	170.5	285.8
Netherlands	459.9	372.7	427.1	365.3	415.5	369.6	433.9	375.9	353.4	331.8	341.8	318.7	341.5	316
New Zealand	123.5	117.9	111	120.9	124	115.1	147.2	125.4	169.8	140.2	170.4	147.2	176.5	150
Norway	642.2	413.8	599.4	420.7	605.4	406.2	655.6	409	643.9	414.6	646.7	419.9	645.6	435.4
Portugal	465.2	489.2	436.6	496.2	405.6	484.8	387.5	449.9	319.4	421	305.9	395.2	305.8	397.6
Slovak Republic	276.1	367.5	281.9	396.9	274.1	405.9	290.6	403.2	262.4	397.8	301.5	456.4	322.5	493.8
Slovenia	325.2	350	316.5	353.4	306.6	361.2	318.3	363.2	283.8	359.6	290.7	365.5	278.1	352.3
Spain	397.3	376.7	392.4	398.1	376.4	396.5	367.5	375.5	304.1	342.2	303.9	339.8	322.6	365
Sweden	568.3	426.9	498.5	427.8	533.6	427.8	598.7	439.1	560.5	435.9	581	434.4	568	436.8
Switzerland	697.1	487.5	701.5	502.5	703.9	486.7	822	509.6	791.8	544.3	791	554.5	790.6	549.8
Turkey	**145.9**	**213.4**	**139.5**	**237.1**	**141.8**	**226.7**	**114**	**192.4**	**100.1**	**175.3**	**98.9**	**174.4**	**92.9**	**174.9**
United Kingdom	439	366.9	361.6	353.8	323.9	303.5	328.8	293.3	327.3	297.8	341.2	315.6	387.5	336.7
OECD Average	**448.6**	**392.6**	**430.3**	**412.3**	**427.1**	**411.4**	**454.0**	**415.0**	**422.3**	**411.4**	**426.2**	**417.5**	**421.1**	**416.4**
Turkey's Share as % in OECD	**32.5%**	54.4%	**32.4%**	57.5%	**33.2%**	55.1%	**25.1%**	46.4%	**23.7%**	42.6%	**23.2%**	41.8%	**22.1%**	42.0%

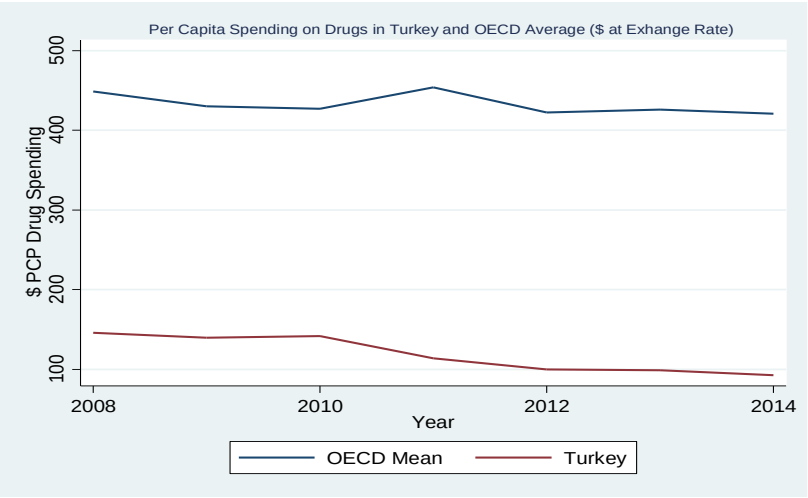
*****Excludes Austria, Canada, and Greece due to missing data. 2014 excludes France due to missing data.

$ PCX: Per capita expenditure on drugs at exchange rate.

$ PPP: Per capita expenditure on drugs at purchasing power parity.

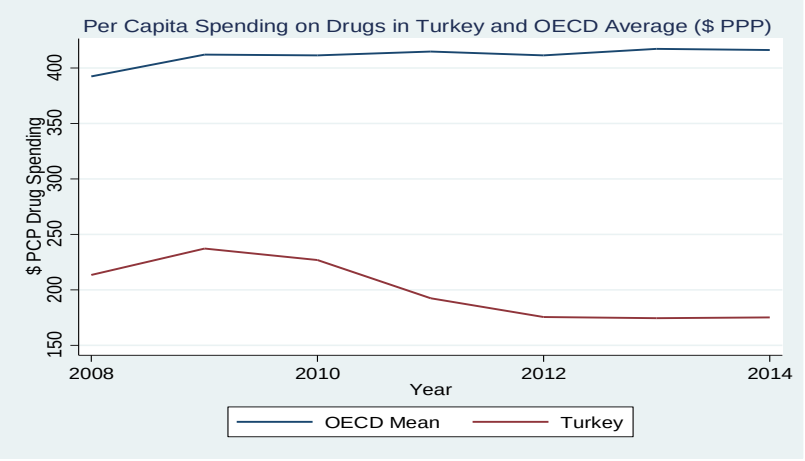
Source: Compiled from OECD at http://stats.oecd.org/index.aspx?DataSetCode=HEALTH_STAT.

B. Per Capita Drug Sales in Turkey and OECD ($ at exchange rate)*



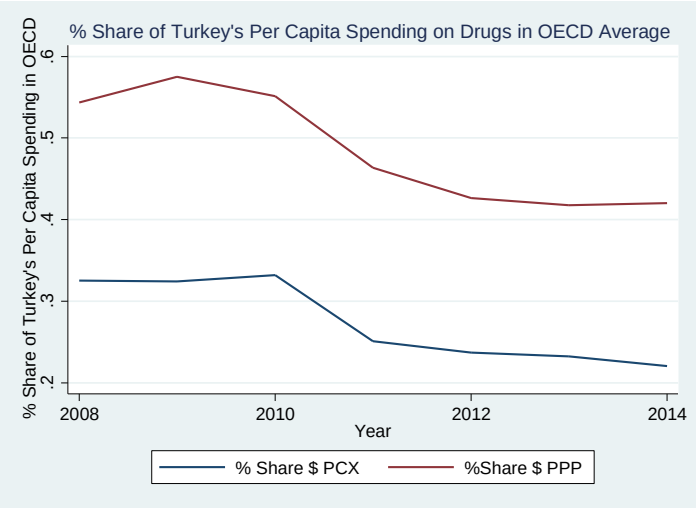
*Excludes Austria, Canada, and Greece due to missing data. 2014 excludes France due to missing data.
Source: Compiled from OECD at http://stats.oecd.org/index.aspx?DataSetCode=HEALTH_STAT.

C. Per Capita Drug Sales in Turkey and OECD ($ at PPP)*



*Excludes Austria, Canada, and Greece due to missing data. 2014 excludes France due to missing data.
PPP: Purchasing power parity.
Source: Compiled from OECD at http://stats.oecd.org/index.aspx?DataSetCode=HEALTH_STAT.

D. Per Capita Drug Sales in Turkey and OECD ($ at PPP)*



*Excludes Austria, Canada, and Greece due to missing data. 2014 excludes France due to missing data.
$ PCX: Per capita expenditure on drugs at exchange rate.
$ PPP: Per capita expenditure on drugs at purchasing power parity.
Source: Compiled from OECD at http://stats.oecd.org/index.aspx?DataSetCode=HEALTH_STAT.

E. Expenditures on Drugs and Share in Gross National Income (GNI)

Year	Gross National Income (GNI, Million TL)	Drug Expenditures (Million TL)	% Share of Drug Expenditures in GNI
2008	776,643	13,600	1.37%
2009	646,892	15,700	1.57%
2010	772,365	15,800	1.36%
2011	831,695	16,300	1.17%
2012	871,125	15,600	0.99%
2013	950,355	16,700	0.92%
Mean	**934,856**	**15,616**	**1.23%**

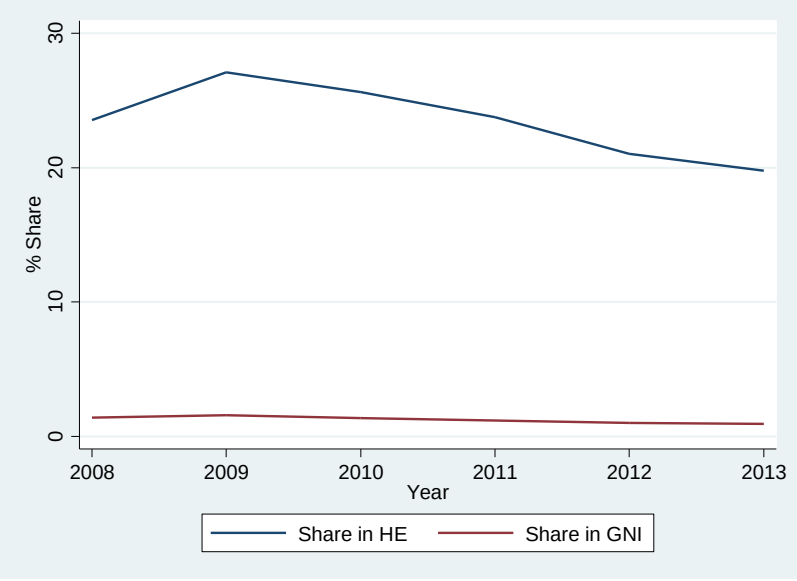
Source: TÜİK.

F. Expenditures on Drugs as a Share of Health Expenditures

Year	Health Expenditures (Public, Private, Household, and Other, Million TL)	Drug Expenditures (Million TL)	% Share of Expenditures on Drugs in Health Expenditures
2008	57,740	13,600	23.55%
2009	57,910	15,700	27.11%
2010	61,677	15,800	25.62%
2011	68,607	16,300	23.76%
2012	74,188	15,600	21.03%
2013	84,390	16,700	19.79%
AVERAGE	**67,419**	**15,616**	**23.48%**

Source: TÜİK and MoH.

G. The Share of Drug Expenditures in GNI and Health Expenditures*



HE = Health expenditures.
GNI = Gross National Income.
Source: TÜİK and MoH.

APPENDIX II. SUMMARY STATISTICS

A. Medicine Use with/without Prescription in 2012 and 2008 THS

	2012 THS		2008 THS	
Medicine Use With/Without Prescription	Total	Percent	Total	Percent
Medicine used without prescription	2335	22.4	1752	28.9
Medicine used with prescription	7339	70.5	3858	63.6
Medicine used with and without prescription	730	7.0	452	7.5
Total	10404	100.0	6062	100.0

B. Social, Demographic and Economic Characteristics of the Respondents in the Subsample by 2012 and 2008 THS

Variables	2012 THS		2008 THS	
	Total	Percent	Total	Percent
Residential Area				
Urban	7446	71.6	4078	67.3
Rural	2958	28.4	1984	32.7
Age Group			6062	
15-24	964	9.3	715	11.8
25-34	1620	15.6	1124	18.5
35-44	1881	18.1	1223	20.2
45-54	2053	19.7	1169	19.3
55-64	1827	17.6	900	14.8
65-74	1246	12.0	581	9.6
75+	813	7.8	350	5.8
Gender				
Male	4010	38.5	2377	39.2
Female	6394	61.5	3685	60.8
Worked in income generating work in the last week				
Yes	3321	31.9	1943	32.1
No	7083	68.1	4119	67.9
Insurance Status				
Active Civil Servant	517	5.0	434	7.2
Retired GERF	1299	12.5	456	7.5
Active SSK	5188	49.9	2746	45.3
Active Bagkur	1852	17.8	1001	16.5
Green Card Holder	891	8.6	781	12.9
Private Health Insurance + Private Funds	53	0.5	8	0.1

Self	338	3.2	533	8.8
Others	266	2.6	103	1.7
Education Level				
Never Schooled	2246	21.6	1506	24.8
Primary Education	5543	53.3	3210	53.0
High School	1499	14.4	839	13.8
Higher Education	1116	10.7	507	8.4
Marital status				
Single	1303	12.5	821	13.5
Married	7737	74.4	4583	75.6
Widow	1364	13.1	658	10.9
Income Level				
Less than 350 TL	503	4.9	799	13.3
351-500 TL	466	4.5	918	15.3
501-620 TL	426	4.1	722	12.0
621-750 TL	914	8.9	593	9.9
751-900 TL	1349	13.1	546	9.1
901-1100 TL	1285	12.4	683	11.4
1101-1300 TL	711	6.9	444	7.4
1301-1700 TL	1605	15.5	551	9.2
1701-2300 TL	1255	12.2	334	5.6
More than 2301 TL	1813	17.6	418	7.0
Existence of chronic disease				
No	2426	23.4	940	21.2
Yes	7932	76.6	3499	78.8
Number of chronic disease				
No disease	2426	23.4	940	21.2
One disease	2862	27.6	1158	26.1
Two diseases	1894	18.3	772	17.4
Three diseases	1137	11.0	456	10.3
Four diseases	715	6.9	355	8.0
Five and more diseases	1324	12.8	758	17.1
Self-reported health status				
Very Good	651	6.3	285	4.7
Good	4479	43.1	2464	40.6
Moderate	3768	36.2	2200	36.3
Bad	1319	12.7	971	16.0
Very Bad	186	1.8	142	2.3

C. Most Prescribed Medicine Groups

Medicine Group (2012 THS)	Prescription	%	Medicine Group (2008 THS)	Prescription	%
1. Painkillers	2,382	39.33	1. Painkillers	3,715	35.78
2. High blood pressure	1,960	32.42	2. Antibiotics	2,505	24.1
3. Antibiotics	1,102	18.19	3. High blood pressure	1,737	16.71
4. Diabetes	904	14.93	4. Other pain	1,236	11.9
5. Stomach troubles	860	14.21	5. Vitamins, minerals or tonics	1,147	11.04
6. Pain in the joints (arthrosis, arthritis)	673	11.11	6. Pain in the joints (arthrosis, arthritis)	1,115	10.74
7. Pain in the neck or back	677	11.19	7. Headache or migraine	1,040	10.01
8. Headache or migraine	649	10.71	8. Stomach troubles	970	9.33
9. Other pain	438	7.24	9. Medicine for anemia	897	8.63
10. Other Cardiovascular disease	454	7.49	10. Diabetes	867	8.35