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BEING HEALTHY IN TURKEY: A PSEUDO-PANEL DATA ANALYSIS

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Abstract: This study examines the determinants of health status in Turkey. Moreover, this is the first study up to date that explores the indoor air pollution as an additional factor of health. The analysis relies on detailed micro-level data derived by the Turkish Statistical Institute (TURKSTAT) Cross Sectional Income and Living Conditions Survey over the years 2006-2012. Using Pseudo-Panel Data, an Adapted Probit Fixed Effects Model is applied to control for time invariant characteristics of the regions, thereby eliminating potentially large sources of bias. Furthermore, the Random-Effects Ordered Logit Model is applied for robustness check. Various determinants, including individual and household characteristics, such as socio-economic status, are examined. The findings show that income and education are the most important socio-economic determinants of health followed by the marital and employment status. Furthermore, estimations for the type of fuel used for heating in dwelling as a proxy for indoor air pollution show that individuals that use natural gas and electricity report higher levels of health outcomes compared to those who use wood and coal. Overall, the findings point out the importance of policies on the education reconstruction, income distribution, clean environment, improvement of health status and reduction of health inequalities.

Keywords: *Health status, pseudo-panel, socio-economic status, indoor air pollution.*

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TÜRKİYE'DE SAĞLIKLILIK HALİ: BİR PSEUDO-PANEL VERİ ANALİZİ

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Öz: Çalışma, Türkiye'deki bireylerin sağlık düzeylerini belirleyen faktörleri ampirik olarak incelemektedir. Çalışma ayrıca mikro veri seti kullanarak Türkiye'de kapalı ortam hava kirliliğinin sağlık üzerindeki rolünü araştıran ilk makale olma özelliği ile de önem arz etmektedir. İlgili analizler Türkiye İstatistik Kurumu (TUİK) Gelir ve Yaşam Koşulları Anketi (2006-2012) yatay kesit verileri kullanılarak yapılmıştır. Yaş kohortları temelinde oluşturulan pseudo panel verileri kullanılarak uygulanan yöntemlerden birincisi olan Uyarlanmış Probit Sabit Etkiler Modeli ile, zamandan bağımsız değişen bölgesel karakteristiklerin kontrolü ve böylece tahminlerdeki yanlılığın önlenmesi amaçlanmıştır. İkinci yöntem olan Rassal Etkiler Sıralı Logit Modeli de, ilk yöntemle elde edilen sonuçların bu yöntemle de geçerli olup olmadığını görmek için uygulanmıştır. Sosyoekonomik statü gibi fertlere ve hanehalklarına ait pek çok değişken analize dahil edilmiştir. Bunlardan eğitim ile gelirin ve onları takiben istihdam durumu ve medeni halin bireylerin sağlıklı olma hallerini etkileyen en önemli iki faktör olduğu ortaya konulmuştur. Kapalı ortam hava kirliliğine ilişkin olarak, elektrik ve doğal gaz kullanımının kömür ve odun kullanımının tersine sağlığı pozitif yönde etkilediği bulunmuştur. Çalışmadaki nihai bulgular, eğitimde yeniden yapılandırma politikalarının, gelir eşitliğini sağlayıcı politikaların, temiz hava koşullarını sağlamaya yönelik girişimlerin sağlıklı bireylerin gelişiminde ve toplumdaki sağlık düzeyi eşitsizliklerinin en aza indirgenmesinde önemli adımlar olabileceğini göstermektedir.

Anahtar Sözcükler: Sağlık düzeyi, Pseudo-Panel, sosyo-ekonomik statü, kapalı ortam hava kirliliği.

INTRODUCTION

The health status consists of key factors coming from people's social, economic and physical environment. Besides their genetic backgrounds and living/working conditions, the important role of environmental factors is also discussed and analyzed in the relevant health literature. Environmental issues, such as water and air quality, environmental pollution, urbanization, climate change, extreme weather conditions, waste management and recycling among others, have a significant impact on health and well-being. The aim of this study is to contribute to the strand of literature on health determinants exploring the case of Turkey. Using pseudo panel data and fixed effects regressions, the paper examines the health determinants in Turkey and it also explores the role of indoor air pollution on health. Overall, the results confirm the proposal made by the International Energy Agency (2010) suggesting that Turkey should promote fuel switching from high-sulfur lignite and coal to natural gas.

Another motivation of this study is that the examination of health determinants can help policy makers to design and apply policies that improve health and therefore human development outcomes. There is strong evidence from earlier studies, showing that good health in general can play a major role in human development and therefore in economic growth and poverty alleviation (Barro, Sala-I-Martin, 1995; Bloom *et.al*., 2004; Thomas, Strauss, 1997).

The analysis is based on the Adapted Probit Fixed Effects Model proposed by van Praag and Ferrer-i-Carbonell (2004). The reason we apply this model is that Ordered Logit Model does not allow the estimation of fixed effects model in a panel framework. A key advantage of using pseudo panel estimates is that it is possible to control for the regional, time invariant characteristics and to account for intercept heterogeneity. As a robustness check, Random-Effects Ordered Logit Model is additionally applied.

The structure of the paper is as follows: In section 2 we present the literature review, while we discuss the econometric framework in section 3. Section 4 provides the data and the research sample design. In section 5 we report the results, and in section 6 we present the concluding remarks.

1. LITERATURE REVIEW

A detailed examination of the health status determinants enables policy makers to identify also the factors of economic growth and therefore poverty reduction and human development. Earlier studies used the Self-Assessed Health (SAH) to examine the relationship between health, well-being, lifestyle and other determinants (Kenkel

1995; Ettner 1996; Deaton, Paxson, 1998; Benzeval *et.al*., 2000; Salas, 2002; Adams *et.al*., 2003; Contoyannis, Jones, 2004; Frijters *et.al*., 2005; Contoyannis *et.al*., 2004, Hajdu, Hajdu, 2015). This paper aims to explore the determinants of SAH in Turkey.

There are different channels describing and explaining how a determinant of good health may contribute to the economic growth. For instance, better nutrition, which provides better health, is strongly associated with responses to increases in labour productivity and thus in income and economic growth (Strauss, Thomas, 1998; Fogel, 1994). Another important determinant of health is education which gives the opportunity for people to have better access to health care, increasing economic growth through healthy and productive individuals. Thus, by analyzing the determinants of health it is possible to identify their effects on economic growth and poverty alleviation.

Earlier studies found a strong relationship between socio-economic status (SES) and health. SES is often measured as a combination of education, income and occupation and it is important to health, not only for those being in poverty, but also for the people at all levels of SES. On average, individuals, who are in the most advantaged social groups in terms of higher educational attainment and high-income level, are healthier. Also, previous studies have showed that household income is associated with the development of children and youth (Haveman *et.al*., 1991; Huston *et.al*., 1994; Brooks-Gunn, Duncan, 1997). Following Auster *et.al*. (1969) and Grossman (1972), many studies suggest that total years of formal schooling is the most important determinant of good health[1] compared to the other components of SES, such as the income, marital or occupation status. Since schooling is the causal determinant of occupation or income, a large part of the income's effect on health can be attributable to the impact of education on income or occupation status. Increasing educational level may most probably offer better occupational opportunities and higher earnings. Additionally, more educated people are more aware of the harmful effects of smoking and they may have an advantage in terms of access to information and resources that promote health (Rosenzweig, Schultz (1982, 1983, 1991); Grossman, Kaestner, 1997). Generally, education is an important key factor for the reduction of health inequalities. The development of policies that encourage more years of schooling and support early childhood education may have benefits on health improvement. However, a reverse causality can occur for both income-health[2] and education-health relationships. Since this paper does not question the existence of a causal relationship between health determinants and health outcomes, it does not attempt to tackle with the issue of endogeneity and more specifically the possible reverse causality mentioned above.

Another determinant of health is the job or occupational status that is also one of the components of SES. Employed people may present higher levels of health status, since the earnings allow them to sustain their life, while the unemployed people might

be under-stress on searching for a job and they have less earning capabilities to support themselves and their families. Consequently, unemployment may have harmful impact on mental and physical health (Wilson, Walker, 1993; Ross, Mirovsky, 1995). Overall, financial strain and vulnerability to the life events may affect health (Kessler *et.al*., 1988). However, some types of social security benefits delivered to the unemployed can buffer the adverse effects on health (Kessler *et.al*., 1988; Rodriguez, 2001), but this is out of scope of this study. Regarding retired people the results can be diverse. If the retirement is voluntary, then the health status might be better. On the other hand, if it is not, retirement probably has negative effects on health. Nevertheless, retired people are usually old, where age is negatively associated with health.

In addition to SES, age is another important determinant of health as most recently discussed in the theory developed by Grossman (2000). Health stock depreciates with a person's age at an increasing rate, and thus, we expect a negative and significant relationship between age and health status.

Another factor examined is the household size (type). Generally, the literature provides evidence that the family size can be protective and beneficial to people with health problems (Aldwin, Greenberger, 1987; Doornbos, 2001). In other words, household size and therefore family support can be a proxy for home health care, which also substitutes for medical care that may improve people's health (Halliday, Park, 2009).

Other studies examined the effects of outdoor air pollution on health. However, this study does not employ the effects of air pollution because the survey design does not offer the possibility for the development of this type of analysis. More specifically, the sample design is based on Nomenclature of Territorial Units for Statistics (NUTS) 1 region. A large geographical and aggregated area, such as the NUTS 1, does not allow for the precise air pollution mapping to the respondent and consequently the estimates will be non-robust. Nevertheless, in the conclusion section, we discuss future suggestions on the sample survey designs in Turkey and their possible implication on policy making. A number of epidemiological studies support the view that exposure to traffic-related pollutants is associated with a broad spectrum of adverse short-term respiratory effects in vulnerable individuals. People in Japan living close to main roads with heavy traffic suffered more from respiratory symptoms and allergies than those living further away (Shima *et.al*., 2002; Ostro *et.al*., 2006). Similar studies carried out in other countries, such as the UK, the USA and the Netherlands, reported increased respiratory symptoms, reduced lung function in children and infant mortality for those living in close proximity to roads with high traffic intensity (Oosterlee *et.al*., 1996; Van Vliet *et.al*., 1997; McConnell *et.al*., 2006; Currie, Walker, 2011). Other epidemiological studies exploring the negative effects of air pollutants emphasized on the deterioration

in functions and increased clinical diseases, such as heart rate variability, asthma, stroke, lung cancer, premature births and deaths (Laden *et.al*., 2000; Suresh *et.al*., 2000; Janssen *et.al*., 2002; O'Neill *et.al*., 2004).

The remained determinants include the marital status, and dwelling characteristics, such as the house size, whether there is availability of piped water and indoor toilet, and the fuel type used for heating as a proxy for indoor pollution. Regarding the marital status we expect that divorced and widowed people report lower levels of health status than the married couples. On the other hand, the singles may present higher levels of health outcomes compared to the married in the younger age groups. However, we expect that married couples belonging to older age groups, present better health based on the theory discussed earlier that household size and family support can be a proxy for health care.

Previous studies have also explored the determinants of health in Turkey. Sözmen *et.al*. (2012) using the world health survey in 2003 for Turkey, found that education and family wealth are the most important factors of SAH and health inequalities. Similarly, Etiler (2016) explored the determinants of health using the Turkish Health Survey (THS) in 2010. The rates of poor health among women and men were respectively 9.8 and 5.2 per cent and this gender gap is increasing with age. The study supports that for women, retirement from secure jobs and marriage has a positive impact on health status, while for men, unemployment is associated with poor health. Additionally, they found that obesity and smoking cause poor health. A different study by Karaoglan, Tansel (2017) explores the determinants of Body Mass Index (BMI) in Turkey. The analysis is based on the THS that took place in 2008, 2010 and 2012. Their findings support the importance of the socio-economic and demographic factors. Karaoglan, Tansel (2017) found that higher education levels are negatively associated with BMI levels, while the relationship between age and BMI levels presents an inverted U-shape curve. Regarding marital status, the singles are less likely to be obese or overweight compared to divorced and widowed, while individuals in urban areas reported higher levels of BMI than those living in rural areas. Also, the impact of household income on BMI is positive. This study attempts to contribute to the earlier literature on health status in Turkey by exploring a long and detailed survey over the period 2006-2012. Additionally, more factors are considered, as we provide more details in the following sections. Furthermore, this is the first study that explores the fuel type used for heating in the dwelling as a determinant of health in Turkey.

2. METHODOLOGY

In this study, we make use of the repeated cross-sectional Income and Living Conditions Survey (ILCS) of Turkey. The main outcome of interest, which is the SAH,

is a categorical (ordinal) variable. Ordered Logit or Ordered Probit Models do not allow for fixed effects estimates in a panel framework. Panel data can also be identified with repeated cross-sections under appropriate conditions and this methodological innovation is commonly known as *'pseudo-panel approach'*.

One benefit of the pseudo-panel approaches is that they suffer less from problems related to sample attrition. The second benefit comes from the wide availability of cross-sectional data that makes possible the construction of pseudo-panels that are appropriately representative, covering long periods back in time. Third, repeated cross-sectional data suffer less from the typical panel data problem of non-response, which leads to missing values. On the other hand, panel data sets offer to the researcher the ability to observe and follow the same individuals over time. Therefore, it is possible to identify and include the individual's past into a fixed effects model. We should notice that there is a panel ILCS in Turkey; however this covers only 4 years and additionally the sample is designed on the national level and not at regional NUTS 1 level. Thus, it is not possible to control for unobservable regional characteristics, such as economic, demographic and other factors. Moreover, using this panel survey it is not possible to control and cluster standard errors on area-specific time trends, meaning that the estimates would be less efficient. Nevertheless, we repeat the estimations using the panel version of ILCS as a robustness check and the results remain very similar.

Following Deaton (1985), we make use of age, gender and region cohorts to estimate a fixed effects model from repeated cross-sectional data. Through this approach, individuals who share some common characteristics (year of birth, gender and region) are grouped into cohorts. Second, we aggregate all observations to cohort level, and the model becomes:

$$\overline{H}_{c,t} = \overline{a}_{c,t} + \beta_1 \log\left(\overline{y}_{c,t}\right) + \beta \overline{Z}_{c,t} + \overline{\mu}_c + k_j + \phi_t + k_j T + \mathcal{E}_{c,j,t} \qquad (1)$$

$\overline{H}_{c,t}$ is the average value of all observed self-reported health status levels coded as very good, good, fair, bad, very bad in cohort *c* and time *t*. Variable $\log\left(\overline{y}_{c,t}\right)$ denotes the average logarithm of household income and $\overline{Z}_{c,t}$ is a vector of average household and demographic factor values. Set $\overline{\mu}_c$ controls for individual effects, while k_j controls for region. More specifically, there are 12 regions that we mention in the next section. Set ϕ_t is a time-specific vector of indicators for the year, while $k_j T$ is a set of area-specific time trends. Finally, $\mathcal{E}_{c,j,t}$ expresses the error term which we assume to be *iid*. Standard errors are clustered at the area-specific time trends.

The dataset comprises repeated observations over *T* periods and *C* cohorts. The main problem when we estimate the beta coefficients from (1) is that $\bar{a}_{ct}$ depends on *t*

and is likely to be correlated with the other covariates since it is not observed. Therefore $\bar{a}_{ct}$ is treated as a fixed unknown parameter and we apply the fixed effects method.

In a panel framework, since Ordered Logit with Fixed Effects model is not feasible, we apply the Adapted Probit OLS proposed by van Praag and Ferrer-i-Carbonell (2004). In this case, we convert the dependent ordinal variable (self-reported health status) into a continuous variable by assigning z-scores (see for more details and examples in van Praag, Ferrer-i-Carbonell, 2004).

3. DATA

The data used in this study are derived from the ILCS of Turkey which started in 2006 and the last survey took place in 2012. The respondents are aged 15 and older and the annual sampling size is around 18,000 households. The survey also includes regions, which are coded according to the Nomenclature of Territorial Units for Statistics (NUTS) as NUTS level 1 classification and these are: TR1-Istanbul, TR2-West Marmara, TR3-Aegean, TR4- East Marmara, TR5-West Anatolia, TR6-Mediterranean, TR7-Central Anatolia, TR8-West Black Sea, TR9-East Black Sea, TRA-North-east Anatolia, TRB-Central east Anatolia, TRC-Southeast Anatolia (Turkish Statistical Institute, 2012).

Based on the previous literature (Or, 2000; Achia *et.al*., 2010; Giovanis, 2014) we include the following individual and household variables into the analysis. These are the household income[3], age, household type, job status, industry code of the job occupation, house tenure, marital status, education level, type of the fuel mostly used in the dwelling for heating, piped water system in the dwelling, indoor toilet, house size and NUTS 1 regions. The health outcome is the reported Self-Assessed Health (SAH) defined by the response to the following question "What is your general health status; and it is coded as very good/good/fair/bad/very bad?".

We report the descriptive statistics in Table 1. The annual average household income is around 21,300 Turkish Liras for the total sample while the average income is slightly higher for movers. The statistics show that almost all the households in the sample have available piped water in the dwelling at 96 per cent. Concerning the SAH, table 1 shows that 11.88 and 52.73 per cent of the people report very good and good health respectively, the 20.74 per cent of the sample reports fair health status, while 12.81 and 2.04 per cent reports bad and very bad health status, respectively.

Table 1. Descriptive Statistics

Panel A: Continuous Variables	**Mean**	**St.Deviation**	**Minimum**	**Maximum**
Household Income	21,322.12	19,695.18	95.77	642,017.8
Household Size	102.1819	31.53276	25	999
Age	39.04466	15.60866	15	110

Panel B: Categorical Variables	**Percentage**	**Variables**	**Percentage**
Gender (Male)	48.0	Tenure Status (Free accommodation)	13.89
		Household Type (Single Person)	2.65
Gender (Female)	52.0	Household Type (Two adults whose age	8.71
Education (Illiterate)	13.91	<65, no dependent child)	
Education (Literate but not a	8.46	Household Type (Two adults, at least one	5.43
graduate)		adult's age >65, no dependent child)	
Education (Primary School)	36.30	Household Type (Other households	13.62
Education (Secondary School)	16.81	without dependent child)	
Education (High School)	9.54	Household Type (Single person with	1.58
Education (Vocational or	6.79	dependent child)	
Technical High School)		Household Type (Two adults with one	10.81
Education (University or	8.20	dependent child)	
Higher) Marital Status	23.71	Household Type (Two adults with two	13.21
(Married)	68.13	dependent children)	
Marital Status (Never Married)	4.81	Household Type (Two adults with three or	11.62
Marital Status (Widowed)	2.84	more dependent children)	
Marital Status (Divorced)	0.51	Other households with dependent children	32.26
Marital Status (Separated)	96.48	Other households (Not possible to	0.10
Piped water system (Yes)		determine the household type)	
Piped water system (No)	3.52	Job status (Employee-full time)	35.35
Indoor toilet (Yes, for sole use		Job status (Employee-part time)	4.04
of the household)	84.32	Job status (self employed-full time)	7.54
Indoor toilet (Yes, Shared)	11.71	Job status (self employed -part time)	5.46
Indoor toilet (No)	3.97	Job status (looking for a job)	6.17
Health Status (Very Good)	11.88		
Health Status (Good)	52.73	Job status (Pupil, student)	3.01
Health Status (Fair)	20.74	Job status (Retired)	6.83
Health Status (Bad)	12.81	Job status (Old, Permanently Disabled)	20.41
Health Status (Vary Bad)	2.04	Job status (Fulfilling domestic tasks)	10.76
Fuel Type (Wood)	19.06	Job status (Other inactive)	0.42
Fuel Type (Coal)	49.27	Occupational code (Managers)	7.13
Fuel Type (Natural Gas)	19.44	Occupational code (Professionals)	6.89
Fuel Type (Fuel-oil)	0.60	Occ. code (Technicians and Associate	5.09
Fuel Type (Diesel Oil-Gasoil)	0.16	Professionals)	
Fuel Type (Electricity)	4.22	Occ. code (Clerical Support Workers)	4.82
Fuel Type (Dry Cow Dung)	6.36	Occ. code (Service & Sales Workers)	11.94
Fuel Type (Other)	0.89	Occ. code (Agricultural & Fishery	29.0
Tenure Status (Owner)	65.95	Workers)	12.93
Tenure Status (Tenant)	18.86	Occupational Code (Crafts & Trade	8.87
Tenure Status (Lodging)	1.30	Workers)	13.33
		Occ. code (Plant & Machine Operators)	
		Occupational code (Elementary	
		occupations)	

RESULTS

The results show that an individual's health is determined partly by their life experience and the social roles, in terms of marital status, education, employment and household type. On the contrary, it is less driven by other household characteristics, such as indoor toilet and pipe water infrastructure in the dwelling.

The first significant determinant of health, as we expect, is the household income, which is associated with higher levels of health outcomes. In line with the income, the coefficient of education is significant showing that increasing the years of schooling and the education level is a key for improving the health status (Table 2). Before proceeding to the econometric results shown in Table 2, the graphs also allow us to make presumptions about the positive effects of income and education on health (Figures 1-3).

Figure 1. Relationship Between Average Household Income and Health (with outliers)

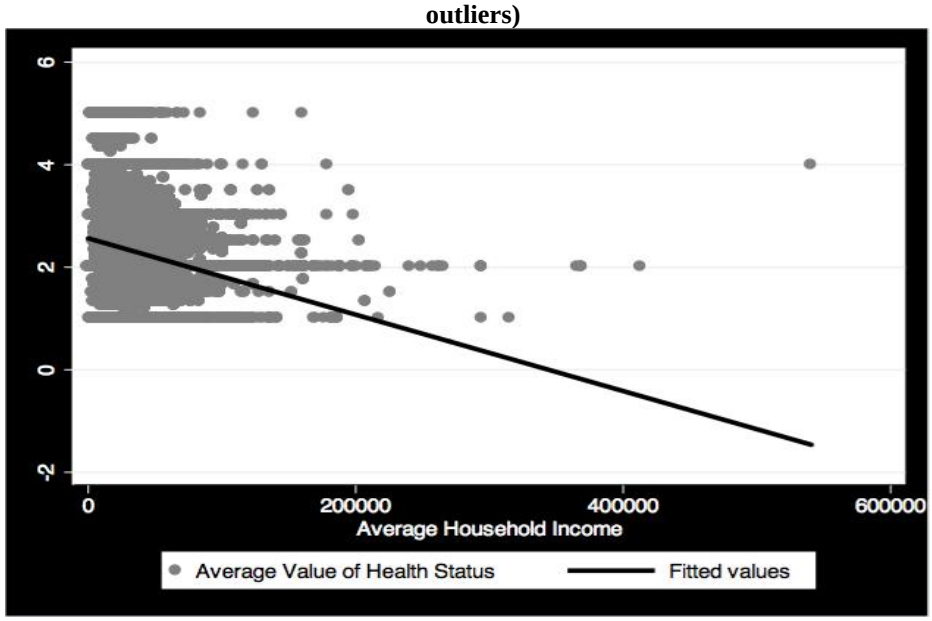
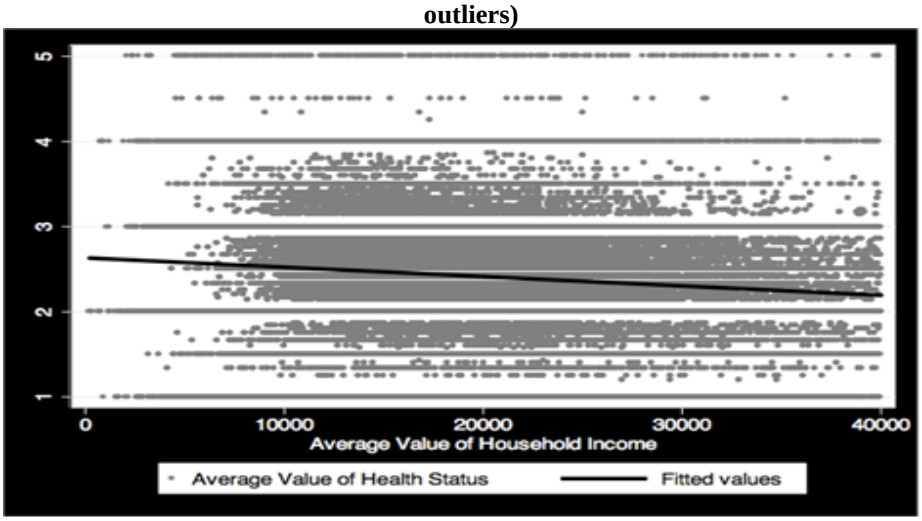
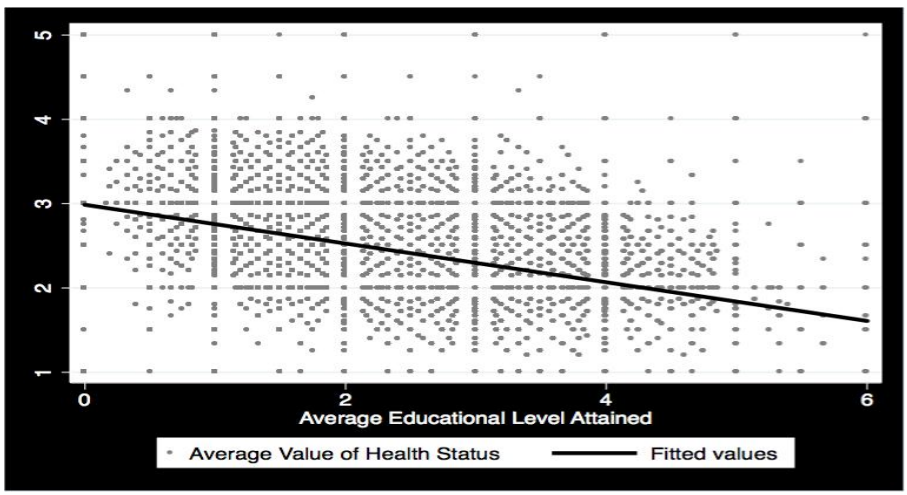


Figure 2. Relationship Between Average Household Income and Health (without outliers)



Note: To exclude outliers sample size reduced as covering only households who get 40.000 or less Turkish Liras per year. Any trial using different income values does not change the main result.

Figure 3. Relationship Between Average Education Level Attained and Health



Note: The educational level attained is encoded in a scale from 1 to 6, where 1 indicates being illiterate, 2 indicates being literate (but not graduated), 3 represents secondary school graduation 4 represents high school graduation, 5 indicates vocational high school completion and finally 6 indicates faculty/university or higher levels educational attainment.

We should note that a negative sign on a coefficient in Table 2 implies a positive effect on health status, as the encoding scale ranges from 1 to 5, where 1 indicates very good health and 5 points out very poor health. The same applies for the regression lines in figures 1-3. A negative line expresses a positive relationship. Figure 3 showing the relationship between education and health reveals a positive association.

However, these basic findings should be investigated also by econometric applications taking into account other determinants of health allowing for unbiased and robust estimates. In table 2 we present the main econometric results. The individuals who completed the primary school report higher levels of health status than individuals who are illiterate. Furthermore, the relationship between education level and health status is monotonic as we can observe from the remained coefficients of education level. Thus, based on the estimated coefficients of income and education level, richer and more educated people present better health outcomes and live longer than those who are poor and less-educated. These results support the idea of Wilkinson (1996) that the distribution of income is one of the most powerful determinants of health that is recently re-assessed by Herzer, Nunnenkamp (2015). Their study examines the effect of income inequality on health in developed and developing countries. Similarly, Sen (1999) strongly argues that mortality is an important indicator of economic success and the distribution of income within countries. He also claims that mortality itself is helpful in the formulation of public policy decisions. Deaton (2001, 2002) argues that the lack of investment on public goods increases poverty and income inequalities, lowers welfare and consequently affects health status and inequalities. Education helps people to choose a healthy environment to live, to be more aware of a healthy lifestyle, and to receive high quality health care. As Schultz (1984) suggests, education allows people to take better choices in life related to hygiene and nutrition. He posits several possible explanations in his general framework for the analysis of health. First, education may increase the productivity of health inputs. Second, it may reduce costs of information about the optimal use of health inputs where educated people can be advantageous in searching out such information. Third, education may increase family income. Also, education may change preferences related to fertility, family size affecting also the health of children and parents.

The results based on the Random-Effects Ordered Logit estimations confirm the findings derived from the Adapted Probit Fixed Effects model. The coefficients have the same sign while the magnitude is higher as these methods use the Logit approach where the coefficients are roughly 4 times higher compared to the coefficients estimated by a linear regression.

Table 2. Empirical Estimates of the Health Status Determinants

Variables	Adapted Probit Fixed Effects	Panel Ordered Logit	Variables	Adapted Probit Fixed Effects	Panel Ordered Logit
Household Income	-0.1251***	-0.2924***	Household Type (2 ad., no dep,	-0.0138	-0.1350**
	(0.0065)	(0.0137)	children < 65)	(0.0268)	(0.0673)
Age	0.0201***	0.0549***	Household Type (2 ad., no dep.	0.0761**	0.2194***
	(0.0004)	(0.0082)	children, at least one adult >65	(0.0330)	(0.0759)
Marital Status (Single)	0.0279**	0.1990***	Household Type (2 ad. with one	-0.0316	-0.1359**
	(0.0135)	(0.0250)	dep. child)	(0.0169)	(0.0676)
Marital Status (Widowed)	0.2344***	0.5251***	Household Type (2 ad. with two	-0.0237*	-0.1335**
	(0.0321)	(0.0637)	dep. children)	(0.0123)	(0.0673)
Marital Status (Divorced)	0.1796***	0.5565***	House Tenure (Tenant)	-0.0043	0.0242
	(0.0271)	(0.0576)		(0.0086)	(0.0707)
Marital Status (Separated)	0.1414***	0.6039***	House Tenure (Lodging)	-0.0293	-0.0903
	(0.0474)	(0.1033)		(0.0242)	(0.0619)
Primary school	-0.2646***	-0.6769***	Indoor Flushing Toilet (Yes)	-0.0150	-0.0143
	(0.0161)	(0.0282)	shared	(0.0212)	(0.0376)
High school	-0.3702***	-0.9943***	Indoor Flushing Toilet (No)	0.0257**	0.0722***
	(0.0198)	(0.0385)		(0.0119)	(0.0245)
Higher education level	-0.4136***	-1.165***	Type of Fuel (Coal)	0.0110	0.0161
	(0.0213)	(0.0437)		(0.0096)	(0.0199)
Job Status (Employee Part Time)	0.1471***	0.3457***	Type of Fuel (Natural Gas)	-0.0235*	-0.0972**
	(0.0091)	(0.0253)		(0.0129)	(0.0395)
Job Status (Self-Employed Part Time)	0.1496***	0.3645***	Type of Fuel (Fuel-Oil)	-0.0309	-0.1365
	(0.0135)	(0.0438)		(0.0421)	(0.1032)
Unemployed	0.1196***	0.3694*	Type of Fuel (Electricity)	-0.0385*	-0.1926***
	(0.0261)	(0.1884)		(0.0218)	(0.0569)
Retired	0.1512***	1.8682***	Type of Fuel (Dried cow dung)	0.0818***	0.1269***
	(0.0093)	(0.0710)		(0.0181)	(0.0342)
Occupation code (Professionals)	-0.0140	-0.0368	Piped Water (No)	0.0283*	0.0636*
	(0.0166)	(0.0428)		(0.0146)	(0.0382)
Occupation code (Clerical Support	0.0321*	0.1259***	Number of Observations	112,338	84,640
Workers)	(0.0180)	(0.0429)			
Occupation code (Skilled agricultural,	0.0560***	0.1518***	R Square	0.2070	
forestry and fishery workers)	(0.0154)	(0.0338)			
House Size	-0.0008***	-0.0013***	Wald Chi Square		7,528.34
	(0.0001)	(0.00035)			[0.000]

Standard errors in brackets, p-values in square brackets, ***, ** and * indicate significance at 1%, 5% and 10% level

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Based on the data, the average household income is 15,850 and 41,600 for illiterate and higher educated (university and above) individuals, respectively. Moreover, the 19.00 and 66.00 per cent of people who completed a higher education degree reported that they have very good and good health status, while the respective values for illiterate individuals are 8.50 and 42.50 per cent. This shows the large health disparities through the education channel. The next coefficient of interest is the age, which is positive and significant implying that a higher occurrence of health problems is more likely to take place in old age.

Regarding the marital status, those who are widowed present the lowest health outcomes amongst the other categories of marital status. The 24.50 of the married couples self-assessed their health as very good, while the respective values for single, widowed and divorced individuals are 8.00, 1.00 and 4.00 per cent. This might be explained by the fact that married individuals enjoy a higher household income. Also, it can be related to the theory that the family size and structure act as proxies for health care that improve the health status of the family members.

Similarly, job status is an important determinant of health status. According to the results in table 2 we observe that part-time employees, unemployed and retired present lower levels of health status compared to the full-time employees. This can be explained by various facts, as the unemployed, and especially those who are long-run unemployed, are more depressed and stressed. In addition, retired people may suffer more often from health problems, reflected by their old age.

In Table 2, the results for occupation codes show that there is no difference on health status between individuals who are professionals and the managers. Skilled workers employed in agricultural and forestry industry present lower levels of health outcomes followed by the clerical support workers. This can be associated with the fact that individuals working in the agricultural and forestry industry are poorer and less educated. For example the 18.00 per cent of the workers employed in this sector are illiterate, while only 0.80 completed a higher university degree. On the other hand, the 27.00 per cent of those who are managers achieved a higher education degree and only 0.6 per cent of the sample is illiterate.

The house size contributes to good health, which once again can be associated with higher income of individuals. Regarding household type the results are mixed. The number of household members or children could be additional determinants of health. However, these variables are highly correlated with the household type. Thus, we decided to use the household type, because it allows us to examine the effects of the household structure on health in more details. The reference category is the household that consist of a single person. In this case, a couple with no dependent children and

younger than 65 years old or a household with two adults, who have one or two dependent children, are healthier compared to a household comprising only a single person. On the other hand, a household with two adults, where at least one of them is older than 65 years old, and has no dependent children, are less healthy than single individuals. This result is consistent with the estimates of marital status described earlier. These findings also reflect the old age of those persons, as in the case of widowed and retired people, who are mainly old.

The remained determinants examined include the indoor flushing toilet and piped water availability in the dwelling and the type of fuel used for heating. Table 2 shows that there is no difference on health status levels between those who stated that indoor flushing toilet is available for sole use of the household and those who reported that it is shared. However, the individuals who answered that there is no indoor flushing toilet and no piped water in the dwelling report significantly lower levels of health status. The type of fuel used for heating in the dwelling is important for the health status. More specifically, using natural gas, fuel-oil and electricity has positive effects on individuals' health status compared to coal and wood. In addition, when dried cow dung is used as fuel for heating has significant and the highest negative effects on health status.

Overall, the results show that SES is an important determinant for health. On average, individuals with better health take place in such social groups who have the highest socio-economic status. People who belong to well-educated and higher income classes have lower rates of morbidity, mortality and better rates of health status (Deaton, 2001; 2002). The general findings so far are consistent with other studies (Rosenzweig and Schultz 1982, 1983, 1991; Grossman, Kaestner, 1997; Benzeval *et.al*., 2000; Deaton, 2001; 2002). Also, education is perhaps the most basic socio-economic status (SES) component, since it shapes future occupational opportunities and the earning potential of people. Consequently, education and income increase the advantages of people in terms of information about healthy lifestyle and access to better quality of health care services. Some economists found a negative correlation between socio-economic status characteristics and health status related to smoking and obesity. However, we do not analyze the latter, because such information is not available in the ILCS of Turkey. Furthermore, epidemiologists make a criticism on the economic research about the education and health relationship where they claim that economists can explain only a small part of the gradient. However, they also agree on the fact that socio-economic status is a *fundamental cause* of health. In addition, people with low-SES experience greater residential crowding and noise and generally are located in polluted areas. Noise exposure has been linked to poorer health outcomes and lower cognitive skills (Lercher *et.al*., 1998; Lercher *et.al*., 2002; Ozdamar, Giovanis, 2014).

To sum up, the results suggest that one of the main policies in Turkey should be the education reconstruction and income distribution focusing on SES disparities elimination or reduction. Furthermore, a broad approach is needed to eliminate the multiple determinants of SES disparities and therefore their negative effects on health. Moreover, a new policy approach is necessary to reconsider the benefit side of cost-benefit analysis. Traditionally, cost-benefit analysis is mostly done to understand the ways of economic efficiency and cost minimization. Nevertheless, it often neglects the understanding of the health-promoting prospects of policies through educational improvement or income inequality.

Another important aspect for future research is the male-female health-survival paradox, where women report lower levels of health status, but they live longer compared to men who are physically stronger and report higher levels of health status. This paradox remains a very interesting research topic, but demanding and challenging, since many biological and non-biological factors influence the mortality and health of female and males and the differences between them. These factors are rooted in social, cultural, behavioural, biological and psychological conditions. Biological factors, mainly genetic and hormonal differences between sexes and behavioural and environmental factors, including alcohol consumption, smoking and health risks at work are thought to explain this paradox (Wingard, 1984; Waldron, 1985). On the other hand, women report more chronic conditions than men, but their conditions and disabilities are less severe and in the most cases these are not-life threatening (Verbrugge, 1985; Verbrugge, Wingard, 1987; Rieker, Bird, 2005).

Other factors are owned to social conditions. Still it is not overall clear, whether this paradox is attributable to differences in culture between contemporary and older societies. Past societies, which were characterized by various cultural practices, were dominated by high fertility combined with low-risk male behaviour. In these societies people might have experienced in a less degree the male-female health-survival paradox compared to the modern populations where low-fertility and the high-risk male behaviour is mostly common (Pampel, 2003; Oksuzyan *et.al.*, 2010). Overall, the research shows that the differences in mortality differences between women and men are caused by a complex combination of biological and non-biological factors. This study has not explored this paradox; however, we suggest it for future research to investigate it in Turkey using cross-sectional data over a long period of time.

CONCLUSION

This study examined the determinants of the health status in Turkey using a set of repeated cross sectional micro-level data and a pseudo panel model. The analysis relied on data derived from the Income and Living Conditions Survey during the period

2006-2012. The results showed that income and education are the most important determinants followed by job status, marital status, house size and household type. On the other hand, house tenure shows no significant effects on health. This is also the first study that examined an additional determinant of health status in Turkey that is the type of fuel used for heating in the dwelling and it is employed as a proxy for indoor air pollution.

However, there are still major drawbacks in this study. First, the econometric methods we applied require the availability of panel data. Therefore, one major limitation of using repeated cross-sectional data is that the same individuals are not followed over time. Nevertheless, repeated cross-sectional data suffer less from typical panel data problems like attrition and non-response that are often substantially larger, both in increasing number of individuals or households. Another drawback is that an individual may have "unobservable" characteristics that are genetic or inherited at birth and that can influence a range of health outcomes. If we do not consider for those effects, then the observed association between health, income and other characteristics will not reflect the true relationship. However, it is generally very difficult to find appropriate measures to act as proxies for such characteristics, including this survey. Furthermore, panel datasets also do not solve this limitation.

Additionally, this study suggests future research applications and suggestions on survey improvements in Turkey. First, the sample design should be based on neighbourhood or postcode level, or at least on city level. This will allow the researchers to map and assign precisely the air pollution to the individuals. The detailed disaggregated air pollution mapping will help the researchers to examine also the possible effects of outdoor air pollution, as an additional important factor of health. This is especially an issue in large cities where urbanization and traffic are observed in a great degree. Second, and in line with the previous, various robustness checks and sensitivity analyses can take place, including different estimates for urban and rural areas, age groups, gender, and different specifications in the regression models allowing for concavity on income and the air pollutants. In parallel with the earlier statement, weather data can be included in the regression analysis controlling for meteorological effects on air pollution and health. More specifically, extreme weather conditions, such as very high or very low temperature lead to worse health levels, while mild weather improves health. Additionally, wind direction and speed, humidity and solar radiation among others affect health and air pollution. Thus, using this information it is possible to derive precise estimates of willingness to pay helping the policy makers to implement successful environmental related policies. Fourth, additional questions in future surveys design related with lifestyle, such as smoking, drinking and biomarkers, like blood pressure and others should be included. Finally, the above-mentioned proposed samplings in a panel survey framework would be very useful to be designed and

implemented. These will additionally, help the research institutions and policy makers for future applications on urban and regional planning and sustainable development including the public health.

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NOTES

[1] See Grossman and Kaestner (1997) for the detailed literature review.

[2] See Husain (2010) for the relevant discussion and literature review.

[3] The analysis was also conducted using individual level income; however this is affected by labour force participation so it is not explicitly modelled here.

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