Being Healthy in Turkey: A Pseudo-Panel Data Analysis

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10 February 2016

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Abstract

This study empirically examines the determinants of health status in Turkey. Moreover, this is the first study up to date that explores the indoor air pollution as a determinant of health in Turkey using a micro-level dataset. Relevant analyses are done using Turkish Statistical Institute (TURKSTAT) Cross Sectional Income and Living Conditions Survey (2006-2012). Two approaches are followed for the entire analyses. Using Pseudo-Panel Data based on age cohorts, an Adapted Probit Fixed Effects Model is applied to control for time invariant characteristics of the regions, thereby eliminating potentially large sources of bias. Moreover, Random-Effects Ordered Logit Model is applied as a robustness check. Various determinants are examined including household and personal characteristics such as socioeconomic status. The findings show that income and education are the most important socioeconomic determinants of health followed by the marital and employment status. Furthermore, estimations for fuel-typed used in dwelling as a proxy for indoor air pollution show that using natural gas and electricity has more positive effects on individuals' health status than using wood or coal. Finally, findings may point out the importance of policies on the education reconstruction, income distribution and clean environment to improve health status of people and reduce health inequalities.

Keywords: Health Status; Indoor air pollution; Pseudo-Panel; Socio-Economic Status

1. Introduction

The determinants of health consist of key factors from people's social, economic and physical environment. In addition to their genetic backgrounds and living/working conditions, the important role of environmental factors including water and air quality, environmental pollution, urbanization, climate change, extreme weather conditions, waste management and recycling are also mentioned as significant determinants of health in the relevant literature of health. The aim of this study is to contribute to the strand of literature on health determinants with a Turkish case study. Using pseudo panel data and fixed effects regressions, this study will be the first study that examines the health determinants in Turkey that specifically explores the role of indoor air pollution on health as well. Overall results confirm the proposal of International Energy Agency (2010) which suggests that Turkey should promote fuel switching from high-sulfur lignite and coal to natural gas.

An additional 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 has been high amount of evidence showing that good health in general can play a major role in human development and therefore economic growth and poverty alleviation (Barro and Sala-I-Martin, 1995; Bloom et al., 2004; Thomas and Strauss, 1997).

The analysis is conducted by using the Adapted Probit Fixed Effects Model proposed by van Praag and Ferrer-i-Carbonell (2004) for the fact that Ordered Logit Model does not allow fixed effects in panel framework. A key advantage of using pseudo panel estimates is that it is possible to control for the regional, time invariant characteristics and accounting for intercept heterogeneity. As a robustness check, Random-Effects Ordered Logit Model is applied as well.

The structure of the paper is as follows: Section 2 presents a short literature review, while the econometric framework is discussed in section 3. Section 4 provides the data and the research sample design. The results are reported in section 5, while the concluding remarks are presented in section 6.

2. Literature review

A detailed examination to understand the determinants of health status enables policy makers to identify also the determinants of economic growth and therefore poverty reduction and human development. There are different channels to explain how a determinant of good health

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could strongly create an increase in economic growth as well. For instance, better nutrition, which provides better health, is strongly associated with responds to increases in labor productivity and therefore income and economic growth (Strauss and Thomas 1998; Fogel, 1994). Moreover as another important determinant of health, education gives an opportunity to people for a better access to health care that increases economic growth through healthy and productive individuals. Thus, by identifying the determinants of health it is possible to identify their effects on economic growth and poverty alleviation as well.

Among studies on the determinants of health, several researches found a strong relationship between socio-economic status (SES) and health status. Socioeconomic status (SES) is often measured as a combination of education, income and occupation. SES is important to health not only for those in poverty, but also for the people at all levels of SES. On average, individuals, who are in most advantaged social groups in terms of higher educational attainment and high-income level, are healthier. As previous studies have demonstrated that household income is associated with the development of children and youth and generally household's members, (Haveman et al., 1991; Huston et al., 1994; Brooks-Gunn and Duncan, 1997). In addition, 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] and these studies suggest that schooling is much more important determinant of health than other components of SES such as income or occupation. Since schooling is the causal determinant of occupation or income, the greater part of the income's effect on health can be attributable to the impact of education on income or occupation. Increasing educational level may most probably provide better occupational opportunities and higher earnings. Moreover, more educated people can be more aware of the harmful effects of smoking or better-educated people can be more advantageous in accessing information and resources to promote health (Rosenzweig and Schultz (1982, 1983, 1991); Grossman and Kaestner (1997). Generally, education is an important and a key factor to reduce health inequalities and for the development of policies encouraging more years of schooling and supporting 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 causal relationship between health determinants and health status, it is not attempted to tackle with the issue of endogeneity and more specifically reverse causality in this research.

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Another determinant of health is the job or occupational status that is one of the components of SES as well. Employed people may have better health, since they have an earning to sustain their life, while the unemployed people might be under-stress on searching for a job that may harm their mental and physical health (Wilson and Walker, 1993; Ross and Mirovsky, 1995). In other words, 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, while on the other hand if it is not, retirement probably has negative effects on health. However, retired people are usually old, where age is negatively associated with health.

The Self-Assessed Health (SAH) has been used widely in previous studies of the relationship between health or well-being and their determinants (Ettner 1996; Deaton and Paxson 1998; Benzeval et al. 2000; Salas 2002; Adams et al. 2003; Frijters et al. 2005; Contoyannis et al. 2004, Hajdu and Hajdu, 2015) and of the relationship between health and lifestyles (Kenkel 1995; Contoyannis and Jones 2004). The results are various. This paper aims at examining the determinants of Self-Assessed Health (SAH) in Turkey.

In addition to SES, age is another important determinant of health as most recently mentioned in the theory of Grossman (2000). It is indicated that the health stock of a person depreciates with his/her age at an increasing rate. Thus, a negative and significant relationship between age and health status is expected in this study as well.

Another factor examined in this study 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 and 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 and 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 allow it. More specifically, the sample is based on Nomenclature of Territorial Units for Statistics (NUTS) 1 region, which will lead to non-precise estimates. Nevertheless in the conclusion part future suggestions on the sample survey designs in Turkey and their possible implication on policy making are discussed. 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 respiratory symptoms and allergies than those living further away (Shima et al. 2003; Ostro et al. 2006). Similar studies carried out in other countries such as the UK, the USA and the Netherlands (Oosterlee et. al. 1996; Van Vliet et. al. 1997; McConnell et. al. 2006; Currie, 2011) reported increased respiratory symptoms, reduced lung function in children and infant mortality for whom live in close proximity of roads with high traffic intensity. Other epidemiological studies on 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, and leukaemia, premature births and deaths (Laden et al., 2000; Suresh et al., 2000; Janssen et al., 2002; O'Neill et al., 2004).

The remained determinants are marital status, and dwelling characteristics, such as the house size, whether there is piped water and indoor toilet in the dwelling, fuel type used for heating as a proxy for indoor pollution. Regarding the marital status it is expected that divorced and widowed people report lower levels of health status than the married couples. On the other hand, the single individuals might report higher levels of health status than the married couples in the younger age groups. However, it is expected that in older age groups, married couples present better health based on the theory discussed previously that household size and support can be a proxy for health care. This is the first study that explores the fuel type as a determinant of health in Turkey using a micro-level dataset.

3. Methodology

In this study the Income and Living Conditions Survey (ILCS) of Turkey is used and the survey is based on repeated cross-sectional data. Moreover, the main outcome of interest, which is health status, is a categorical (ordinal) variable. However Ordered Logit or Ordered Probit Model does not allow for fixed effects estimates in a panel framework. ILCS of Turkey is such a survey that is based on repeated cross-sectional data, where a random sample is taken from the population at consecutive points in time. The availability of panel data can also be identified with repeated cross-sections under appropriate conditions and this methodological innovation is commonly known as *'pseudo-panel approach'*.

The first benefit of the pseudo-panel approach is that they suffer less from problems related to sample attrition, as the samples are renewed at every period. The second benefit comes from

the wide availability of cross-sectional data that makes possible to construct pseudo-panels that are appropriately representative, covering long periods back in time. Thirdly, 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, the individual's past can be identified and be included in a fixed effects model. It should be noticed that there is a panel Income and Living Conditions Surveys (ILCS) in Turkey; however this covers only 4 years and additionally the sample is designed on 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, a robustness check is applied using panel version of this dataset and the results remain unchanged.

First of all, following Deaton (1985), the use of cohorts is applied to estimate a fixed effects model from repeated cross-sections. Through this approach, individuals who share some common characteristics (year of birth, gender and region) are grouped into cohorts. Second, aggregating all observations to cohort level, the model is written as:

$$\overline{H}_{c,t} = \overline{a}_{c,t} + \beta_1 \log\left(\overline{y}_{c,t}\right) + \beta' \overline{Z}_{c,t} + \overline{\mu}_c + k_j + \phi_t + k_j T + \varepsilon_{c,j,t} \quad (1)$$

$\overline{H}_{c,t}$ 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, k_j is controls for region. More specifically, there are 12 regions that are presented 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, $\varepsilon_{c,j,t}$ expresses the error term which we assume to be *iid*. Standard errors are clustered at the area-specific time trends.

The dataset is consisted by repeated observations over *T* periods and *C* cohorts. The main problem with estimating 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 fixed effects method is applied.

In a panel framework, since Ordered Logit with Fixed Effects are not feasible for model (1), the Adapted Probit OLS proposed by van Praag and Ferrer-i-Carbonell (2004) is applied. In this case, the dependent ordinal variable (self-reported health status) is converted in continuous variable assigning z-scores (see for more details and examples in van Praag and Ferrer-i-Carbonell, 2004).

4. Data

The data used in this study are derived from the ILCS of Turkey that is started in 2006 and the last survey took place in 2012. The respondents on this survey are aged 15 and older. The annual sampling size is around 13,000 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, 2013).

Based on the previous literature (Or, 2000; Achia et al., 2010; Giovanis, 2014) the demographic and household variables, which are 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, are examined. The health outcome is self-reported health (SRH) defined by a response to the question "What is your general health status; and it is coded as very good/good/fair/bad/very bad?".

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 <65,	8.71
Education (Illiterate)	13.91	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 without	13.62
Education (Secondary School)	16.81	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 Higher)	8.20	dependent child)	
Marital Status (Married)	23.71	Household Type (Two adults with two	13.21
Marital Status (Never Married)	68.13	dependent children)	
Marital Status (Widowed)	4.81	Household Type (Two adults with three or	11.62
Marital Status (Divorced)	2.84	more dependent children)	
Marital Status (Separated)	0.51	Other households with dependent children	32.26
Piped water system (Yes)	96.48	Other households (Not possible to determine	0.10
Piped water system (No)	3.52	the household type)	
Indoor toilet (Yes, for sole use of		Job status (Employee-full time)	35.35
the household)	84.32	Job status (Employee-part time)	4.04
Indoor toilet (Yes, Shared)	11.71	Job status (self employed-full time)	7.54
Indoor toilet (No)	3.97	Job status (self employed -part time)	5.46
Health Status (Very Good	11.88	Job status (looking for a job)	6.17
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 Workers)	29.0
Tenure Status (Owner)	65.95	Occupational Code (Crafts & Trade Workers)	12.93
Tenure Status (Tenant)	18.86	Occ. code (Plant & Machine Operators)	8.87
Tenure Status (Lodging)	1.30	Occupational code (Elementary occupations)	13.33

The descriptive statistics are reported in Table 1. The annual average household income is around 21,300 Turkish Liras for the total sample, while the average 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 self-reported health status, 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 them report fair health status, while 12.81 and 2.04 per cent report bad and very bad health status respectively.

5. Results

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

The first significant determinant of health, as it was expected, is the household income. Thus, higher income is associated with higher-better levels of health outcome. In line with the income, the coefficient for education is significant showing that increasing educational level is a key for a better health status as well (Table 2). Before obtaining econometric findings shown in Table 2, diagrammatic demonstrations also has led us to do presumptions on the positive effects of income on health (Figure 1 and Figure 2) and positive effects of education on health (Figure 3).

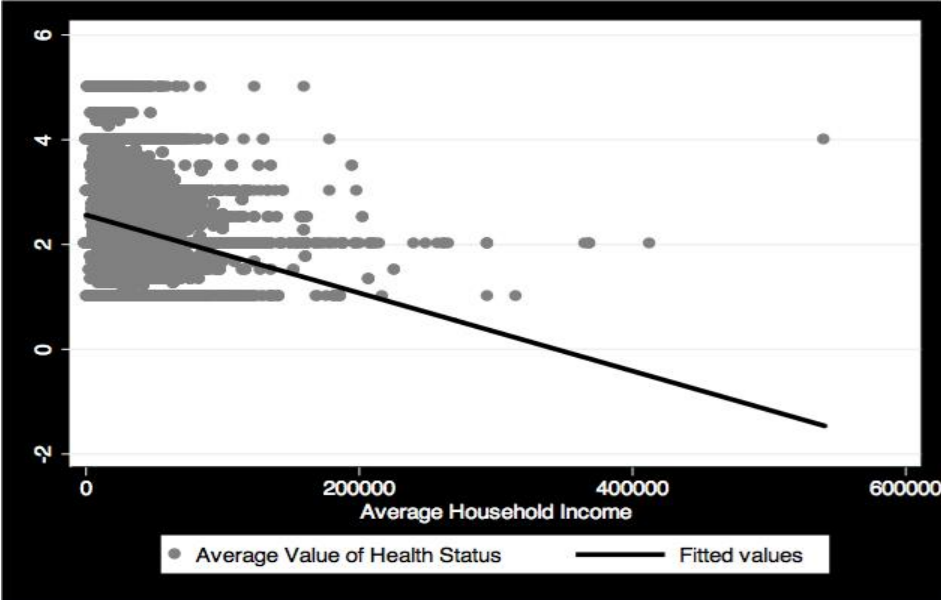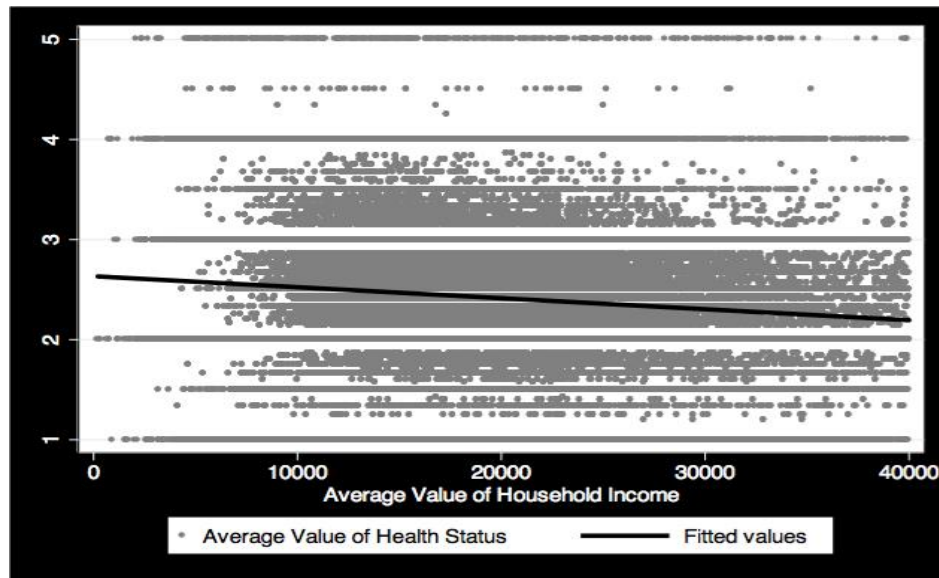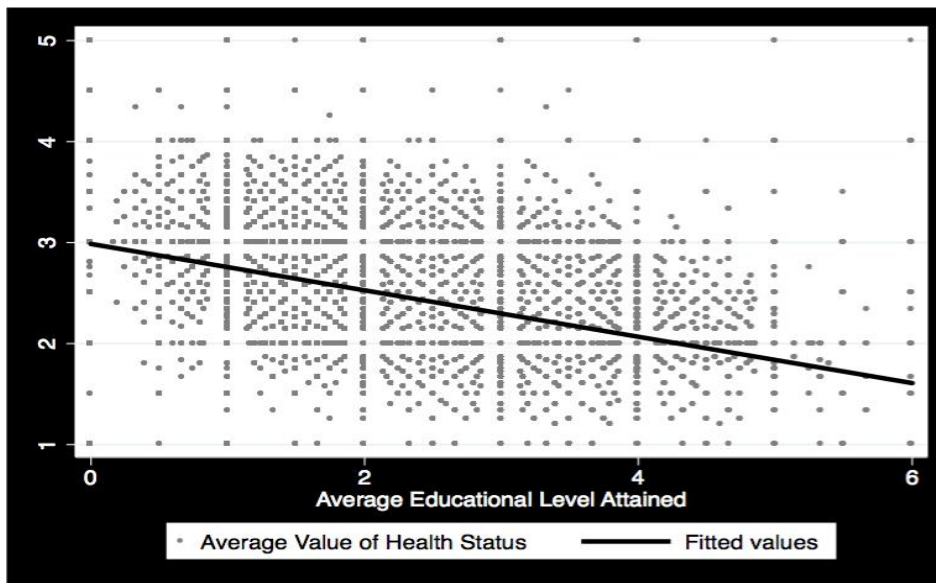**Figure 1: Relationship Between Average Household Income and Health(with outliers)**

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

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.

It should be noticed that a negative sign on a coefficient in Table 2 implies a positive effect on health status, as the latter is encoded in a scale from 1 to 5, where 1 indicates very good health, while 5 indicates very bad health. Same applies for the regression lines in figures. A negative

line indicates a positive relationship. Diagrammatic demonstration of the relationship between education and health indicates a positive association between these two variables.

However, these basic findings should be investigated econometrically while taking into account other determinants of health for unbiased and robust estimates. Relevant results are shown in Table 2. individuals who completed the primary school report higher levels of health status than individuals who are illiterate that is the reference point of the categorical variable *education*. The relationship between education level and health status is monotonic as it is shown by the remained coefficients of education level, where individuals who completed the high school and higher education level have coefficients equal at -0.3702 and -0.4136 respectively. Thus, based on the estimated coefficients of income and education level, richer and more educated people report better health status levels and live longer than whom are poorer and usually less-educated. This supports the idea of Wilkonson (1996) that the distribution of income is one of the most powerful determinants of health that is recently reassessed by Herzer and Nunnenkamp (2015) as well. Their study carefully examine the effect of income inequality on health in developed and developing countries. Similarly, Noble-laureate Amartya 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) supports this idea that not investing in public goods, therefore the high-level income inequality, the experience of increased poverty, lower welfare and definitely affect health and health inequalities. On the other hand, education helps to people to choose a healthy environment to live, to be more aware of a healthy lifestyle, to receive high quality health care. As Schultz (1984) mentioned more education helps people to make 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 may be advantageous in searching out such information. Third, education may increase family income. Finally, education may change preferences for family size and therefore health of children and other household members.

The results based on Random-Effects Ordered Logit estimations confirm the findings found by applying the Adapted Probit Fixed Effects estimates. 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 than the coefficients derived from 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, children < 65)	-0.0138	-0.1350**
	(0.0065)	(0.0137)		(0.0268)	(0.0673)
Age	0.0201***	0.0549***	Household Type (2 ad., no dep. children, at least one adult >65	0.0761**	0.2194***
	(0.0004)	(0.0082)		(0.0330)	(0.0759)
Marital Status (Single)	0.0279**	0.1990***	Household Type (2 ad. with one dep. child)	-0.0316	-0.1359**
	(0.0135)	(0.0250)		(0.0169)	(0.0676)
Marital Status (Widowed)	0.2344***	0.5251***	Household Type (2 ad. with two dep. children)	-0.0237*	-0.1335**
	(0.0321)	(0.0637)		(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) shared	-0.0150	-0.0143
	(0.0161)	(0.0282)		(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 Workers)	0.0321*	0.1259***	Number of Observations	112,338	84,640
	(0.0180)	(0.0429)			
Occupation code (Skilled agricultural, forestry and fishery workers)	0.0560***	0.1518***	R Square	0.2070	
	(0.0154)	(0.0338)			
House Size	-0.0008***	-0.0013***	Wald Chi Square		7,528.34
	(0.0001)	(0.00035)			[0.000]

Based on the data, it is estimated that 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 respectively. This indicates the great 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 possible in old age indicating that health status becomes more important with age. People generally encounter deterioration in health with old age.

Regarding the marital status, the reference category is the married individuals. Those who are widowed present the lowest health outcome levels amongst the other categories of marital status. Regarding the health 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 associated with the income, while the married individuals enjoy a higher household income as well as it might be related to the theory that the family size and structure can be a proxy for health care and improves health status of its members.

Similarly, job status is an important determinant of health status. The reference category is the full-time employees. Thus, a positive sign for the part-time employees, unemployed and retired individuals indicate a lower level of health status for these categories than full-time employed individuals. This can be explained by various facts as the unemployed are more depressed and stressed. If they are unable to find a job, and especially those who are long-run unemployed, the situation can create problems for both mental and physical health. In addition, retired people, as well as the old widowed, might have more health problems, reflecting their old age that implies additional health problems.

In Table 2, the results for occupation codes are reported as well. More specifically, there is no difference on health status between individuals who are professionals and the reference category that is managers. However, skilled workers employed in agricultural and forestry industry present lower levels of health outcomes followed by clerical support workers. This can be associated that individuals belonging in the agricultural and forestry industry are poorer and less educated. For example the 18.00 per cent of the workers employed in agricultural and forestry industry 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 finished a higher education degree and only 0.6 per cent of the sample is illiterate.

The house size contributes positively on health, which once again can be associated with higher income of individuals. Regarding household type the results are mixed. Number of household members or the number of children could be additional determinants of health. However, these variables are highly correlated with the household type. Thus we decided to use household type because it allows us to examine the effects of that structure of a household on health in more details. The considered reference category of the household type is the single person. In that case, a couple with no dependent children and younger than 65 or a household with two adults, who have one or two dependent children, are healthier than a household which is consisted only by a single person. On the other hand, a household with two adults, which at least one of them is older than 65 years old, and have no dependent children, are lees healthy than single individuals. This result is consistent with the estimates of marital status described previously. These findings also reflect the old age of those persons, as in the case of widowed and retired people, who are mainly old.

The rest of the factors have small or insignificant effects on health. More specifically, house tenure is insignificant, whether an individual owns or rents the house. The remained determinants examined are the existence of indoor flushing toilet and piped water in the dwelling and the type of fuel used for heating. Table 2 shows that whether there is indoor flushing toilet for sole use of the household or shared among household members has no different impact on health; however, the individuals who answered that there is no indoor flushing toilet and no piped water in the dwelling have lower health status levels. 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 more positive effects on individuals' health status than using coal or wood. In addition, when dried cow dung is used as fuel for heating has significant and the highest negative effects on health status.

First of all, overall 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 (Benzeval et al. 2000; Prus 2001; Robert and Li 2001;

Deaton, 2001; 2002; Beckett and Elliott 2002; Bostean, 2010; Rosenzweig and Schultz 1982, 1983, 1991; Grossman and Kaestner, 1997). Second, education is perhaps the most basic socio-economic status (SES) component since it shapes future occupational opportunities and earning potential of people and increase their advantages to be better informed about healthcare. Moreover, some economists found negative correlation between socio-economic status characteristics and health status related to smoking and obesity. However, the latter is not analyzed in this study, as such information is not available in ILCS of Turkey. Furthermore, epidemiologists do critics on the economic research about the education and health relationship where they think that economists can explain only a small part of the gradient, however they also agree on the fact that socioeconomic status is a *fundamental cause* of health. In addition, people with low-SES also experience greater residential crowding and noise and generally are located in polluted areas. Noise exposure has been linked to poorer health status levels and cognitive skills (Berglund and Lindvall, 1995; Lercher et. al., 1998; Lercher et. al., 2002; Ozdamar and Giovanis, 2014).

To sum up, the results suggest that one of the main policies in Turkey should be education reconstruction and income distribution focusing on SES disparities reduction or elimination. 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 are mostly done to understand the ways to obtain economic efficiency and cost minimization, however they often neglect to understand the health-promoting prospects of policies through educational improvement or income inequality.

6. Conclusion

This study examine the determinants of the health status in Turkey using a set of repeated cross sectional and pseudo panel micro-data on self-reported health status from the Income and Living Conditions Survey during the period 2006-2012. The results show that education is the most important determinant 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 examines an additional determinant of health status in Turkey that is the type of fuel for heating in dwelling which proxies indoor air pollution.

However, there exist some drawbacks in this study. Firstly, the econometric methods applied seemingly 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 that may influence a range of health outcomes. If these effects are not taken into account, then the observed association between income and other characteristics and health might 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 and panel datasets do not solve this limitation.

Furthermore, this study suggests future research applications and suggestions on survey improvements in Turkey. Firstly, the sample design should be based on neighborhood or postcode level, or at least based on city level. The reason for that is the mapping and proper assignment of air pollution can be at least at city level. This will help the researchers to examine also the possible effects of outdoor air pollution, as an additional important factor of health, especially in big cities where urbanization and traffic are observed in a great degree. Secondly, and in line with the previous, various robustness checks and sensitivity analyses can take place, as different estimates for urban and rural areas, age groups, gender, and different specifications in the regression models allowing for concavity on income or the air pollutants. In parallel with the previous 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 leads 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 derived precise estimates of willingness to pay helping the policy makers for environmental policy design. Fourthly, additional question designs in survey taking place in Turkey can be included, such as smoking, drinking and biomarkers, like blood pressure and others. 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 policy makers for future applications on urban and regional planning and sustainable development including the public health.

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.

Acknowledgement

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