

SELF-REPORTED HEALTH STATUS: A MICROECONOMETRIC ANALYSIS FOR TURKEY

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Abstract: In this paper, we examine the effects of the demographic, health and socio-economic indicators on self-reported health status (SRH) in Turkey for the year of 2012. Independent variables taken into account in the study are formed under these three titles. The Health Survey data have been collected by Turkish Statistical Office (TURKSTAT). We first used ordered logit model as a microeconomic approach but, however, generalized ordered logit model is applied after the rejection of the parallel regression assumption. Results show that people who have a chronic disease and an accident in their life are less likely to report good health. An increase in body mass index, getting older, being a female cause a negative effect on reporting good health. Increasing income level, living in urban area, being employed have a positive effect on reporting good health. In the education category, people are more likely to report fair health but the effect decreases when the education level increases.

Keywords: self-reported health, ordered logit, generalized ordered logit

JEL classification: I10, I12, C25

INTRODUCTION

Self-reported health (SRH) is one of the remarkable topics employed frequently because of its power of measuring health inequalities in a country or within countries [Clarke, Ryan 2006]. In many of the studies, SRH is widely used to get information about individual health status in a population [Vaillant, Wolff

<https://doi.org/10.22630/MIBE.2018.19.4.42>

2012] by asking the question “What is the status of your health?” or “How is your health status in general?”. Although doubts about measuring of self-reported health have a great attention in the literature, it has been reappraised thanks to time and economic advantages of the collected self-reported health data [Subramanian et al. 2010]. Besides, people’s perspective of their health, measured with a Likert scale as very bad, bad, fair, good and very good health, reflects the mortality rates which is not captured in objective measures. Reporting very bad and bad or fair health can be a signal of high mortality rates; reporting good and very good health can be a symbol of low mortality rates [McCallum et al. 1994]. Literature on health is divided into different groups which analyze the relationship between SRH and biological, socio-economic, gender effects, and other many effects as well. For instance: Winkleby et al. [1992], Fernandez et al. [1999], Bloom, Canning [2000], Schulz et al. [2000], Shibuya et al. [2002], Tubeuf et al. [2008], Hosseinpoor et al. [2012], Oncel [2015], Tansel and Karaođlan [2016], Boerma et al. [2016], Deaton and Paxson [2017], Sedefoglu and Soytas [2017]. However, in the national literature, in Turkey, not many studies have considered the linkage of SRH and demographic, socio-economic and health in the same paper. In this paper, we look at the demographic, socio-economic and health effects on SRH to highlight the importance of the three factors and to extend the literature through that way. Evaluation of demographic, socio-economic and health effects on SRH for a developing country as Turkey has a crucial importance on planning process of policies. Furthermore, ordered logit or probit models are mostly employed in both national and international literature because of the measurement method of dependent variable to find out the relationship between SRH and the factors thought that they are going to have an effect on SRH. However, the parallel regression hypothesis has to be valid to expound the parameters. The generalized logit model is run if Wald test results give the information of not valid parallel regression assumption.

The rest of the paper is organized as follows: The second section gives information about the applied method and empirical data. The third section summarizes the econometric results. Lastly, summary information is given in the fourth section.

APPLIED METHOD AND EMPIRICAL DATA

A number of models are available in microeconomic theory for such data like health, poverty, income inequality, or etc. and those models, such as binary logit models, ordered and multinomial logit models, are discussed in relation to type of the dependent variable. When dependent variable consists of two values as 1 and 0, models are known as binary logit and probit models; when dependent variable occurs with more than two ordered values, the estimation of the parameters can be made through ordered logit or probit models. The probability of an event is the common characteristics of the mentioned models and they cannot be

measured with the way that used in classical regression due to the reason of differences of measurement way of attitudes, behaviors, characteristics or decisions [Liao 1994].

In this paper, ordered logit model is preferred as an empirical approach. In a basic form, ordered logit model fixed into our research is specified as follows:

$$SRH_i = DV_i\beta + HV_i\gamma + SEV_i\alpha + e_i$$

where the variable of SRH_i is a dependent variable formed by a response of the question “What is the status of your health?” and it ranges from 1 to 5 where the numbers mean very bad, bad, fair, good and very good, respectively. DV_i represents the demographic variables; HV_i indicates the health variables; SEV_i displays the socio-economic variables; β , α and γ are the parameters; e_i is the error term of the model. In the ordered logit model, it is important to take parallel regression assumption into account to interpret the coefficients correctly. The fundamental problem in the ordered logit model is that the assumption is mostly violated [Williams 2006]. A Wald test provided by Brant (1990) is helpful to test the parallel regression assumption separately for each variable [Long 2001]. Rejection of the assumption makes it necessary to refer alternative models. In that case, generalized ordered logit model is one of the alternative models to ordered logit model because of the violation of parallel regression hypothesis.

In Table 1, definition of independent variables is presented. Age, gender, marital status and living area are described under the demographic variables. Education groups, income groups and employment status are specified under the socio-economic variables and the variable of accident, body mass index (bmi), chronic, insurance are defined as health variables.

Table 1. Definition of independent variables¹

Variables	Description
Demographic Variables (DV)	
Age	If the individual's age group is: age15_24 then 1, others 0 age25_34 then 1, others 0 age35_44 then 1, others 0 age45_54 then 1, others 0 age55_64 then 1, others 0 age65_74 then 1, others 0 age75 then 1, others 0
Gender	Female 1, others 0
Marital Status	If the individual is married 1, others 0
Living Area	If the individual is living in urban 1, others 0

¹ For the sake of brevity, the table of descriptive statistics is not given in the main paper but the detailed table of descriptive statistics can be obtained from the authors upon request.

Variables	Description
Socio-economic Variables (SEV)	
Education	If the individual's education level is; illiterate 1, others 0 incomplete 1, others 0 primary 1, others 0 secondary 1, others 0 high school 1, others 0 tertiary 1, others 0
Income ²	If the individual is; very poor 1, others 0 poor 1, others 0 medium 1, others 0 rich 1, others 0 very rich 1, others 0
Employment	If the individual is employed 1, others 0
Health Variables (HV)	
Accident	If the individual has an accident including all accident types 1, others 0
Body Mass Index (bmi)	Number
Chronic	If the individual has a chronic health problem 1, others 0
Insurance	If the individual is paying all health expenses 1, others 0

Source: own elaboration

In Table 2, health reporting scores are represented. According to results, 56.73% of the people respond the question as good while 0.76% of the people respond the question as very bad. The second highest rate after the response of good is obtained in the response of fair with 23.16 and the third one is seen in very good with 13.10%. The response of bad is the fourth one with 6.26% in five categories.

Table 2. Health reporting scores

Health Status	Very good	Good	Fair	Bad	Very bad	Total
Frequency	3364	14562	5944	1606	194	25670
Percentage (%)	13.10	56.73	23.16	6.26	0.76	100

Source: own calculations

² Income categories were created by 20% quantiles based on the individuals' income levels in the dataset.

RESULTS

In order to see the effects of the demographic, health and socio-economic indicators on self-reported health status in Turkey, ordered logit model is estimated the results are reported in Table 3. Concerning the results of the ordered logit model, health variables accident, bmi, chronic and insurance; demographic variables age, female urban; socio-economic variables education, employment and income are effective on self-reported health status at a statistically significant level.

Table 3. Ordered logit model results

N= 25670 LR chi2(24) = 10535.76 Prob > chi2 = 0.0000 Log likelihood = -23918.326			
Variables	Coefficients and Standard Errors	Variables	Coefficients and Standard Errors
accident	-0.2655*** (0.0529)	urban	-0.1218*** (0.0313)
bmi	-0.0167*** (0.0028)	illiterate	-1.0703*** (0.0665)
chronic	-1.6406*** (0.0320)	incomplete	-0.6853*** (0.0701)
insurance	0.1132* (0.0642)	primary	-0.5186*** (0.0481)
age25_34	-0.5438*** (0.0522)	secondary	-0.2314*** (0.0526)
age35_44	-0.8841*** (0.0579)	high school	-0.18737*** (0.0486)
age45_54	-1.2454*** (0.0597)	poor	0.2406*** (0.0563)
age55_64	-1.6299*** (0.0632)	medium	0.3085*** (0.0506)
age65_74	-1.9688*** (0.0694)	rich	0.3508*** (0.0520)
age75	-2.4975*** (0.0798)	veryrich	0.53838*** (0.0522)
female	-0.2276*** (0.0296)	employed	0.1365*** (0.0327)
married	-0.0344 (0.0354)	Cut 3	-3.4836 (0.1134)
Cut 1	-8.1998 (0.1784)	Cut 4	0.26046 (0.1100)
Cut 2	-5.7481 (0.1644)		

Note: Coefficients signed as *, **, and *** are statistically significant at the level of 10%, 5% and 1%, respectively.

Source: own calculations

In ordered logit model, parallel regression assumption must be tested. To test the validity of the assumption, Walt test suggested by Brant (1990) is applied and test results are reported in Table 4. In the test results, significant chi-square values mean that the parallel regression assumption is not valid. In Table 4, the parallel regression hypothesis is rejected for all model and for 16 of the 23 variables. Since the assumption is rejected in ordered logit model, generalized ordered logit model is estimated.

Table 4. Walt test results

Independent variables	Chi2	Prob	d.f.
All	408.33	0.000***	69
accident	26.16	0.000***	3
bmi	3.80	0.283	3
chronic	100.07	0.000***	3
insurance	3.12	0.373	3
age25_34	14.89	0.002**	3
age35_44	21.13	0.000***	3
age45_54	28.72	0.000***	3
age55_64	22.44	0.000***	3
age65_74	14.99	0.002**	3
age75	20.47	0.000***	3
female	50.26	0.000***	3
married	47.66	0.000***	3
urban	19.40	0.000***	3
illiterate	4.92	0.177	3
incomplete	13.40	0.004**	3
primary	14.13	0.003**	3
secondary	6.04	0.110	3
highschool	5.98	0.113	3
poor	0.72	0.868	3
medium	3.15	0.369	3
rich	4.62	0.202	3
veryrich	8.49	0.037**	3
employed	46.88	0.000***	3

Note: Coefficients signed as *, **, and *** are statistically significant at the level of 10%, 5% and 1%, respectively.

Source: own calculations

Generalized ordered logit model estimation results are showed in Table 5. Coefficients of the generalized ordered logit model cannot be interpreted directly. Thus, marginal effects are computed in order to interpret the coefficients. Values of the marginal effects are represented in Table 6.

Table 5. Generalized ordered logit model results

N= 25670 LR chi2(96) = 10899.79 Prob > chi2 = 0.0000 Log likelihood = -23736.312				
Variables	Coefficients and Standard Errors			
	mleg1	mleg2	mleg3	mleg4
accident	-0.14983 (0.2723)	-0.4620*** (0.0948)	-0.4023*** (0.0654)	0.0390 (0.0812)
bmi	-0.0039 (0.0136)	-0.0154*** (0.0052)	-0.0188*** (0.0035)	-0.0101** (0.0051)
chronic	-1.6595*** (0.2521)	-1.9332*** (0.0922)	-1.8034*** (0.0376)	-1.2441*** (0.0505)
insurance	0.16865 (0.3709)	0.2915** (0.1332)	0.1184 (0.0852)	0.0838 (0.0905)
age25_34	-0.3404 (0.4494)	-0.2140 (0.1788)	-0.6450*** (0.0821)	-0.3767*** (0.0671)
age35_44	-0.3362 (0.4532)	-0.6060*** (0.1721)	-1.0361*** (0.0842)	-0.6706*** (0.0815)
age45_54	-0.6532 (0.4329)	-0.9793*** (0.1674)	-1.4214*** (0.0838)	-0.9442*** (0.0906)
age55_64	-1.3211*** (0.4007)	-1.3260*** (0.1665)	-1.7650*** (0.0860)	-1.2853*** (0.1120)
age65_74	-1.1729*** (0.4012)	-1.4868*** (0.1674)	-2.0760*** (0.0931)	-1.9966*** (0.1953)
age75	-1.3901*** (0.3993)	-1.9354*** (0.1695)	-2.6251*** (0.1109)	-2.7835*** (0.3862)
female	0.5208*** (0.1650)	0.1226* (0.0627)	-0.2476*** (0.0390)	-0.2600*** (0.0447)
married	0.3681** (0.1738)	0.1666** (0.0671)	0.0720 (0.0465)	-0.3015*** (0.0555)
urban	-0.1140 (0.1648)	-0.0935 (0.0607)	-0.01717 (0.0396)	-0.2741*** (0.0489)
illiterate	-2.2848*** (0.6183)	-1.2634*** (0.1520)	-1.1121*** (0.0858)	-1.1838*** (0.1729)
incomplete	-2.0664*** (0.6330)	-0.9211*** (0.1609)	-0.8101*** (0.0905)	-0.4650*** (0.1158)
primary	-1.4542** (0.6050)	-0.6667*** (0.1397)	-0.6544*** (0.0648)	-0.3635*** (0.0718)
secondary	-0.9267 (0.6590)	-0.1795 (0.1672)	-0.3645*** (0.0751)	-0.1853** (0.0708)
highschool	-0.9042 (0.6522)	-0.2009 (0.1578)	-0.3094*** (0.0692)	-0.1284** (0.0655)
poor	0.3838 (0.2603)	0.2829** (0.0937)	0.2240*** (0.0698)	0.17045* (0.0989)

Variables	Coefficients and Standard Errors			
	mleg1	mleg2	mleg3	mleg4
medium	0.1614 (0.2215)	0.3875*** (0.0857)	0.2998*** (0.0628)	0.2132** (0.0883)
rich	0.2894 (0.2474)	0.4896*** (0.0930)	0.3170*** (0.0649)	0.2580** (0.0886)
veryrich	0.3413 (0.2638)	0.7337*** (0.0986)	0.52925*** (0.0658)	0.4154*** (0.0874)
employed	0.8921*** (0.2615)	0.5275*** (0.0788)	0.1992*** (0.0419)	-0.0238 (0.0491)
constant	7.4046*** (0.8576)	5.0302*** (0.2652)	3.7604*** (0.1494)	-0.2245 (0.1769)

Note: Coefficients signed as *, **, and *** are statistically significant at the level of 10%, 5% and 1%, respectively.

Source: own calculations

According to Table 6, estimated coefficients can be summarized as follows:

Accident: The variable of accident is found statistically significant at the level of 1% for the category of bad, fair and good. Significant results show that if the individual has an accident, they are more likely to report bad and fair health compared to having not an accident.

Bmi: The category of fair and good health at the level of 1%, the category of bad at the 5% and the category of very good at the level of 10% are found statistically significant. It means that increase of 1% in body mass index causes an increase (%) in the likelihood of bad and fair health.

Chronic: All health category is found statistically significant at the level of 1%. Thus, people who have a chronic disease, when we compare with the people who have not a chronic disease, are more likely to report very bad, bad and fair health and they are less likely to report good and very good health.

Insurance: The variable of insurance is statistically significant at the level of 10% only for the category of bad health. Therefore people who pay all health expenses are less likely to report bad health.

Age: In age groups, all health categories are found statistically significant at the level of 1% except for the category of very bad and for the variable of age25_34 in the category of bad. Compared to the reference category of age15_24, people are more likely to report bad and fair health when they are getting age and they are less likely to report good and very good health with increasing age.

Female: The variable is found statistically significant for the category of fair and very good health at the level of 1% and for the category of very bad and good at the level of 5%. Females, compared to men, are more likely to report fair health while they are less likely to report good and very good health.

Married: The married variable is statistically significant for the category of very bad and bad at the level of 10% and for the category of good and very good at the

level of 1%. Married people are more likely to report good health although they are less likely to report very good, bad and very bad health in comparison with unmarried people.

Urban: The urban variable is statistically significant at the level of 5% for the good health and at the level of 1% for the very good health. People who live in urban area, compared to rural area, are more likely to report good health while they are less likely to report very good health.

Education: In education groups, all variables are statistically significant at the level of 1% for fair, good and very good health except the variable of highschool. The variable of illiterate is statistically significant at 10% for very bad health and at 5% for bad health. The variable of incomplete is statistically significant at 10% for bad health. The variable of primary is statistically significant at 10% for very bad health and at 5% for bad health. Compared to the reference category of tertiary, people who are in the illiterate, incomplete, primary, secondary and high school education level, they are more likely to report bad and fair health. Even the signs of the coefficients are positive on reporting of bad and fair health, people are more likely to be optimistic about their health when the education level increases.

Income: In income groups, the variable of poor is statistically significant at the level of 10% for very bad and good health and at the level of 5% for bad and fair health. The variable of medium and rich are statistically significant at the level of 1% for the bad and fair health and at the level of 5% for the good and very good health. The variable of very rich is statistically significant at the level of 1% for all health categories except for the very bad health. Based on the reference category of very poor, significant variables in income groups report that individuals are more likely to report good and very good health with rising income level.

Employed: The variable of employed is statistically significant for the category of very bad, bad and good health at the level of 1% and for the category of fair at the level of 5%. Significant coefficients report that employed people, compared to unemployed people, are less likely to report very bad, bad and fair health.

Table 6. Marginal effects of the generalized ordered logit model

Variables	Very bad	Bad	Fair	Good	Very good
accident	0.00040 (0.00079)	0.0145*** (0.0036)	0.0614*** (0.0129)	-0.0794*** (0.0139)	0.0030 (0.0063)
bmi	0.000009 (0.00003)	0.0004** (0.00013)	0.0028*** (0.0006)	-0.0024*** (0.0006)	-0.0007* (0.00039)
chronic	0.00475*** (0.0008)	0.0539*** (0.0027)	0.2524*** (0.0057)	-0.2141*** (0.0068)	-0.0970*** (0.0041)
insurance	-0.00046 (0.0011)	-0.0083* (0.0044)	-0.0123 (0.0148)	0.0150 (0.0161)	0.00614 (0.0064)
age25_34	0.00096 (0.0014)	0.0050 (0.0050)	0.1170*** (0.0158)	-0.0970*** (0.0168)	-0.0260*** (0.0042)

Variables	Very bad	Bad	Fair	Good	Very good
age35_44	0.00095 (0.0014)	0.01839** (0.00612)	0.1880*** (0.0173)	-0.1640*** (0.0184)	-0.0433*** (0.0045)
age45_54	0.00209 (0.0017)	0.03413*** (0.00779)	0.2622*** (0.0181)	-0.2421*** (0.0191)	-0.0562*** (0.0043)
age55_64	0.00595** (0.0029)	0.0535*** (0.0106)	0.3276*** (0.0193)	-0.3204*** (0.0196)	-0.0667*** (0.0040)
age65_74	0.00521* (0.0028)	0.0709*** (0.0133)	0.3894*** (0.0206)	-0.3857*** (0.0200)	-0.0798*** (0.0036)
age75	0.00723* (0.0037)	0.12043*** (0.0198)	0.4477*** (0.0236)	0.4904*** (0.0188)	-0.0849*** (0.0033)
female	-0.00135** (0.0004)	-0.00191 (0.0016)	0.0458*** (0.0064)	-0.0227** (0.0071)	-0.0198*** (0.0034)
married	-0.0010* (0.0005)	-0.00356* (0.00182)	-0.0080 (0.0078)	0.0365*** (0.0088)	-0.0239*** (0.0046)
urban	0.00028 (0.0004)	0.00215 (0.0014)	0.00053 (0.0065)	0.0190** (0.0075)	-0.0220*** (0.0041)
illiterate	0.01834* (0.0107)	0.03930** (0.0133)	0.1783*** (0.0203)	-0.1752*** (0.0207)	-0.0607*** (0.0055)
incomplete	0.01531 (0.0098)	0.02145* (0.0117)	0.1294*** (0.0203)	-0.1366*** (0.0211)	-0.0296*** (0.0061)
primary	0.00498* (0.0026)	0.01457** (0.0047)	0.0995*** (0.0118)	-0.0921*** (0.0127)	-0.0264*** (0.0050)
secondary	0.00324 (0.003)	0.00179 (0.0051)	0.0620*** (0.0139)	-0.0536*** (0.0148)	-0.0133*** (0.0048)
highschool	0.00316 (0.0029)	0.00252 (0.0049)	0.0508*** (0.0127)	-0.0471*** (0.0135)	-0.0094** (0.0046)
poor	-0.00085* (0.0005)	-0.00596** (0.0019)	-0.0301** (0.0105)	0.0233* (0.0128)	0.0136 (0.0083)
medium	-0.00395 (0.0005)	-0.0090*** (0.0018)	-0.0403*** (0.0095)	0.0328** (0.0118)	0.0169** (0.0073)
Rich	-0.00068 (0.00055)	-0.01088*** (0.0068)	-0.0407*** (0.0097)	0.0315** (0.0321)	0.0207** (0.0075)
veryrich	-0.00824 (0.00062)	-0.01679*** (0.0021)	-0.0694*** (0.0984)	0.0535*** (0.0118)	0.0335*** (0.0075)
employed	-0.00212*** (0.0006)	-0.01127*** (0.0018)	-0.0206** (0.0067)	0.0359*** (0.0075)	-0.0017 (0.0037)

Notes: Coefficients signed as *, **, and *** are statistically significant at the level of 10%, 5% and 1%, respectively. Basic categories for the age, income and education groups are age15_24, tertiary and very poor.

Source: own calculations

SUMMARY

In this study, we aim to discuss self-reported health in Turkey based on the demographic, health and socio-economic variables with an empirical evidence of microeconometrics. Generalized ordered logit model is implemented after ordered logit model is operated with Wald test. As a result of the study, we can conclude that self-reported health status is not only effected by biological factors, is effected by demographic, socio-economic and health factors at different levels. Generalized ordered logit model results remark that rising level of body mass index, having chronic disease and accident play an efficient role to report fair health instead of good health. In view of gender differences, females are less likely to report good and very good health compared to male. Living in the urban area makes people think about their health as good. Employed people are also more likely to report good health. In income groups, significant variables indicate that people are more likely to report good and very good health when they are getting richer. In education categories, enhancing education level decreases the likelihood of reporting fair health and thus it boosts the likelihood of reporting good health. In view of the foregoing results, as a conclusion remark, we can point out that taking the demographic, socio-economic and health factors into account to put forth the importance of those factors in SRH is helpful to people who work on improving process of policies.

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