The Causal Effect of Education on Health Behaviors: Evidence From Turkey

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Abstract

This study provides causal effect of education on health behaviors in Turkey which is a middle income developing country. Health Survey of the Turkish Statistical Institute for the years 2008, 2010 and 2012 are used. The health behaviors considered are smoking, alcohol consumption, fruit and vegetable consumption, exercising and one health outcome namely, the body mass index (BMI). We examine the causal effect of education on these health behaviors and the BMI Instrumental variable approach is used in order to address the endogeneity of education to health behaviors. Educational expansion of the early 1960s is used as the source of exogenous variation in years of schooling. Our main findings are as follows. Education does not significantly affect the probability of smoking or exercising. The higher the education level the higher the probability of alcohol consumption and the probability of fruit and vegetable consumption. Higher levels of education lead to higher BMI levels. This study provides a baseline for further research on the various aspects of health behaviors in Turkey.

Keywords: Turkey, Health Behaviors, Education, Instrumental Variable Estimation
JEL Classicification: I10, I12, I19

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1. Introduction

It is important to analyze the health behaviors because, health outcomes such as life expectancy and mortality are mainly related to health related behaviors. For instance, Mokdad et al. (2004) estimate that almost half of the adult mortality in the USA is ascribed to risky health behaviors. Education is one of the important factors that explain the variation in health behaviors. Cutler and Lleras-Muney (2010) emphasize that health outcome differences by education need to be explained by health behavior differences by education. Grossman (1972) in his seminal theoretical model provides a formal explanation of the observed differences in health behaviors by education. Accordingly, education affects health outcomes for allocative efficiency and productive efficiency reasons. Allocative efficiency implies that educated individuals choose different input allocations. Productive efficiency implies that more educated individuals produce health outcomes in a more efficient manner from a given input allocation.

The differentials in health behaviors by education are studied mostly in developed and high income countries such as USA and UK. However, there is less evidence on this issue in developing countries. The nature of these relationships may differ in developing countries from that in developed countries because of lower income, lower education levels and scarcer health services in developing countries. This paper investigates the health behaviors and education gradient in Turkey which is a developing and middle income country with relatively low levels of education and insufficient health-care. The health behaviors considered in this study are smoking, alcohol consumption, fruit and vegetable consumption, exercising and a health outcome namely, the body-mass index (BMI). Smoking and excessive alcohol consumption are considered as risky health behaviors and high ranges of BMI is a risky health outcome. A risky health behavior adversely affects the general health status. As the frequency of risky health behaviors increase, people are more likely to report poor self-assessed health (SAH) as shown by Brunello et al. (2015). SAH is a good predictor of mortality (Idler and Benyamini, 1997). Risky health behaviors also lead to serious health problems such as cardiovascular diseases, cancer, diabetes, etc. Cawley and Ruhm (2011), Hung et al. (2004) and Stewart et al. (2009) among others who investigate this connection.

There is a large literature that examines smoking and BMI. Examples of such studies include Carbone et al. (2005), Chaloupka and Warner (2000), Cutler and Gleaser (2005), Cutler et al. (2003), de Walque (2007), Gruber and Frakes (2006) and Mullahy (1997). Most of them investigate the relationship between health behaviors and education and various demographic factors that might influence them. Cutler and Lleras-Muney (2010) study this relationship in the USA and the UK. An earlier study, Kenkel (1991) and Lantz et al. (1998 and 2001) also investigate this relationship in the USA. Ettner (1996) examines the effect of socioeconomic status of the individual on alcohol consumption in the USA. Kemptner et al. (2011) examine the association between education and smoking as well as obesity in West Germany. They find that although an increase education level decreases the likelihood of being obese for both men and women in West-Germany there is no significant link between education and smoking. Brunello et al. (2013) in 13 European countries and Webbink et al. (2010) examine the relationship between education and obesity.

It is well recognized that education may be endogenous to health. The endogeneity can arise for three reasons: First, investment in health in earlier ages can affect both health and education in older ages. Second, unobserved factors such as ability, time preference, genetic factors and family background can affect both health and education simultaneously as indicated by Eide and Showalter (2011) and Bolin (2011). Third, there may be potential reverse causality from health to education in addition to causality from education to health. Researchers such as de Walque (2007), Grimard and Parent (2007), Sander (1995) and Arendt (2005) study smoking and treat education as endogenous. Brunello (2013) and Arendt (2005) treat education as endogenous for BMI. In this study, we take into account the possible endogeneity of education to the health behaviors investigated and use Instrumental Variable (IV) estimation.

The literature on the determinants of health behaviors in Turkey is limited and most of the studies do not take the endogeneity problem into account. Tansel and Karaoğlan (2014) estimate the association between health behaviors and education for Turkey by using the same data set as this study, however, the possible endogeneity of education is not considered. In contrast, following studies consider the possible endogeneity of education to health. Karaoğlan and Tansel (2015) include a detailed study of the relationship between education and body mass index. Tansel and Karaoğlan (2015) is devoted to a study of the relationship between education and self-assessed health and several clinical health indicators. Cesur et al. (2014) also consider the endogeneity

problem of education to health. They restrict the sample to men and women between 18-30 years old, which is a younger age group than our current study. They take the 1997 change in compulsory schooling laws as the instrument for the individual's education level. Since the people who are affected by this reform are very young, their investigation relates to a young population in Turkey. In contrast, we examine the determinants of health behaviors for the individuals above age 25 in Turkey by using the same data set. We also implement IV estimation method in order to overcome the endogeneity problem. We use the educational expansion of the early 1960's as the instrument for education. To our knowledge, we are the first to use this educational expansion as a source of exogenous variation in years of schooling[1]. Our results indicate no significant causal effect of education on smoking and on exercising. We also find that as education level increases, probability of alcohol consumption as well as the fruit and vegetable consumption both increase. Another finding is that higher levels of education lead to higher BMI levels. We note that some of these findings are contrary to what is found in the developed countries.

The rest of the paper is organized as follows. Section 2 introduces the data and descriptive statistics. Section 3 describes discusses the validity of the instrument and the methodology used in estimation. The empirical results are presented in Section 4. Section 5 concludes.

2. Data

We use the 2008, 2010 and 2012 waves of the Turkish Health Survey (THS). THS is a repeated cross sectional data set over individuals conducted by the Turkish Statistical Institute (TURKSTAT). The survey implements separate questions to three age groups namely, 0-6, 7-15 and 15 or older. For the latter group information is collected on self-assessed health, health behaviors, chronic diseases, weight and height as well as education level, demographic characteristics such as age, gender, marital status, rural/urban region, labor market status and

[1] There are several studies that use the 1997 change in compulsory schooling laws in Turkey as instrument. For instance, Aydemir and Kırdar (2013) use this instrument to examine the relationship between years of schooling and earnings. Kırdar et al. (2012) examine the impact of the raise in compulsory schooling years on teenage marriage and births. Finally, Kırdar et al. (2014) investigate whether the increase in compulsory schooling years narrow the gender educational as well as the rural/urban educatıonal gap. The 1997 law change increases compulsory schooling from five- to eight years. We do not use this change in law as instrument for years of schooling in this study because most of the individuals who are bound to this law are very young and most of them can be still enrolled in education.

household income. We calculate the individual's year of birth by subtracting his/her age from the survey year. We investigate the causal effect of education on health behaviors of adults. In an attempt to circumvent the endogeneity of education we consider the individuals 25 years of age and over since most people complete their schooling around 25 years old. We do not observe significant differences in the main results when we use three waves of the THS separately, we therefore pool the 2008, 2010 and 2012 waves in our analysis[2].

We do not observe the individual's years of schooling in the THS data set but we know the highest level of education completed. Therefore we impute the individual's years of schooling as follows. For illiterates years of schooling is set to 0. If an individual is literate, but did not graduate from any school then years of schooling is set to 2. The years of schooling is set to five, eight and 11 for those who have completed primary, middle or high school respectively. Finally, if the individual has university or higher degree the years of schooling is set to 15.

In this study, the health behaviors considered are smoking, alcohol consumption, fruit and vegetable consumption and exercising. We also consider a health outcome namely, the BMI[3]. Table 1 shows the descriptive statistics for health behaviors. An individual is considered as a smoker if he/she were a regular smoker or currently smokes every day or sometimes. According to World Health Organization (WHO) the overall smoking rate is 27.1 in Turkey. It is a rather high 41.4 per cent for men and 13.1 percent for women[4]. Table 1 indicates that the average years of schooling is higher among smokers than among nonsmokers. Further, a larger percentage of men are smokers than women. The fraction of smokers is higher among urban residents than among rural residents.

Alcohol consumption per individuals over 15 is overall 17.3 per cent while it is 19.7 per cent for men and 8.2 per cent for women[5]. We consider an individual as alcohol consumer if he/she currently consumes alcohol regularly or occasionally. Table 1 shows that average years of schooling is higher among drinkers (9.63 years) than among non-drinkers (6.14 years). Alcohol consumption is more prevalent among men than among women and among urban residents than

[2] Separate analysis of the 2008, 2010 and 2012 waves are available from the authors upon request.
[3] For detailed discussion on the health behavior related questions in THS data set see Tansel and Karaoglan (2014).
[4] Source: World Health Organization (WHO):
http://www.who.int/tobacco/surveillance/policy/country_profile/tur.pdf?ua=1.
[5] Source: World Health Organization (WHO):
http://www.who.int/substance_abuse/publications/global_alcohol_report/profiles/tur.pdf?ua=1

among rural residents. Alcohol consumers are also younger than the alcohol non-consumers. An individual is a regular fruit and vegetable consumer if he/she consumes fruit and vegetable and/or their juice at least once a week. Table 1 shows that the average years of schooling of regular fruit and vegetable consumers is higher than that of the non-consumers. The fruit and vegetable consumption is lower among females than among males. The younger people consume more fruit and vegetable than older people and urban residents consume more fruits and vegetable than rural ones.

An individual is considered as exercising regularly if he/she makes high level of exercise (such as aerobics) and/or medium level of exercise (such as riding a bicycle) and/or walks at least 10 minutes in a week. Table 1 suggests that individuals who exercise regularly have higher years of schooling. Exercise prevalence is higher among the men compared to women and among the young compared to the elderly. The urban residents exercise slightly more than the rural ones.

BMI is obtained by dividing the reported weight (in kilograms) by square of the reported height (in meters). It is used to determine whether or not an individual is overweight or obese. According to Who criteria an individual is underweight if his/her BMI is under 18.5. He/she is normal weight if the BMI in the range of 18.5-25. If BMI is in the range of 25-30 then the individual is considered as overweight and a BMI greater than 30, indicates an obese individual. Table 2 shows the descriptive statistics for various BMI levels. The average years of schooling is lower among obese individuals compared to other groups. Females are more obese than males in contrast males are more overweight than females. Obese individuals are slightly older. The BMI ranges do not differ by urban and rural residence.

3. Discussion for the Validity of the Instrument and Methodology

3.1 Educational Expansion in Turkey as the Instrumental Variable

Education may be endogenous to health for several reasons. First, health investment in early years of life can affect both education and health in later life. Second, unobserved variables such as ability, time preference, genetic factors and family background can affect both education and health simultaneously. Third, there may be reverse causality from health to education in addition to causality from education to health. “Years of schooling” is our education variable. We first test

whether the years of schooling is endogenous to the health behaviors and the health outcome considered. For smoking, alcohol consumption, fruit and vegetable consumption and exercising we use Wald endogeneity test statistics, and for BMI we implement both Durbin and Wu-Hausman test statistics for endogeneity. We reject the null hypothesis that the years of schooling is exogenous to the health behaviors and the health outcome considered. Therefore, we use Instrumental Variable (IV) estimation in all cases in order to have consistent estimates of the effects of education on health behaviors and the health outcome considered.

In this study we take educational reforms of October 1960 and January 1961 in Turkey as an instrument for the years of schooling. This is the first study that takes the educational reforms of the early 1960s as an instrument for the years of schooling in Turkey. There were several educational reforms in the early 1960s. First, a law that was passed in January 1961 increased compulsory schooling from 3 to 5 years in villages (Erdoğan, 2003; Şen, 2013) which has the direct effect of increasing years of schooling. Second, a law which was passed in October 1960 stipulated that men can satisfy the mandatory military service requirement by serving as a primary school teacher in the villages[6]. Third, another 1961 law permits middle school graduates to become primary school teachers and high school or higher graduates to become middle school teachers after completing a teacher training course. With these new regulations the number of teachers in Turkey has increased substantially[7] (Akyüz, 2007).The number of schools also increased.

We define an educational reform dummy denoted by R61 based on timing of the reforms and the individual's year of birth. We believe that it is a valid instrument for individual's years of schooling

[6] These men could eventually take up teaching as a profession if they wish to do so.

[7] For the detailed discussion of these laws see: Türkiye Cumhuriyeti Milli Eğitim Bakanlığı (Ministry of Education of Turkish Republic)."Milli Eğitim Temel Kanunu" from http://mevzuat.meb.gov.tr/html/temkanun_1/temelkanun_1.html) (accessed July 10, 2014) and Official newspapers dated 12.01.1961 (Law Number: 222) and 15.10.1960 (Law Number: 97).

[8] A detailed discussion on health reforms in the 1960s can be found in Karaoğlan (2015)

for several reasons. First, the reforms are uncorrelated with individual's health behaviors since they are results of the political developments in the early 1960s after the military intervention. Second, the individual's birth year is independent of the unobservable characteristics such as time preferences, genetic factors and parental endowments. Third, in the THS data set we are using in this study, the correlation coefficients between individual's years of schooling and policy dummy is positive and around 0.32 suggesting a relatively high correlation finally, there is evidence that health reforms introduced in the early 1960s did not impact the health behaviors. Therefore, we confidently state that the educational reforms of the early 1960s constitute a valid instrument for examining the effects of education on health behaviors.

Angrist and Krueger (1991) is the first study which proposes the positive relationship between increase in the years of compulsory education and individual's years of education. The authors state that individuals who were born in later quarters attend to school more than the others since compulsory schooling laws force individuals to enroll in education up to a certain age. Therefore, increase in years of compulsory schooling force individuals to attend to school for more years. Since change in compulsory schooling laws are determined by the government, it provides an exogenous variation in individual's years of schooling. In addition, compulsory schooling reforms are unrelated to individual's health outcomes. Therefore, it is a good instrument for individuals' years of schooling while examining the education gradient of health. Likewise, other educational reforms such as change in testing system, increase in number of courses, and increase in number of schools also provide exogenous variation in individual's years of schooling. Arendt (2005) is one of the studies that uses the educational reforms together with change in compulsory schooling laws as an instrument for education.

The increase in the number of years of compulsory schooling in the villages, the increase in the number of teachers and schools in the early 1960's will all be referred to as "educational expansion". In order to show the effect of this educational expansion on education in general we provide several figures below. First, Figure 1 shows the fraction of individuals who have at least primary school degree out of the birth cohort. There is a jump in the number of graduates between the 1950-51 and 1952-53 birth cohorts. The fraction of individuals who have at least primary school degree increases from 0.65 to 0.75 between 1949-1950 and 1951-1952 birth cohorts.

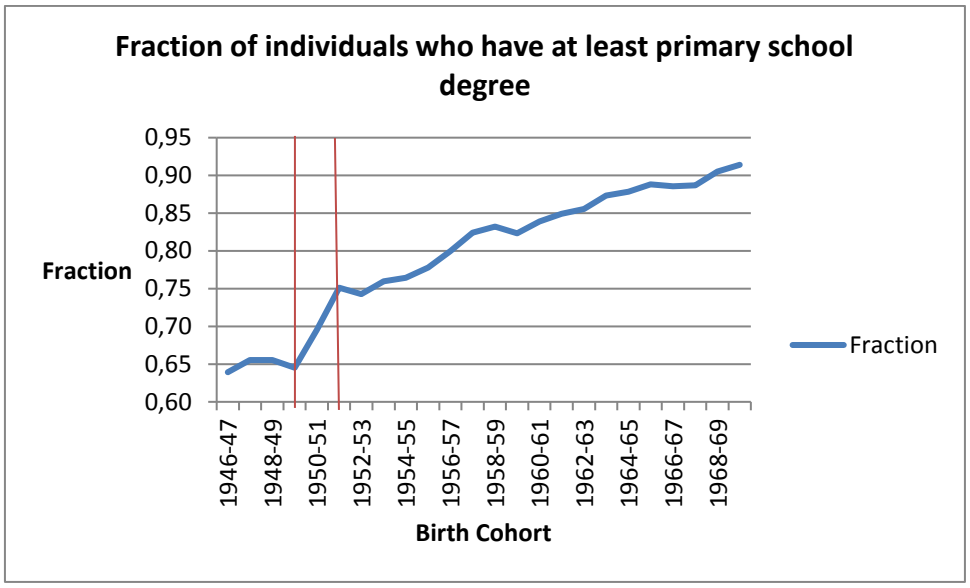

Figure 1. The fraction of the individuals who have at least primary school degree,

Source: THS Data Set

Figures 2 and 3 show the city and village population and their ratio in total population respectively. Both the population in villages and their percentage in total population are higher than the corresponding numbers in the cities until the mid-1980s. According to the 1927 General Census nearly 80 per cent of the population lives in villages which decreased to 35 per cent in 2000. The decrease in the village population becomes rapid after 1955. However, when the educational expansion took place in the early 1960's a large percentage of the population lived in the villages. Therefore, we can confidently state that the educational expansion benefited a large part of the population of Turkey.

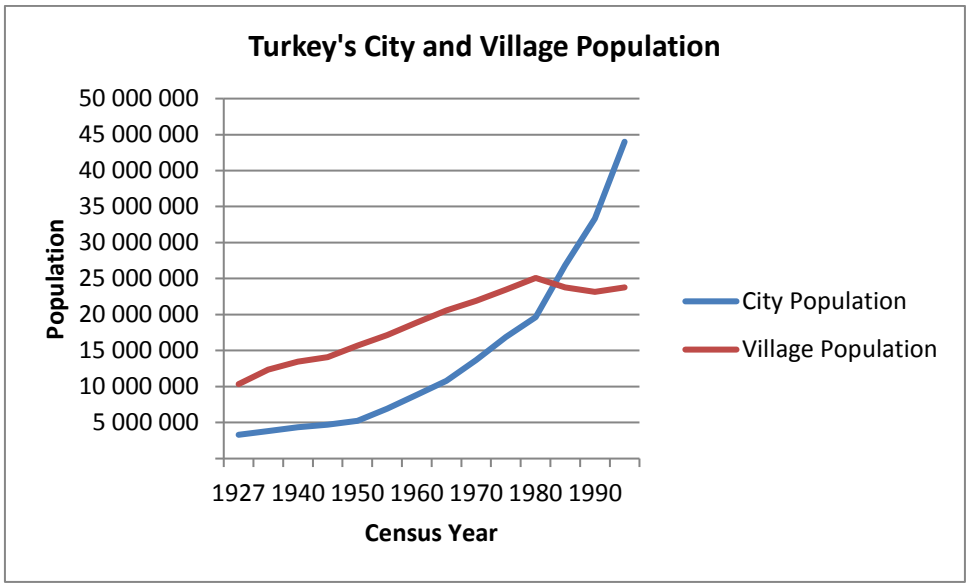

Figure 2. City and Village Population in Turkey over Time

Source: TURKSTAT, General Census Results

Figure 4 shows the number of primary school graduates in villages over time there is an increasing trend in the number of graduates in villages, which becomes steeper after educational expansion of the early 1960's. The rate of growth in the number of primary school graduates in villages was almost 10 per cent in 1960-61 academic year. It reached to 20 per cent in the 1964-65 academic year five years after the educational expansion.

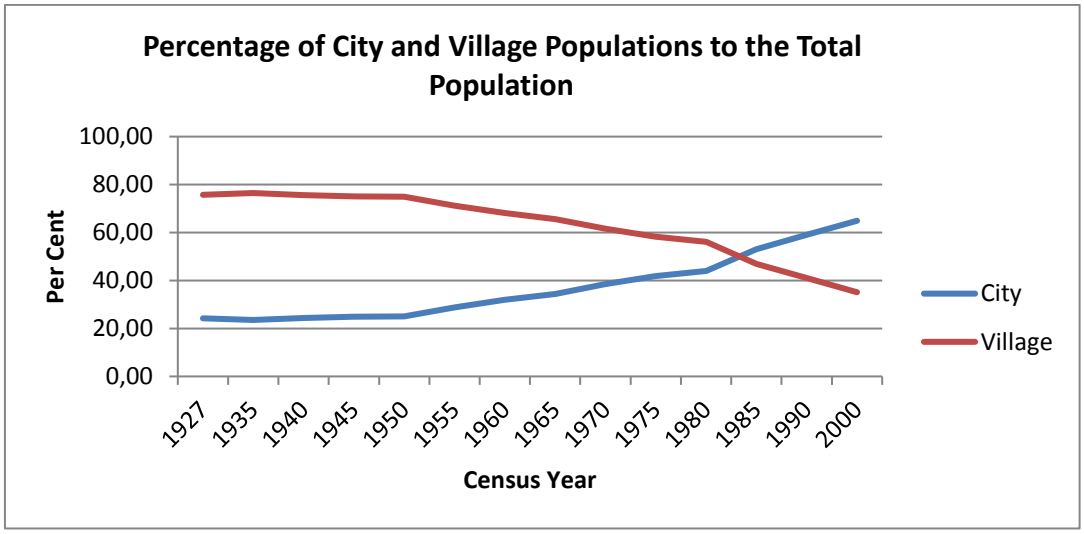

Figure 3. Percent of City and Village Populations to the Total Population

Source: TURKSTAT, General Census Results

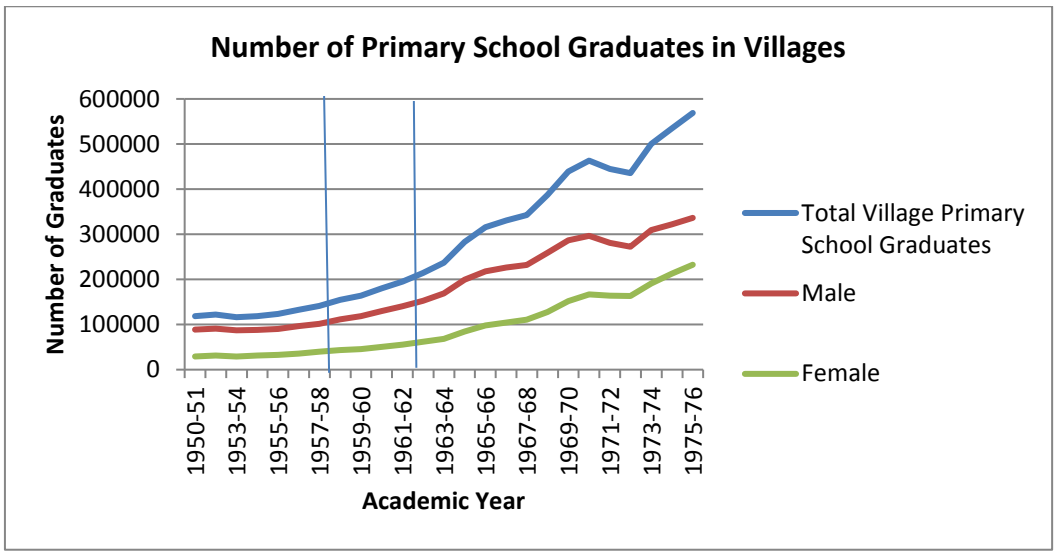

Figure 4. Number of Primary School Graduates in Villages,

Source: Turkish Ministry of Education Statistics

Next in Figure 5 we examine the total number of students enrolled in the primary schools over time. We observe an increasing trend in number of primary school students which becomes steeper after the 1960s educational expansion. The number of students in primary schools was

2.5 million during the 1959-1960 academic year. It rose to around 3.95 million in the 1965-1966 academic year representing almost a 50 per cent increase five years after the educational expansion. The similar rates of growth were 50 and 70 respectively for male and female students.

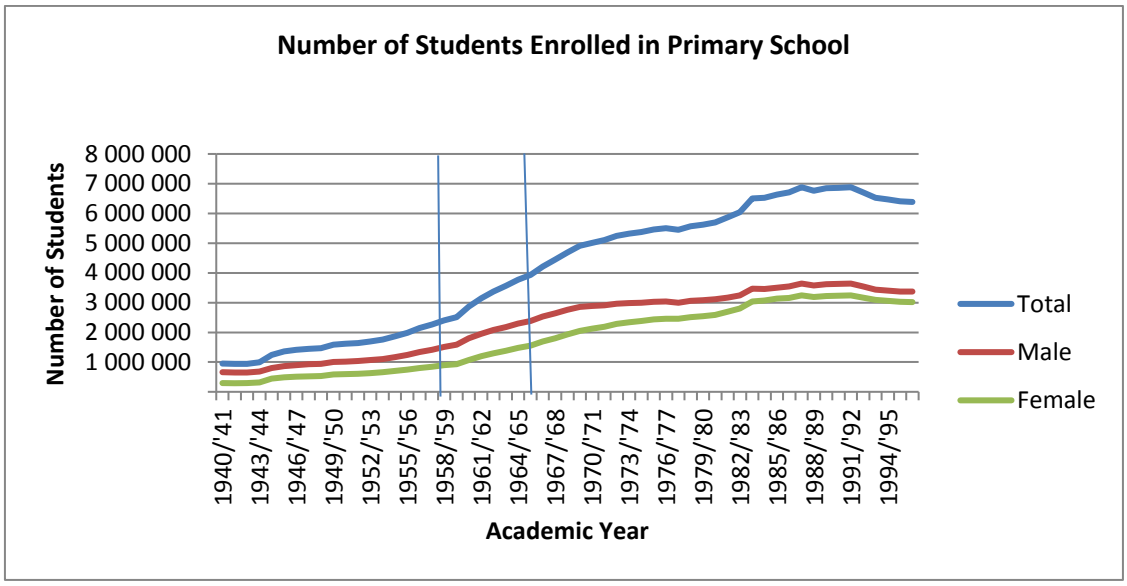

Figure 5. Number of Students in Primary Schools in Turkey over Time

Source: TURKSTAT

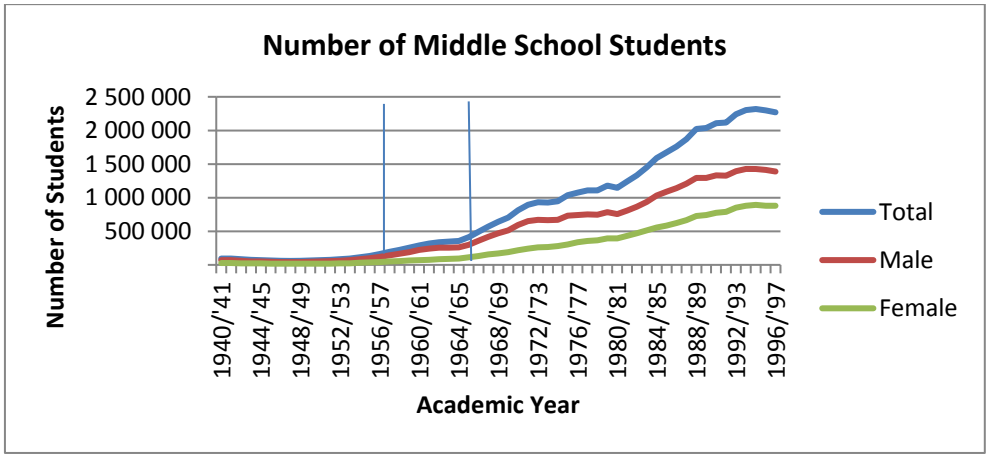

Figure 6. Number of Students in Middle Schools in Turkey over Time

Source: TURKSTAT

Figure 6 shows the number of middle school students in Turkey over time. There is an increasing trend which takes off after the mid 1950's and becomes steeper after the educational expansion. In the 1959-1960 academic year, before the educational expansion the number of male students in middle schools is around 191 thousand and female students is 64 thousand. In the 1965-1966 academic year, five years after the educational expansion these numbers rise to about 300 thousand for males and 113 thousand for females. These imply a 57 per cent increase for males and 76 per cent increase for females. We note that the education reforms benefit the females more than males.

The slight decline in the number of middle school students in the early 1980s may be due to the terrorist activities and the military coup of 1980.

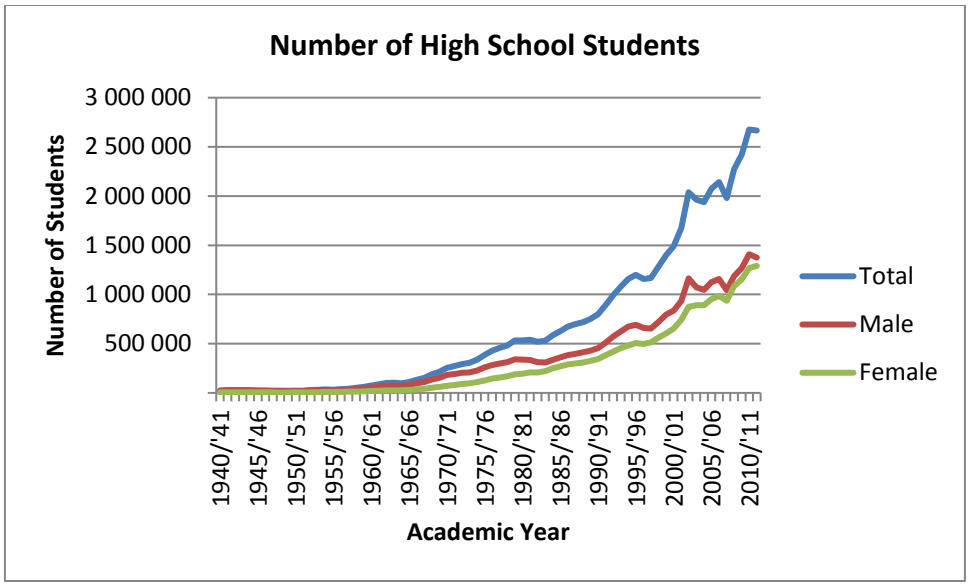

Figure 7. Number of Students in High Schools in Turkey over Time

Source: TURKSTAT

Although the educational reforms of the early 1960s are relevant for primary and middle schools they have spillover effects on high schools. Figure 7 shows that the number of high school students over time. This number is around only 4500 before 1960s and increases gradually afterwards. The number for females is even lower. But the male-female gap in the number of high school students gets narrower over time.

One of the important objectives of the early 1960s education reforms was to increase the number of primary school teachers. Figure 8 shows the number of primary school teachers which becomes steeper after the educational expansion. For instance, the number of primary school teachers increase from 54 thousand to 89 thousand between 1959 and 1965. This implies a 65 per cent increase in 6 years' time. The educational reforms in the 1960s also aimed to increase the number of middle school teachers by implementing a law that high school graduates may serve as middle school teachers after completing a course.

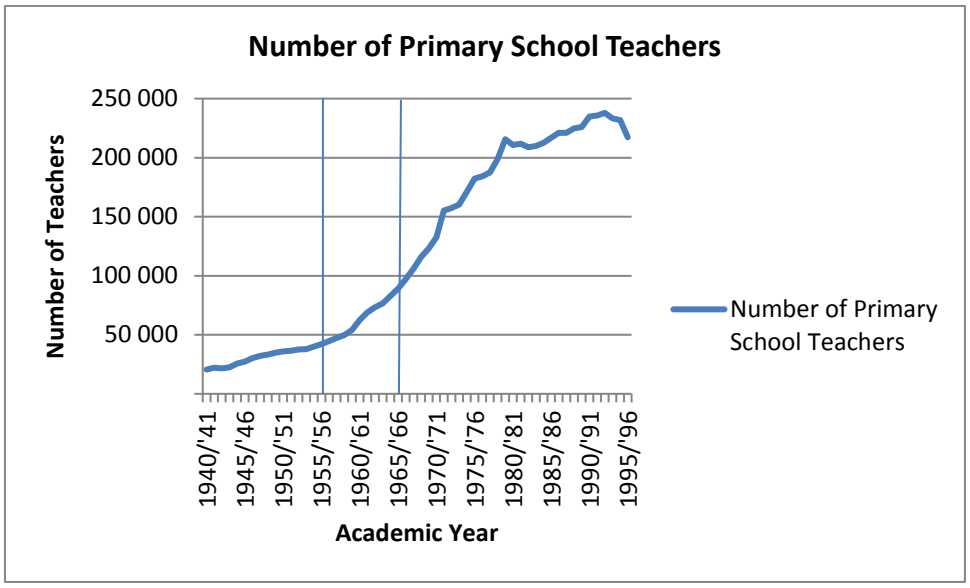

Figure 8. Number of Primary School Teachers

Source: TURKSTAT

Figure 9 shows the number of middle school teachers over time. In the 1959-1960 academic year the number of middle school teachers was about 11 thousand and increased to 13.3 thousand in the 1961-1962 academic year implying a 21 per cent increase in two years' time. Therefore we can confidently say that educational reforms of the early 1960's were successful in increasing the number of primary school teachers as well as the number of middle school teachers in a short period of time.

Figure 10 shows the number of high school teachers over time. There is a spillover effect in number of high school teachers after the educational reforms of early the 1960's. The increasing trend in the number of high school teachers that started in 1959 becomes more apparent in the early 1970s, 10 years after the educational expansion.

Next, we examine the numbers of primary, middle and high schools over time respectively in Figures 11, 12 and 13.

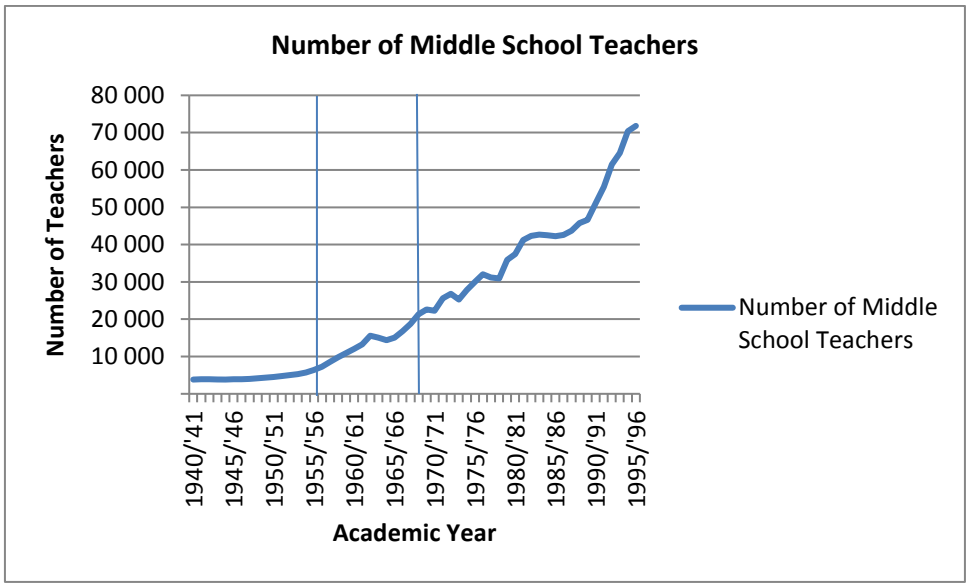

Figure 9. Number of Middle School Teachers

Source: TURKSTAT

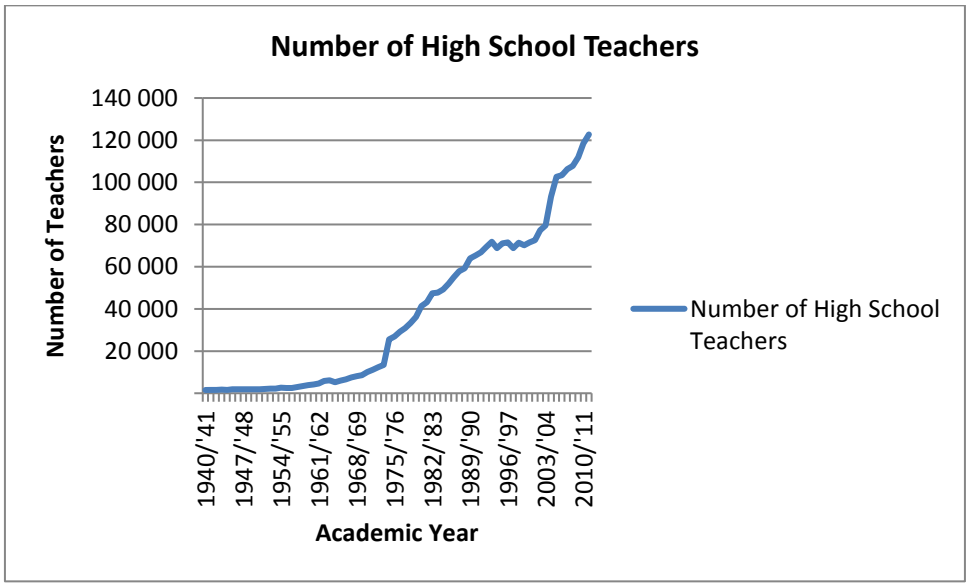

Figure 10. Number of High School Teachers

Source: TURKSTAT

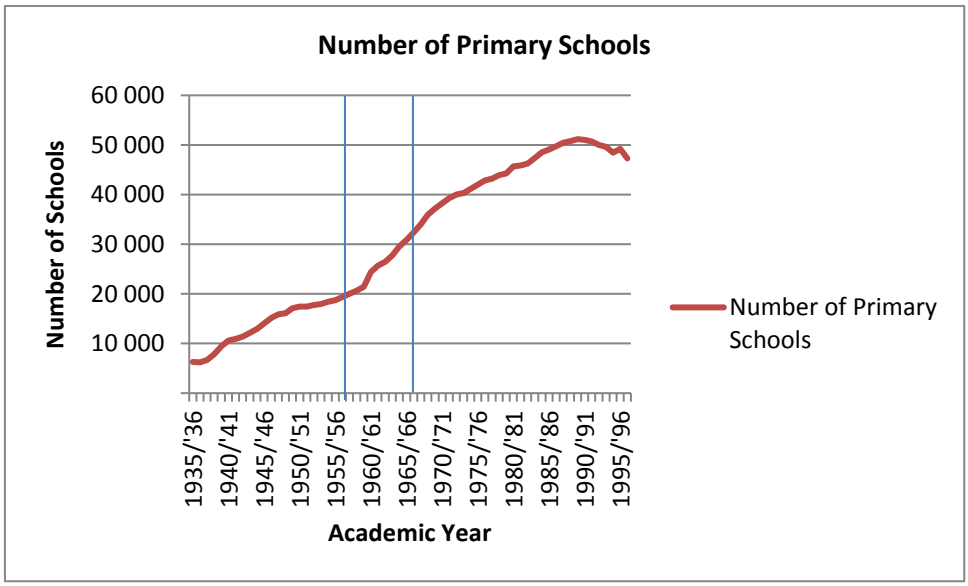

Figure 11. Number of Primary Schools in Turkey over Time

Source: TURKSTAT

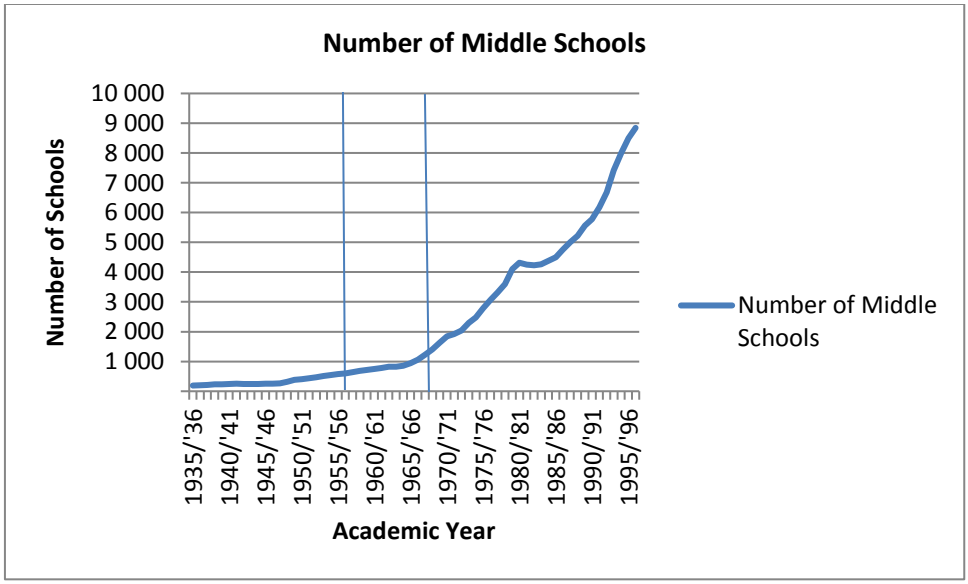

Figure 12. Number of Middle Schools in Turkey over Time

Source: TURKSTAT

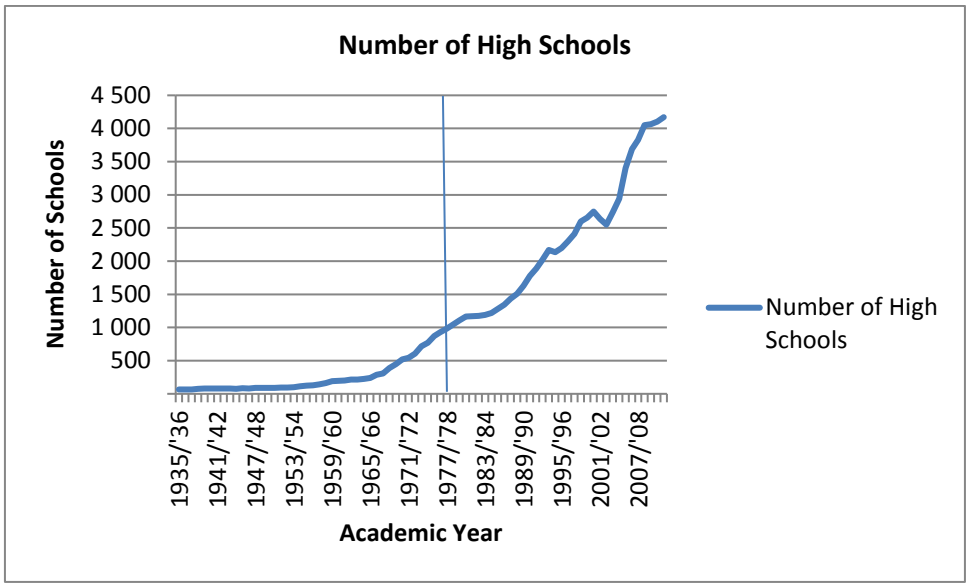

Figure 13. Number of High Schools in Turkey over Time

Source: TURKSTAT

The number of primary schools increased from 21.4 thousand in the 1959-1960 academic year to 25.7 thousand in the 1961-1962 academic year which implies around 20 per cent increase in the number of primary schools in one year. The number of middle schools was only 715 in 1959-1960 academic year and it increased to 1405 in the 1968-1969 academic year, 7 years after the educational reforms. This implies a nearly 100 per cent increase in number of middle schools. There is also an increasing trend in the number of high schools since the early 1960s. The increase becomes steeper after the 1970s, 10 years after the educational expansion[8].

In the light of the above discussion, we assume that individuals who were born in or after 1952 are affected by the educational reforms of the early the 1960s assuming that school starting age is 6 in Turkey. The individuals who are 9 years old in September 1961 are assumed to be affected by the educational expansion.

[8] More information and pictures on the education reforms in early the 1960s can be found in Karaoğlan (2015).

3.2 Methodology

We estimate an IV-probit model for the health behaviors and Two Stage Least Squares (2SLS) for the BMI in order to investigate the causal link between the individual's years of schooling and health behaviors and the BMI. The two equation model is written as:

$$E_i = \delta + X_i\ \alpha_1 + \alpha_2 R61_i + trend\ controls + \varepsilon_i \qquad (1)$$

$$H_i = \alpha + \beta_1 \hat{E}_i + Z_i\beta_2 + trend\ controls + u_i \qquad (2)$$

Where the vector X includes individual's gender, age, and the rural/urban region of location. In the IV estimation setting we include only purely exogenous covariates as control variables in order to see the impact of years of schooling on different health behaviors. In addition, since our analysis covers a long period of time we control for birth year trends and their higher powers. Gender is defined as a dummy variable which is equal to 1 if the individual is male, 0 if female. H indicates the dummy variable (continuous variable for the BMI) for the relevant health behavior. In each case, 1 indicates a smoker, drinker, exerciser, fruit and vegetable consumer and 0 indicates otherwise. R61 is the instrument for individual's years of schooling, which is equal to 1 if the individual was born in 1952 or later. Thus cohorts born in 1952 or later were exposed to the educational expansion while those born before 1952 did not benefit from the educational expansion of the early 1960s. E shows the individual's completed years of schooling. In the first stage Equation (1) is estimated by OLS and in the second stage a probit estimation is applied to the Equation (2). Hence is the name IV-probit estimation. The major educational expansion that we use as the instrument includes an increase in the compulsory schooling from three to five years in the villages. Unfortunately, we do not know whether an individual lived in a village or not when he/she attended to the primary school. Therefore, we calculate the average years of schooling by using the Ministry of Education statistics on the number of graduates from rural and urban areas. [9]. The average years of schooling for primary school graduates before 1952 is computed as a weighted average of three and five years of schooling where the weights are the number of rural and urban primary school graduates respectively.

[9] Rural areas include villages and districts and urban areas include cities and towns.

For the primary school graduates who complete school in 1952 or later, the years of schooling is equal to 5. Therefore, policy dummy "R61"which represents the educational expansion is equal to 1 if the individual was born in or after 1952, 0 otherwise. $\hat{E}$ Includes the predicted values of the education variable estimated from the first stage regression. In our analysis, the main parameter of interest is β_1 which shows the causal effect of one year increase in years of schooling on various health behaviors and BMI. All standard errors are clustered by year of birth.

4. Estimation Results

A previous study, Tansel and Karaoğlan (2014) using the same data set as this study report on the association between education and health behaviors and BMI with simple probit and OLS estimations. The results of these estimations are reported in the first part of Table 3 where we show only the coefficient of years of schooling for the purposes of comparison with the IV estimation results. The simple probit results indicate that the probabilities of smoking, alcohol consumption, fruit and vegetable consumption and exercising are all positively and significantly related to education. For BMI, OLS results show that higher level of education is related to normal ranges of BMI. Tansel and Karaoğlan also report on the association between different levels of education and health behaviors and BMI (not shown). For instance the probability of smoking decreases as level of education increases. Although still positive the probability of smoking is smaller for a university graduate than for a middle school graduate.

In this section we report the IV estimation results which indicate the causal nature of the relationship between education and health behaviors considered and the BMI. Table 3 presents both the first and the second stage results of the IV estimation. Bound et al. (2005) suggest that F-statistics of the first stage estimation is good indicator of the quality of the instrument. The F-statistics of the first stage regression for each case show that the policy dummy R61 representing the educational expansion of the early 1960's positively and significantly affect the individual's years of schooling. Educational expansion is a strong predictor of the years of schooling. The educational expansion leads to 0.81 years increase in individual's years of schooling when the endogenous health behavior is smoking and 0.82 when the endogenous health behaviors considered are alcohol consumption and fruit and vegetable consumption and it leads to 0.84 years increase in years of schooling when the endogenous health variables are exercising and BMI.

Table 3 also reports the second stage results from IV-probit estimation (2SLS for BMI). These results suggest that additional years of schooling does not have significant impact on probability of smoking and exercising unlike in the case simple probit estimation. However, it leads to an increase in the probability of alcohol consumption and fruit and vegetable consumption. Further, an increase in the years of schooling leads to an increase in the individual's BMI level.

Contrary to our result of no impact of education on smoking, in a previous study Tansel (1993) finds a negative effect of education on smoking in Turkey which is larger than the effect of an increase in the cigarette prices. Our result also contradicts with the previous studies in developed countries. Both de Walque (2007) and Grimard and Parent (2007) find that as individual's education level increases, probability of smoking decreases in the USA.

We also find that years of schooling increases the probability of alcohol consumption. This is not a surprising result for our sample since we consider both heavy drinkers and occasional drinkers as regular alcohol consumers. The number of heavy drinkers is very small in our sample. In our sample 24 per cent of occasional drinkers are high school graduates and 29.22 per cent of occasional drinkers have a university degree or above. The higher educated people are more likely to be in social network activities and more likely to be social drinkers, compared to less-educated individuals. On the contrary, Cutler and Llearas Muney (2010) find that alcohol consumption is negatively related to years of schooling where they consider only heavy drinkers as alcohol consumers.

We find that education increases the probability of fruit and vegetable consumption. This may indicate that individuals with higher levels of education are more aware of the benefits of fruit and vegetable consumption than individuals with less education. Finally, we find that additional years of schooling leads to higher BMI levels. This result contradicts with those in the developed countries such as Arendt (2005), Kemptner et al. (2011), Brunello et al. (2013) and Webbink et al. (2010) who all find that higher education levels lead to lower ranges of BMI. However our results are in conformity with those of Cesur et al. (2014) who focus on a younger age group in Turkey.

For the rest of the covariates the findings are as follows: Males tend to smoke more, consume more alcohol and exercise more than females. Fruit and vegetable consumption do not significantly differ by gender. Further, the results also suggest that females tend to have higher BMI levels relative to

males. Age does not significantly affect the probability of smoking. However, the BMI level increases with age and this relationship is concave. Probability of alcohol consumption and probability of exercising also increases with age in a concave relationship. In contrast, older individuals are less likely to consume fruit and vegetable. Finally, the individuals who live in urban areas tend to smoke more than the individuals living in rural areas but there is no significant association between region and the probabilities of other health behaviors. Finally, we performed several robustness checks on our results. We have carried out estimations by including marital status, labor market status variables and household income as a group or jointly. Our results did not change qualitatively. These estimates are not reported to save space but are available upon request.

5. Conclusion

The causal nature of the relationship between education and health is a popular topic in the health economics literature. Recent studies focus on the endogeneity of education in this relationship. In this paper we examine the relationship between several health behaviors and a health outcome on the one hand, and education on the other considering the endogeneity of education. We implement an IV estimation. We use the educational expansion of the early 1960s as the source of exogenous variation in education. The results show that exposure to the educational expansion has a statistically significantly positive impact on years of schooling.

For smoking, alcohol consumption, fruit and vegetable consumption and exercising we use an IV-probit estimation and for BMI we estimate a 2SLS estimation. We use the educational expansion of the early 1960s as the instrument for education. We find that an increase in years of schooling triggered by the educational expansion does not significantly affect the probability of smoking as well as exercising but, increases probability of alcohol consumption and consumption of fruits and vegetables. Higher years of schooling lead to higher BMI levels.

These results highlight that in Turkey which is a developing country, the effects of education on smoking, alcohol consumption and BMI are somewhat different than found in the developed countries. The studies on developed countries generally imply that smoking and alcohol consumption decreases with education level and individuals with higher education levels have normal ranges of BMI (For instance, see de Walque (2007), Gruber and Frakes (2006), Cutler and

Lleras-Muney (2010), Kemptner et al. (2011), Webbink et al. (2010)). We find in Turkey that increasing levels of education may not promote healthy life style in terms of smoking and exercise. This important finding suggests that education may not be an effective policy tool to curtail smoking and that government policy should focus on other possible ways of combatting smoking. We also find in Turkey that education improves fruit and vegetable consumption which may help people to live healthy. The finding that education increases BMI suggests that policy instruments other than education must be used to fight the recent increase in the prevalence of obesity in Turkey. Thus, education may not be a suitable policy instrument to fight smoking and obesity in Turkey. The findings of this paper are expected to give clues to the policy makers about the health behavior of the population in Turkey.

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Table 1. Descriptive Statistics for Health Behaviors (Smoking, Alcohol Consumption, Fruit and Vegetable Consumption, Exercise)

Smoking			
Variable	**Smoker**	**Non-Smoker**	**Total**
Male*	0.43 (0.49)	0.57 (0.49)	1.00
Female*	0.17 (0.38)	0.83 (0.38)	1.00
Years of Schooling	7.78 (4.00)	6.21 (4.58)	6.66 (4.48)
Age (Years)	43.32 (12.04)	49.51 (15.47)	47.74 (14.83)
Urban*	0.31 (0.46)	0.69 (0.46)	1.00
Rural*	0.22 (0.42)	0.78 (0.42)	1.00
Number of Observations	9915	24801	34716
Alcohol Consumption			
Variable	**Alcohol Consumer**	**Non-Alcohol Consumer**	**Total**
Male*	0.20 (0.40)	0.80 (0.40)	1.00
Female*	0.04 (0.21)	0.96 (0.21)	1.00
Years of Schooling	9.63 (4.16)	6.14 (4.33)	6.54 (4.45)
Age (Years)	43.52 (12.00)	47.91 (15.06)	47.41 (14.81)
Urban*	0.13 (0.34)	0.87 (0.34)	1.00
Rural*	0.08 (0.27)	0.92 (0.27)	1.00
Number of Observations	5333	41160	46493
Fruit and Vegetable (FV) Consumption			
Variable	**Consume FV Regularly**	**Not Consume FV**	**Total**
Male*	0.59 (0.49)	0.41 (0.49)	1.00
Female*	0.57 (0.49)	0.43 (0.49)	1.00
Years of Schooling	6.85 (4.46)	6.11 (4.39)	6.54 (4.45)
Age (Years)	46.72 (14.68)	48.34 (14.93)	47.40 (14.81)
Urban*	0.60 (0.49)	0.40 (0.49)	1.00
Rural*	0.54 (0.50)	0.46 (0.50)	1.00
Number of Observations	26938	19516	46454
Exercise			
Variable	**Exercise Regularly**	**Not Exercise Regularly**	**Total**

Male*	0.71 (0.45)	0.29 (0.45)	1.00
Female*	0.63 (0.48)	0.37 (0.48)	1.00
Years of Schooling	7.00 (4.36)	5.78 (4.48)	6.60 (4.44)
Age (Years)	46.21 (13.84)	50.07 (16.33)	47.50 (14.83)
Urban*	0.67 (0.47)	0.33 (0.47)	1.00
Rural*	0.66 (0.47)	0.34 (0.47)	1.00
Number of Observations	29068	14537	43605

Source: 2008, 2010 and 2012 Turkish Health Survey except for smoking which is based only on 2010 and 2012..

Notes: (1)*indicates a dummy variable

(2) The numbers in the parenthesis are standard deviations

Table 2. Descriptive Statistics for BMI

Variable	Underweight (BMI<18.5)	Normal Weight (18.5<=BMI<=24.99)	Overweight (25<=BMI<30)	Obese (BMI>=30)	Total
Male*	0.01	0.37	0.45	0.17	1.00
	(0.10)	(0.48)	(0.50)	(0.38)	
Female*	0.02	0.38	0.34	0.26	1.00
	(0.15)	(0.48)	(0.47)	(0.44)	
Years of Schooling	7.73	7.56	6.99	5.81	6.96
	(4.82)	(4.54)	(4.30)	(4.02)	(4.39)
Age (Years)	42.57	43.77	47.47	50.51	46.65
	(16.79)	(14.96)	(13.94)	(13.08)	(14.44)
Urban*	0.02	0.37	0.39	0.22	1.00
	(0.13)	(0.48)	(0.49)	(0.41)	
Rural*	0.02	0.37	0.39	0.22	1.00
	(0.14)	(0.48)	(0.48)	(0.41)	
Total Observations	732	15412	16023	8907	41074

Source: 2008, 2010 and 2012 Turkish Health Survey

Notes : (1)*indicates a dummy variable

(2) The numbers in the parenthesis are standard deviations

Table 3. IV-Probit (2SLS for BMI) Estimation Results

Dependent Variable: Years of Schooling	**Smoking**	**Alcohol Consumption**	**Fruit and Vegetable Consumption**	**Exercise**	**BMI**
Probit (OLS for BMI estimation Results)					
	0.003 (0.003)	0.04*** (0.004)	0.02*** (0.001)	0.02*** (0.002)	-0.11*** (0.006)
Assumption: Individuals who were born in or later than 1952 are affected from educational reforms Birth Cohort: 1909-1987 (Individuals who are 25 or older in the pooled sample)					
First Stage Results					
Policy Dummy	0.81*** (0.17)	0.82*** (0.16)	0.82*** (0.16)	0.84*** (0.17)	0.84*** (0.10)
Male	2.04*** (0.07)	2.04*** (0.06)	2.04*** (0.06)	2.01*** (0.06)	1.83*** (0.03)
Age ($x10^{-1}$)	1.70*** (0.71)	2.41*** (1.05)	2.37*** (1.06)	2.67*** (1.12)	1.26*** (0.99)
Age Squared ($x10^{-3}$)	-1.20* (0.67)	-1.48*** (0.48)	-1.49*** (0.48)	-1.48*** (0.47)	-1.47*** (0.39)
Urban	2.24*** (0.04)	2.22*** (0.03)	2.22*** (0.03)	2.20*** (0.03)	2.17*** (0.04)
Trend	0.05 (0.07)	0.04 (0.10)	0.04 (0.10)	0.06 (0.10)	-0.03 (0.10)
Trend Square	-0.00006 (0.001)	-0.0008 (0.001)	0.0008 (0.001)	0.0008 (0.001)	-0.00008 (0.0008)
Trend Cube	0.00001 (0.000007)	0.000007 (0.000006)	0.000007 (0.000006)	0.000006 (0.000006)	0.00001 (0.000005)
Observations	34716	46493	46454	43605	41074
R-squared	0.27	0.27	0.27	0.27	0.24
Endogeneity Test Statistics	2.79 (p-value:0.09)	4.24 (p-value:0.04)	3.11 (p-value:0.07)	2.65 (p-value:0.10)	10.98 (p-value:0.0009)
F-statistics	19.28	25.91	25.96	24.63	21.33
Second Stage Results					
Years of Schooling	-0.02 (0.04)	0.11* (0.06)	0.08** (0.04)	-0.03 (0.03)	0.26* (0.15)
Male	0.87*** (0.08)	0.74*** (0.16)	-0.12 (0.09)	0.29*** (0.07)	-1.12*** (0.35)
Age ($x10^{-1}$)	-0.09 (0.24)	2.93*** (0.44)	-9.49*** (0.53)	4.81*** (0.34)	5.50*** (0.57)
Age Squared ($x10^{-3}$)	-0.38 (0.24)	-0.90*** (0.25)	-0.84*** (0.18)	-0.80*** (0.13)	-3.22*** (0.86)
Urban	0.25*** (0.10)	0.001 (0.15)	-0.01 (0.10)	0.007 (0.07)	-0.38 (0.39)
Trend	-0.14*** (0.03)	0.15*** (0.04)	-1.09*** (0.06)	0.40*** (0.03)	0.11 (0.11)
Trend Square	0.002*** (0.0003)	0.0005 (0.0005)	-0.0001 (0.0003)	-0.0001 (0.0002)	0.001 (0.002)
Trend Cube	-0.00001*** (0.000001)	-0.000001 (0.000003)	0.000007*** (0.000001)	0.000002** (0.000001)	-0.00002**** (0.0000078)

Source: Authors' computations based on 2008, 2010 and 2012 THS except for smoking which is based on only 2010 and 2012.

Note:***, ** and * indicate 1, 5 and 10% levels of significance respectively. Standard errors clustered by birth year are shown in parenthesis.