



**Determinants of Secondhand Smoke Exposure in Turkey:
Findings from the Global Adult Tobacco Survey**

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Abstract

The aim of this paper is to evaluate the relationship between sociodemographic determinants and exposure to secondhand smoke at different places as well as to compare the effects of these determinants for the years 2008 and 2012. Data set comes from 2008 and 2012 releases of Global Adult Tobacco Survey for Turkey. Logit models show that young people are disproportionately affected by passive smoking. In addition, males are more likely to be exposed to secondhand smoke at all places studied except for home. Decomposition analysis implies that (1) differences in the distribution of age and education categories between 2008 and 2012 significantly explain the difference in the secondhand smoke exposure at home between these years and (2) differences in the secondhand smoke exposure at work between 2008 and 2012 can be explained by the differences in the distribution of indoor smoking rules at work.

Keywords: Secondhand smoke exposure; Blinder-Oaxaca decomposition; smoke-free policy; nonlinear regression models; GATS.

JEL Codes: I10; C25.

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1. Introduction

Smoking affects not only active smokers but also those who are exposed to secondhand smoke (SHS). SHS also known as passive smoking or environmental tobacco smoke has received great attention in recent years and has been found to be as harmful as active smoking. Consistent adverse health effects caused by SHS exposure have been well documented by a large medical and epidemiological literature³. It has been reported that long-term SHS exposure increases the risk of lung cancer and the risk of acute coronary heart disease, as well as other adverse health outcomes such as adverse birth outcomes in the adult population. Passive smoking particularly causes adverse effects on the health of young children and babies such as reduced lung-function growth, asthma, bronchitis, and sudden infant death syndrome⁴. In addition, smoking initiation risk increases when non-smoking adolescents are exposed to SHS (Wang et al., 2011).

Exposure to SHS may occur at public places such as government buildings, shops, hospitality venues (restaurant, cafe, coffee house and tea house, bar, night club, etc.), health care facilities, and public transportation, as well as private areas such as homes and private cars. Globally, about one third of adults are regularly exposed to SHS (World Health Organization (WHO), 2009). The implementation of comprehensive smoke-free environments to protect people from SHS has been identified as a priority by the WHO Framework Convention on Tobacco Control (FCTC) stating that all countries recognize that exposure to SHS causes death, disease and disability while all parties are obligated to adopt and implement effective measures, in order to provide protection from SHS in indoor workplaces, public transport, indoor public places and other public places (WHO, 2003). In Turkey, tobacco control and protection from secondhand smoke exposure came into force in 1996 by the first tobacco control law (No. 4207). The law banned smoking in most indoor places, including health, education and culture and sports facilities and in public transport (excluding commercial taxis). Before this first tobacco control law passed in 1996, since there were no restrictions on tobacco use, people could smoke anywhere, including on private premises and in all public places, and exposure to SHS was very

³ See among Windham et al. (2000), Otsuka et al. (2001), Whincup et al. (2004).

⁴ See Kriz et al. (2000), Lam et al. (2001) and Mannino et al. (2001).

high⁵. Although a smoking ban had been introduced in 1996, SHS exposure rates were still high (see GATS, 2010). After more than 10 years of implementation, the law was amended in 2008, rendering all indoor public places smoke-free excluding the hospitality sector in the first phase and in the second phase, including hospitality venues.

A large strand of literature on SHS exposure relies on the effects of passive smoking among women, especially pregnant women and children⁶. Yet another strand focuses on the determinants of SHS exposure and on the effectiveness of related measures for reducing smoking exposure⁷. Studies of exposure to SHS are, however, of relatively recent interest in Turkey. There are several studies conducted among different risk groups such as pregnant women and children to show the effects of passive smoking⁸. There are also some studies done to evaluate the effects of smoke-free implementation without no particular interest to passive smoking⁹.

The aim of this study is to contribute to this relatively narrow interest on the SHS exposure in the Turkish health economics literature. Our research objective is to investigate the relationship between sociodemographic determinants and exposure to SHS and to compare the effects of these determinants between the years 2008 and 2012. This study is the first using the Global Adult Tobacco Survey (GATS) data at these two important years to conduct such an analysis. We first apply logit models to analyze the main factors associated with passive smoking. Next, we implement the Blinder-Oaxaca decomposition method extended for nonlinear regression models. Section 2 introduces the data. Section 3 presents the methodology. Results are shown in section 4 and section 5 concludes.

2. Data

The data set for this paper comes from the 2008 and 2012 releases of GATS conducted by the Turkish Statistical Institute (TurkStat) (Turkish Statistical Institute 2008; Turkish Statistical Institute 2012). 9030 individuals who are at least 15 years old in 2008 and 9851 individuals who are at least 15 years old in 2012 were interviewed about their tobacco products' uses, SHS exposure at different places, their knowledge about the negative health effects of smoking and

⁵ See among Bilir and Özcebe (2012), Bilir et al. (2009), Bilir et al. (2012), GATS (2010, 2014).

⁶ See among Johnson et al. (2015), Hajizadeh and Nandi (2016), Jain (2016).

⁷ See among Moore et al. (2009), Verdonk-Kleinjan et al. (2009), Fischer and Kraemer (2016).

⁸ See Bahçeciler (1993), Boyaci et al. (2006), Karcaaltincaba et al. (2009).

⁹ See Arıkan et al. (2011), Özcebe (2011), Caman et al. (2013).

exposure to SHS and their sociodemographic characteristics. Dependent variables are being exposed to SHS at home, at work, at a public building including healthcare facilities, at restaurants and at public transportation units. Exposure to SHS at home variable takes 1 if an individual is exposed to smoking at home on a daily, weekly, monthly or less than monthly basis and 0 otherwise. Exposure to SHS at work variable gets 1 if a working individual answers the question “During the past 30 days did anyone smoked in indoor areas where you work?” as yes and 0 if the answer is no. SHS exposure at public buildings, restaurants and public transportation variables take 1 if the corresponding questions “Did anyone smoked in indoor areas of public buildings/healthcare facilities/restaurants that an individual visited in the past 30 days and in public transportation that an individual used in the past 30 days?” answered as yes and 0 otherwise.

Explanatory variables used in estimations are gender, age groups which an individual belongs to, the highest completed education level of the individual, employment status, proxy variable for household income, urban/rural location of the individual, knowledge about the negative health consequences of exposure to SHS and presence of indoor smoking rules at the work place of an individual. Four age groups: age between 15 and 24 years, 25 and 44 years, 45 and 64 years and at least 65 years are available in the data. Categories of the education variable are no education degree (including two missing cases of unstated education degree), elementary school graduation, primary or secondary (or equivalent) school graduation, high school and equivalent degree and at least college education. Employment status is a binary variable which takes one if the individual is employed and 0 otherwise (including cases of undetermined employment status). If an individual knows negative health effects of SHS exposure, health effects variable gets 1 and 0 otherwise. Similarly, if an individual lives in an urban area, urban variable takes value of 1 and 0 otherwise. Three categories are available for the indoor smoking rules at a work place: (1) smoking not allowed in indoor areas, (2) no smoking policy at work and (3) smoking is allowed anywhere or at some specific places at work.

This survey does not provide information about income (individual and household) but asks about 10 assets that a household or the individual living in that household may have: electricity, flush toilet, home phone, cell phone, television, radio, refrigerator, washing machine, car and motorcycle. Factor scores of the first component extracted from the principal component analysis on these 10 items are obtained and divided into five quintiles. First (last) quantile refers to the

lowest (highest) income group. Missing observations are imputed as 1 if the average of the binary variable is at least 0.5 and 0 otherwise. 3.4% of total observations in 2008 and 3.3% of the total observations in 2012 are imputed. Summary statistics for the variables are shown in Table 1 and Table 2. The analysis in this paper is based on the exposure to SHS for nonsmokers. An individual is called nonsmoker if he/she does not smoke daily or occasionally (i.e. less than daily). There are 6329 nonsmokers in 2008 and 7439 in 2012. Number of available observations for each dependent variable is available in Table 2. Exposure to SHS between 2008 and 2012 decreases by 26.6, 18.6, 36.6, 2.8 and 5.9 percentage points at home, at work, at restaurants, at public buildings and at public transportation respectively.

3. Methodology

First, logit models are estimated for each dependent variable. Next, the Blinder-Oaxaca approach (Blinder 1973; Oaxaca 1973) extended for nonlinear regression models is implemented to decompose SHS exposure at home and at work between 2008 and 2012 into its components.¹⁰ Two problems arise in a detailed decomposition analysis: path-dependency and identification. Path-dependency problem means that the contribution of each explanatory variable to the difference depends on the order in which the explanatory variable enters into the decomposition analysis and Yun (2004) method is used to overcome this issue. Identification problem means that the detailed decomposition results depend on the choice of the base category for the categorical variables used and as suggested by Yun (2005) normalized effects for the categorical variables are reported.

The probability of being exposed to SHS is defined as below:

$$Y = F(Z\alpha) = \frac{e^{Z\alpha}}{1 + e^{Z\alpha}} \quad (1)$$

where F is the cumulative logistic distribution function, Y denotes the binary dependent variable (SHS) which is an $N \times 1$ vector, Z refers to an $N \times M$ matrix of explanatory variables and a $M \times 1$ vector of regression coefficients is denoted by α .

¹⁰ Decompositions for the other dependent variables have insignificant explained and/or unexplained parts so their results are not reported.

Table 1: Summary statistics I

| Variables | 2008 | 2012 |
|-----------------------------|---------------|---------------|
| Male | 0.354 (0.478) | 0.361 (0.480) |
| Age 15-24 | 0.147 (0.354) | 0.139 (0.346) |
| Age 25-44 | 0.390 (0.488) | 0.351 (0.477) |
| Age 45-64 | 0.309 (0.462) | 0.309 (0.462) |
| Age 65+ | 0.155 (0.362) | 0.201 (0.401) |
| No education | 0.248 (0.432) | 0.228 (0.420) |
| Elementary education | 0.441 (0.496) | 0.386 (0.487) |
| Primary/secondary education | 0.117 (0.322) | 0.143 (0.350) |
| High school education | 0.121 (0.326) | 0.136 (0.343) |
| At least college education | 0.074 (0.261) | 0.106 (0.308) |
| Employed | 0.277 (0.447) | 0.282 (0.450) |
| Income group1 | 0.218 (0.413) | 0.345 (0.475) |
| Income group2 | 0.211 (0.408) | 0.083 (0.276) |
| Income group3 | 0.178 (0.382) | 0.189 (0.392) |
| Income group4 | 0.207 (0.405) | 0.246 (0.431) |
| Income group5 | 0.186 (0.390) | 0.136 (0.343) |
| Urban | 0.484 (0.500) | 0.473 (0.499) |
| Health knowledge | 0.972 (0.165) | 0.977 (0.150) |
| Observations | 6306 | 7428 |

Note: Observations refers to the largest group of individuals included in estimations. Standard deviations are in parentheses.

The difference between the average probability of SHS in 2008 (\bar{Y}^{2008}) and in 2012 (\bar{Y}^{2012}) is defined as follows:

$$\bar{Y}^{2008} - \bar{Y}^{2012} = \frac{1}{N^{2008}} \sum_{i=1}^{N^{2008}} F(Z_i^{2008} \hat{\alpha}^{2008}) - \frac{1}{N^{2012}} \sum_{i=1}^{N^{2012}} F(Z_i^{2012} \hat{\alpha}^{2012}) \quad (2)$$

where \bar{Y} refers to the average probability of exposure and N denotes the sample size for the relevant years. Equation (2) can be rewritten as below:

$$\bar{Y}^{2008} - \bar{Y}^{2012} = \underbrace{\left[\frac{1}{N^{2008}} \sum_{i=1}^{N^{2008}} F(Z_i^{2008} \hat{\alpha}^{2008}) - \frac{1}{N^{2012}} \sum_{i=1}^{N^{2012}} F(Z_i^{2012} \hat{\alpha}^{2008}) \right]}_A + \underbrace{\left[\frac{1}{N^{2012}} \sum_{i=1}^{N^{2012}} F(Z_i^{2012} \hat{\alpha}^{2008}) - \frac{1}{N^{2012}} \sum_{i=1}^{N^{2012}} F(Z_i^{2012} \hat{\alpha}^{2012}) \right]}_B \quad (3)$$

The representation in the first square bracket *A* is called explained part which shows the part of the SHS exposure difference between years due to the differences in *Z*'s while keeping the regression coefficients fixed at 2008 levels. The second square bracket *B* represents the unexplained part which reflects the part of the exposure difference between years that are attributable to the differences in regression coefficients while keeping the values of *Z*'s at 2012 values.

Table 2: Summary statistics II

| Variables | # Observation | 2008 | # Observation | 2012 |
|-----------|---------------|---------------|---------------|---------------|
| 1 | 6226 | 0.576 (0.494) | 7408 | 0.310 (0.462) |
| 2 | 1331 | 0.320 (0.467) | 1544 | 0.134 (0.341) |
| 3 | 1711 | 0.476 (0.500) | 2222 | 0.116 (0.320) |
| 4 | 4106 | 0.082 (0.274) | 5187 | 0.054 (0.226) |
| 5 | 3941 | 0.148 (0.355) | 4774 | 0.089 (0.285) |
| 6 | 1327 | 0.645 (0.479) | 1542 | 0.853 (0.354) |
| 7 | 1327 | 0.123 (0.328) | 1542 | 0.024 (0.153) |
| 8 | 1327 | 0.232 (0.422) | 1542 | 0.123 (0.328) |

Note 1: Observations are; 1. Passive smoking at home, 2. Passive smoking at work, 3. Passive smoking at a restaurant, 4. Passive smoking at a public building, 5. Passive smoking in a public transportation, 6. Not allowed in any indoor places at work, 7. No indoor smoking policy at work, 8. Allowed anywhere or only in some indoor places at work.

Note 2: Standard deviations are given in the parentheses.

Alternatively, regression coefficients can be fixed at 2012 levels in the explained part while 2008 values of the explanatory variables can be used in the unexplained part. If there is no specific reason to use one set of regression coefficients, we can also use coefficients from a pooled regression as suggested by Oaxaca and Ransom (1994). Nevertheless, this method may result in an improper transfer of some of the unexplained part of the difference to the explained part and so a group indicator dummy can be added to the pooled regression (Jann 2008). In order to obtain the detailed decomposition results i.e. contribution of each explanatory variable in the

explained and unexplained parts of the difference, we need to multiply each part shown in equation (3) with the appropriate weights summed over explanatory variables. The weight associated with the m th variable to be used in the explained part is shown in (4) and the corresponding weight used in the unexplained part is shown in (5).

$$H_{\Delta Z_m} = \frac{\hat{\alpha}_m^{2008} (\bar{Z}_m^{2008} - \bar{Z}_m^{2012})}{\sum_{m=1}^M \hat{\alpha}_m^{2008} (\bar{Z}_m^{2008} - \bar{Z}_m^{2012})} \quad (4)$$

$$H_{\Delta \alpha_m} = \frac{\bar{Z}_m^{2012} (\hat{\alpha}_m^{2008} - \hat{\alpha}_m^{2012})}{\sum_{m=1}^M \bar{Z}_m^{2012} (\hat{\alpha}_m^{2008} - \hat{\alpha}_m^{2012})} \quad (5)$$

where $\sum_{m=1}^M H_{\Delta Z_m} = \sum_{m=1}^M H_{\Delta \alpha_m} = 1$.

Finally, the detailed decomposition of equation (3) can be written as below:

$$\bar{Y}^{2008} - \bar{Y}^{2012} = \sum_{m=1}^M H_{\Delta Z_m} A + \sum_{m=1}^M H_{\Delta \alpha_m} B = \sum_{m=1}^M A_m + \sum_{m=1}^M B_m \quad (6)$$

4. Results

4.1 Logit Models

Average marginal effects are shown in Table 3 and Table 4. Nonsmoker males are 7.6 and 5.1 percentage points less likely to be exposed to SHS at home in 2008 and in 2012 respectively (Table 3). All age groups are less likely to experience passive smoking at home compared to the age group 15-24 in both years with the largest impact occurring for nonsmokers who are at least 65 years old. From 2008 to 2012, the magnitudes of the coefficients of almost all age groups get smaller. Nonsmokers with no education degree and elementary education are

significantly more likely to be exposed to SHS at home compared to high school graduates for both years. On the other hand, for the nonsmokers with at least college degree are less likely to be exposed even though the effect is not statistically significant. Nonsmokers who have knowledge about the detrimental health effects of SHS exposure are 11 percentage points less likely to be exposed at home in 2008 while the impact of this variable becomes insignificant in 2012. Although in 2008 nonsmokers living in an urban area are 4 percentage points less likely to be exposed to SHS, its impact in 2012 becomes positive indicating that over the four years nonsmokers in urban area are more likely to be exposed to SHS at home.

Table 3: Logit models I (Average Marginal Effects)

| | SHS exposure at home | | SHS exposure at work | | SHS exposure at work | |
|--|----------------------|----------------------|----------------------|---------------------|----------------------|---------------------|
| | 2008 | 2012 | 2008 | 2012 | 2008 | 2012 |
| Male | -0.076*** (0.016) | -0.051*** (0.013) | 0.116*** (0.028) | 0.051*** (0.018) | 0.082*** (0.024) | 0.009 (0.017) |
| Age 25-44 | -0.145*** (0.019) | -0.113*** (0.022) | -0.011 (0.041) | -0.036 (0.035) | 0.017 (0.033) | -0.011 (0.027) |
| Age 45-64 | -0.216*** (0.020) | -0.215*** (0.023) | -0.032 (0.046) | -0.039 (0.038) | -0.011 (0.037) | -0.007 (0.030) |
| Age 65+ | -0.336*** (0.024) | -0.282*** (0.023) | -0.071 (0.084) | -0.103** (0.051) | -0.045 (0.067) | -0.051 (0.051) |
| No education | 0.101*** (0.025) | 0.101*** (0.021) | 0.028 (0.069) | 0.195** (0.088) | -0.075 (0.048) | 0.035 (0.045) |
| Elementary education | 0.062*** (0.022) | 0.057*** (0.017) | 0.093** (0.036) | 0.096*** (0.026) | 0.029 (0.030) | 0.058*** (0.021) |
| Primary/ secondary education | 0.007 (0.027) | 0.008 (0.019) | 0.032 (0.044) | 0.101*** (0.032) | 0.041 (0.037) | 0.073*** (0.026) |
| At least college education | -0.047 (0.029) | -0.022 (0.020) | -0.070** (0.035) | 0.003 (0.020) | -0.006 (0.032) | 0.021 (0.019) |
| Employed | 0.006 (0.017) | -0.012 (0.014) | | | | |
| Income group2 | 0.000 (0.020) | -0.008 (0.020) | -0.043 (0.051) | 0.017 (0.033) | -0.002 (0.039) | 0.008 (0.028) |
| Income group3 | 0.001 (0.021) | -0.006 (0.016) | -0.038 (0.051) | 0.019 (0.024) | -0.003 (0.039) | 0.025 (0.022) |
| Income group4 | 0.007 (0.021) | -0.026* (0.015) | 0.023 (0.051) | 0.022 (0.023) | 0.067* (0.039) | 0.019 (0.020) |
| Income group5 | -0.017 (0.022) | -0.021 (0.018) | 0.050 (0.050) | 0.055** (0.028) | 0.087** (0.039) | 0.021 (0.022) |
| Urban | -0.044*** (0.013) | 0.019* (0.011) | -0.033 (0.028) | -0.030 (0.019) | 0.009 (0.023) | -0.015 (0.016) |
| Health knowledge | -0.109*** (0.036) | -0.057 (0.037) | 0.022 (0.080) | -0.081 (0.076) | 0.060 (0.060) | -0.003 (0.048) |
| No indoor smoking policy at work | | | | | 0.483*** (0.044) | 0.422*** (0.085) |
| Allowed anywhere or only in some indoor places at work | | | | | 0.604*** (0.028) | 0.524*** (0.038) |
| Observations | 6226 | 7408 | 1331 | 1544 | 1327 | 1542 |

* p<0.10, ** p<0.05*** p<0.01. Standard errors are in parentheses. Omitted categories in regressions are age 15-24, high school education, not employed, income group 1 and not allowed in indoor places at work.

Unlike the result from passive smoking at home, nonsmoker males are 12 percentage points (5 percentage points) more likely to be exposed to SHS at work compared to women in 2008 (2012). In addition, older nonsmokers (aged 65+) compared to aged 15-24 ones are less likely to be exposed to passive smoking at work in 2012. Elementary school education, no education and primary school education categories become significant from 2008 to 2012. When indoor smoking policy rule variables are included, no education category becomes insignificant in 2012. On the other hand, nonsmokers in the highest income group are 5.5 percentage points more likely to be exposed at work than nonsmokers from the lowest income group. When we add indoor smoking policy rule variables, the impact of male and income group 5 become insignificant in 2012 even though they are significant in 2008. Results also indicate that when no indoor smoking policy is implemented at work or smoking is allowed indoor places at work, then likelihood of exposure to SHS for nonsmokers significantly increases in both years.

Table 4 shows the results for restaurants, public buildings and public transportation. Based on 2008 results, nonsmoker males are 7, 6 and 3 percentage points more likely to be exposed to SHS at those places respectively. However, the effect of gender decreases over time and disappears in 2012 for public transportation. In general, older nonsmokers are less likely (i.e. younger ones are more likely) to be exposed to SHS at these places and especially age group 65+ are in general less likely to be exposed to SHS compared to the youngest age group. Both elementary education and primary/secondary education categories are less likely to be exposed to passive smoking in both years compared to high school education category. However, the effects of no education and at least college education categories become insignificant in 2012. Only nonsmokers with at least college education are more likely to be exposed in a public building. From 2008 to 2012, no education and elementary categories become much more significant. Nonsmokers from all income groups are less likely to be exposed to SHS compared to the lowest income group at public transportation while in 2012 only the highest two income groups have significant effects. Nonsmokers from urban area are 6 percentage points more (3 percentage points less) likely to be exposed to SHS at restaurants (at public transportation) based on 2008 results while the effects disappear in 2012.

Table 4: Logit models II (Average Marginal Effects)

| | SHS exposure at a restaurant | | SHS exposure at a public building | | SHS exposure at public transportation | |
|-----------------------------|------------------------------|----------------------|-----------------------------------|----------------------|---------------------------------------|----------------------|
| | 2008 | 2012 | 2008 | 2012 | 2008 | 2012 |
| Male | 0.070** (0.028) | 0.030** (0.015) | 0.060*** (0.012) | 0.017** (0.008) | 0.031** (0.014) | 0.005 (0.010) |
| Age 25-44 | -0.032 (0.036) | -0.041* (0.022) | -0.010 (0.015) | 0.007 (0.012) | -0.017 (0.020) | -0.008 (0.015) |
| Age 45-64 | -0.082** (0.039) | -0.006 (0.026) | -0.011 (0.015) | -0.005 (0.013) | -0.055*** (0.021) | -0.029* (0.016) |
| Age 65+ | -0.162*** (0.058) | -0.066*** (0.028) | -0.010 (0.019) | -0.031** (0.012) | -0.078*** (0.023) | -0.053*** (0.016) |
| No education | -0.124** (0.059) | 0.000 (0.041) | -0.017 (0.017) | 0.003 (0.013) | -0.005 (0.024) | -0.049*** (0.017) |
| Elementary education | -0.095*** (0.034) | -0.068*** (0.020) | -0.020 (0.014) | -0.016 (0.010) | -0.035* (0.019) | -0.044*** (0.014) |
| Primary/secondary education | -0.089** (0.039) | -0.036* (0.021) | 0.027 (0.019) | 0.006 (0.012) | 0.002 (0.022) | -0.016 (0.016) |
| At least college education | 0.071* (0.038) | 0.012 (0.022) | 0.035* (0.020) | 0.030** (0.014) | 0.050* (0.028) | -0.014 (0.018) |
| Employed | 0.045 (0.030) | -0.010 (0.017) | -0.018 (0.011) | -0.012 (0.008) | 0.001 (0.015) | -0.005 (0.010) |
| Income group2 | 0.018 (0.049) | -0.029 (0.030) | 0.003 (0.016) | -0.016 (0.012) | -0.057*** (0.021) | -0.013 (0.016) |
| Income group3 | -0.014 (0.050) | -0.022 (0.023) | -0.023 (0.015) | -0.008 (0.010) | -0.090*** (0.021) | -0.002 (0.013) |
| Income group4 | 0.002 (0.048) | -0.005 (0.021) | -0.007 (0.016) | -0.023*** (0.009) | -0.071*** (0.021) | -0.031*** (0.011) |
| Income group5 | 0.007 (0.047) | -0.030 (0.022) | -0.002 (0.016) | 0.003 (0.011) | -0.071*** (0.022) | -0.040*** (0.013) |
| Urban | 0.062** (0.027) | 0.016 (0.015) | 0.011 (0.009) | -0.010 (0.007) | -0.028** (0.012) | 0.011 (0.009) |
| Health knowledge | 0.008 (0.086) | -0.129* (0.074) | -0.057 (0.038) | -0.016 (0.030) | -0.027 (0.043) | -0.024 (0.037) |
| Observations | 1711 | 2222 | 4106 | 5187 | 3941 | 4774 |

* p<0.10, ** p<0.05*** p<0.01. Standard errors are in parentheses. Omitted categories in regressions are age 15-24, high school education, not employed, income group 1 and not allowed in indoor places at work.

4.2 Decomposition Results

Exposure to SHS at home decreases by 26.6 percentage points from 2008 to 2012. We can explain 6% of the difference in the exposure to SHS at home between 2008 and 2012 with the differences in observed characteristics between these years while keeping the effects of those characteristics at 2008 levels (Table 5). As shown in the detailed analysis, two age categories and three education categories are found to be significant. Differences in the proportions of age groups 25-44 and 65+ contribute positively to the difference in the exposure to SHS at home and together explain 3.20% of the the difference. No education, elementary education and at least college education categories together explain 2.18% of the difference in passive smoking at home between years. As shown in Table 6, the largest part of the SHS exposure difference at

home that is attributable to the changes in the behavioral responses is due to the covariate-adjusted difference in SHS exposure rates (i.e., change in constant terms). The contribution of living in an urban area to the unexplained part of the gap is negative. This variable provides 5.77% reduction to the difference in the exposure to SHS at home.

Proportion of passive smoking at work place decreases by 18.5 percentage points between 2008 and 2012. Differences in the observed characteristics explain 60% of the difference in exposure to SHS at work while keeping the regression coefficients at 2008 levels (Table 5). No education and income group 4 categories negatively contribute to the difference but they are significant only at 10% level. Differences in the proportions of highest income group categories explain 3.38% of the passive smoking difference. The biggest contributors to the explained part of the passive smoking differential are the variables related with smoking rules at work places. Differences in the proportions of work places where smoking is not allowed and where smoking is allowed everywhere or at some specific indoor places explain 53% of the difference in the exposure to SHS at work. In the unexplained part, being male and high school education category positively and significantly contribute to the difference in the passive smoking rates between years (Table 6). Gender differences in behavioral responses explains 8.3% of the differences in the SHS exposure between years. High school education explains 6% of the differential at work.

5. Conclusion

This work analyzes the main factors associated with SHS at home, work, restaurants, public buildings and public transportation in Turkey and obtain the contributions of those factors to the differences in SHS exposure between 2008 and 2012. For this purpose 2008 and 2012 releases of GATS are used. Logit models estimated for SHS exposure at these places indicate that young people are disproportionately affected by SHS exposure at all places. Males are less likely to be exposed to SHS at home while at other places they are more likely to be exposed to SHS. In addition, more educated ones are less likely to be exposed to SHS at home and work while they are more likely to be exposed to SHS at restaurants and public transportation. Income group categories are negatively associated with SHS exposure inside of a public transportation.

Table 5: Decomposition analysis (difference explained)

| <i>Difference</i> | Passive smoking at home | | Passive smoking at work | |
|--|-------------------------|-------|-------------------------|-------|
| | 0.266*** (0.008) | | 0.185*** (0.014) | |
| | Coefficient | % | Coefficient | % |
| <i>Explained part</i> | 0.016*** (0.004) | 6.04 | 0.111*** (0.010) | 60 |
| <i>Unexplained part</i> | 0.250*** (0.009) | 93.96 | 0.074*** (0.013) | 40 |
| <i>Covariates</i> | | | | |
| Male | 0.000 (0.000) | 0.13 | 0.000 (0.00) | 0.08 |
| Age 15-24 | 0.001 (0.001) | 0.47 | 0.000 (0.001) | 0.23 |
| Age 25-44 | 0.001* (0.000) | 0.34 | -0.002 (0.001) | -0.92 |
| Age 45-64 | -0.000 (0.000) | -0.02 | -0.000 (0.000) | -0.01 |
| Age 65+ | 0.008*** (0.001) | 2.86 | -0.000 (0.000) | -0.16 |
| No education | 0.001** (0.001) | 0.56 | -0.004* (0.002) | -2.36 |
| Elementary education | 0.002*** (0.001) | 0.75 | 0.003 (0.002) | 1.74 |
| Primary/secondary education | 0.000 (0.000) | 0.18 | -0.000 (0.001) | -0.09 |
| High school education | 0.000 (0.000) | 0.14 | -0.000 (0.000) | -0.01 |
| At least college education | 0.002*** (0.001) | 0.87 | 0.000 (0.003) | 0.21 |
| Employed | -0.000 (0.000) | -0.01 | | |
| Income group1 | -0.000 (0.002) | -0.08 | 0.005 (0.004) | 2.58 |
| Income group2 | 0.000 (0.002) | 0.09 | -0.005 (0.004) | -2.75 |
| Income group3 | -0.000 (0.000) | -0.01 | 0.001 (0.001) | 0.62 |
| Income group4 | -0.000 (0.000) | -0.13 | -0.003* (0.002) | -1.52 |
| Income group5 | -0.001 (0.001) | -0.29 | 0.006*** (0.002) | 3.38 |
| Urban | -0.000 (0.000) | -0.07 | -0.000 (0.000) | -0.10 |
| Health knowledge | 0.000 (0.000) | 0.10 | -0.000 (0.000) | -0.14 |
| Not allowed in any indoor places at work | | | 0.073*** (0.006) | 39.37 |
| No indoor smoking policy at work | | | 0.012*** (0.003) | 6.40 |
| Allowed anywhere or only in some indoor places at work | | | 0.025*** (0.004) | 13.60 |

* p<0.10, ** p<0.05*** p<0.01. Standard errors are in parentheses.

Table 6: Decomposition analysis (difference unexplained)

| | Passive smoking at home | | Passive smoking at work | |
|--|-------------------------|--------|-------------------------|-------|
| | Coefficient | % | Coefficient | % |
| Male | -0.003 (0.004) | -1.13 | 0.015* (0.009) | 8.28 |
| Female | 0.005 (0.007) | 2.01 | -0.007* (0.004) | -3.88 |
| Age 15-24 | 0.003 (0.003) | 1.07 | -0.001 (0.003) | -0.80 |
| Age 25-44 | -0.010* (0.005) | -3.70 | 0.006 (0.016) | 3.45 |
| Age 45-64 | 0.005 (0.005) | 1.83 | -0.004 (0.007) | -1.93 |
| Age 65+ | -0.002 (0.004) | -0.62 | 0.000 (0.001) | 0.20 |
| No education | -0.001 (0.005) | -0.40 | -0.001 (0.001) | -0.56 |
| Elementary education | 0.001 (0.006) | 0.42 | -0.001 (0.006) | -0.37 |
| Primary/secondary education | 0.001 (0.003) | 0.23 | -0.001 (0.004) | -0.78 |
| High school education | 0.001 (0.003) | 0.39 | 0.011** (0.006) | 6.10 |
| At least college education | -0.001 (0.003) | -0.41 | 0.005 (0.008) | 2.97 |
| Employed | 0.003 (0.003) | 1.07 | | |
| Income group1 | -0.004 (0.006) | -1.55 | -0.000 (0.006) | -0.26 |
| Income group2 | -0.000 (0.002) | -0.09 | -0.001 (0.002) | -0.60 |
| Income group3 | -0.001 (0.003) | -0.27 | -0.007 (0.005) | -3.86 |
| Income group4 | 0.006 (0.004) | 2.23 | 0.006 (0.006) | 3.28 |
| Income group5 | -0.001 (0.003) | -0.27 | 0.006 (0.005) | 3.39 |
| Urban | -0.015*** (0.004) | -5.77 | 0.008 (0.008) | 4.20 |
| Not urban | 0.017*** (0.005) | 6.43 | -0.004 (0.004) | -2.11 |
| Health knowledge | -0.025 (0.027) | -9.45 | 0.022 (0.035) | 12.17 |
| No health knowledge | 0.001 (0.001) | 0.22 | -0.000 (0.001) | -0.23 |
| Not allowed in any indoor places at work | | | 0.011 (0.014) | 5.70 |
| No indoor smoking policy at work | | | -0.000 (0.001) | -0.18 |
| Allowed anywhere or only in some indoor places at work | | | 0.000 (0.002) | 0.08 |
| Constant | 0.278*** (0.028) | 104.44 | 0.011 (0.041) | 5.75 |

* p<0.10, ** p<0.05*** p<0.01. Standard errors are in parentheses.

Decomposition results reveal that (1) differences in the proportion of age and education categories significantly explain the difference in the SHS exposure rates between 2008 and 2012; (2) differences in the SHS exposure at work can significantly be explained by the differences in the distribution of indoor smoking rules at work and (3) differences in the behavioral responses of being a male and having a high school education degree can also explain a significant portion of the differences in the SHS exposure at work.

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