Effect Of Expanding Anti-Tobacco Regulations On The Likelihood Of Being A Smoker

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ABSTRACT

Governments across the world have been fighting against tobacco use by introducing a series of anti-tobacco measures to eliminate tobacco-related diseases. After ratifying the first global public health treaty by the World Health Organization in 2005, Turkey urgently implemented a series of anti-smoking policies to address the tobacco epidemic.

We utilized data from the Global Adult Tobacco Surveys 2008 and 2012 for Turkey and implemented a Linear Probability Model to estimate the effect of introducing anti-smoking policies to provide new evidence on reducing smoking.

Two significant anti-tobacco policies undertaken between 2009 and 2010 had a significant negative impact on the likelihood of being a current smoker. The new policies helped reduce the probability of being smokers for both females and males, but the effect was more substantial for male adults. Education has distinct effects on females and males such that with more education, female adults are more likely to smoke while the opposite is true for male adults.

Policymakers should consider these findings to address tobacco consumption and announce multiple policies taking gender differences into account to stop the smoking epidemic.

Key Words: *Cigarette consumption, Anti-tobacco regulation, gender, smoking behavior*

JEL Classification: *I12, I18, J16*

Tütün Yasağının Genişletilmesinin Sigara Kullanma Olasılığı Üzerine Etkileri

ÖZ

Dünya genelinde hükümetler tütün ile ilişkili hast[1]alıkları ortadan kaldırmak için tütün kullanımına karşı bir dizi önlemler alarak mücadele etmektedirler. Türkiye, Dünya Sağlık Örgütü'nün ilk global umumi sağlık antlaşmasını imzaladıktan sonra tütün salgın hastalığına karşı acilen bir dizi karşıt politikayı hayata geçirmiştir.

Sigara tüketiminin azaltılması bağlamında yeni bir kanıt sunmak adına Türkiye için yapılan Küresel Yetişkin Tütün Anketleri 2008 ve 2012 verisetlerine Lineer Olasılık Modellerini uygulayarak tütün karşıtı politikanın etkilerini inceledik.

2009 ve 2010 yılları arasında uygulamaya konulan tütün karşıtı iki önemli politikanın sigara kullanıcısı olma olasılığı üzerinde istatistiksel olarak anlamlı ve negatif bir etkisi görülmektedir. Konuya cinsiyet perspektifinden yaklaştığımızda; bu politika her iki cinsiyetin de sigara kullanıcıları olma olasılıklarını düşürmektedir fakat bu etki yetişkin erkekler için daha fazladır. Eğitimin kadın ve erkek üzerindeki etkisi farklılaşmakta; eğitimli kadınların sigara içme olasılıkları daha yüksek iken yetişkin erkekler için bu durum tam tersidir.

Politika yapıcılar tütün tüketimine önlem almak ve sigara salgınını durdurmak için bu çalışmanın sonuçlarını dikkatle incelemeli ve cinsiyet farklılıklarını dikkate alan bir takım politikalar geliştirmelidirler.

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Anahtar Kelimeler: *Sigara tüketimi, tütün karşıtı düzenlemeler, cinsiyet, sigara içme davranışı*

JEL Sınıflandırması: *I12, I18, J16*

I. INTRODUCTION

Tobacco consumption is anticipated to be the most significant cause of death in low-income and middle-income countries in the 21st century (Chaloupka & Warner, 2000). As of today, the developed world has experienced the effects of tobacco consumption to a great extent such that 18% of deaths are due to tobacco use in these high-income countries while 11% and 4% of deaths owing to tobacco consumption in low-income and middle-income countries, respectively (Giovino et al., 2012). However, with increasing prevalence rate of smoking in low- and middle-income countries, these numbers can change for these nations leading to a high number of tobacco-related deaths.

World Health Organization (WHO) introduced its first global public health treaty, named the WHO Framework Convention on Tobacco Control (FCTC) (Organization & Control, 2008). The goal of the treaty was to fight against the tobacco epidemic across the nations by taking demand- and supply-side measures into account. In this context, the WHO FCTC guided those who are willing to reverse the tobacco epidemic in their countries. This treaty comprised of six vital policies including "monitoring tobacco use and prevention policies," "protecting people from tobacco smoke," "offering help to quit tobacco use," "warning about the dangers of tobacco," "enforcing bans on tobacco advertising, promotion, and sponsorship," and "raise taxes on tobacco" to fight against tobacco use.

Turkey initiated its first anti-tobacco policy in the mid-90s with the Law 4207 (The prevention of harmful effects of tobacco products), which prohibited advertising of tobacco products, sale of tobacco products to minors, and smoking in public places such as health and education institutions and public transportation (Erguder et al., 2008). However, this anti-tobacco policy did not have much impact on reducing tobacco consumption because of the weak enforcement of the law.

Turkish government introduced a 10-year Health Transformation Program (HTP) begun in 2003. One of its primary goals was to improve health outcomes among its citizens. In order to do this, one necessary step was to take severe measures against tobacco consumption, and Turkey ratified the WHO FCTC in 2004. This treaty calls on participated nations/partners to reduce tobacco use by taking some vital measures, including demand and supply measures in their home countries. Following the WHO FCTC, Turkey has made great progress by taking significant measures to reduce tobacco consumption. One of the most noteworthy actions was to expand smoke-free environment to include all enclosed public and workplaces such as the hospitality sector, Turkish tea and coffee houses, and restaurants in July 2009. Also, Turkey introduced a significant increase in the special consumption tax on tobacco products in January 2010 (Warren et al., 2012).

Many studies have found that increased excise taxes and banning tobacco consumption in public places and workplaces reduce tobacco consumption (Chaloupka & Warner, 2000; Fichtenberg & Glantz, 2000; Fong et al., 2006;

Sargent, Shepard, & Glantz, 2004; Wakefield et al., 2000; Wasserman, Manning, Newhouse, & Winkler, 1991; Zablocki et al., 2014). On the other hand, Jones et al. (2015) state that there are no statistically noticeable effects of smoking bans on cigarette consumption (Jones, Laporte, Rice, & Zucchelli, 2015). However, evidence strongly confirms the benefits of comprehensive smoke-free legislation (Rosen, Zucker, Rosen, & Connolly, 2010; van Beek, Kuipers, Lignac, & Kunst, 2018). Increased excise taxes and smoke-free public and workplaces lead to reduced mortality and morbidity among men (Fichtenberg & Glantz, 2000; Sargent et al., 2004). Another critical study focuses on benefits of ending smoking on mortality rates among UK women (Pirie et al., 2013) while others examine the concept of quitting smoking concerning significant health benefits, specifically, gaining years of life (Jha & Peto, 2014; Verguet et al., 2015).

This study extends earlier analyses on the likelihood of being current smokers following the expansion of the smoke-free environment in July 2009 and the increase in special consumption tax on tobacco products in January 2010 in Turkey. We utilize the Global Adult Tobacco Surveys 2008 and 2012 to evaluate the impact of the new anti-tobacco policies in Turkey on the probability of being a current smoker. An example of Turkey is relevant for countries that aim to introduce comprehensive national smoking policies.

II. DATA AND METHOD

This study explores the impact of combined effects of the two major tobacco regulations occurred in July 2009 with the expansion of the smoke-free environment and in January 2010 with an increase in special consumption tax on tobacco products by utilizing data from the Global Adult Tobacco Surveys (GATS) for 2008 and 2012, which was conducted by the Turkish Statistical Institute. The surveys were nationally representative household survey of individuals aged 15 and older. The GATS 2008 survey consists of 9030 individuals, of which 4269 males and 4761 females. Besides, the GATS 2012 survey comprises 9851 interviewed individuals, of which 4470 males and 5381 females. The GATS surveys derive many indicators on tobacco consumption by adults as well as the information on environmental tobacco smoking, and individuals' attitudes towards anti-tobacco campaigns.

The dependent variable in this analysis is the tobacco consumption status of individuals on whether they are currently smoking. There exist three available responses to the question in the survey: 'Never,' 'Sometimes,' and 'Every day,' of which interviewed individuals pick one response. In order to model the outcome variable, we combine the answers ‘Sometimes’ and ‘Every day’ and create a dichotomous variable. We also control for a set of demographic variables to observe the determinants of smoking prevalence in Turkey. These control variables include whether the person is female, the highest educational attainment of individuals composed of primary or less, middle school, high school, and higher education (including master's and Ph.D.), age groups composed of 4 various categories such that 15-24, 25-44, 45-64, 65+, residence of individuals

(rural/urban), employment status, and a dummy variable indicating the smoke-free public places and workplaces are in effect.

This study examines the impact of the recent anti-tobacco regulations in Turkey on current tobacco consumption for adults. Besides, we explore the heterogeneous effects of these policy changes on tobacco consumption in terms of a gender perspective. We utilize a linear probability model to evaluate the effects of the two significant policy changes on the prevalence of smoking for adults (Cameron & Trivedi, 2005). The estimated linear probability model is shown below:

$$y_{it} = \beta_0 + \beta_1 Regulations + \beta_2 X_{it} + e_{it} \quad (1)$$

where y_{it} is the outcome of interest which shows whether the person is currently smoking; $Regulations$ is the dummy variable taking a value of 1 if the year is 2012, which is after the policies went into effect, otherwise 0; X_{it} is a vector of covariates described above, and e_{it} is the error term.

III. RESULTS

Table 1 presents prevalence rates of smoking by years according to some pre-determined characteristics for adult women and men in Turkey. The proportion of women who said they are currently smoking went down by 2 percentage points (pp) from 2008 to 2012, indicating that there can be some relationship between the anti-smoking policies in Turkey and being a current smoker. However, this relationship is much strong for males such that males reporting being current smokers declined by 8 pp between 2008 and 2012.

We observe considerable effects of the anti-tobacco policies among female high school and university graduates showing 7 to 8 pp declines in being current smokers. Among males, primary and high school graduates show a more significant decline in cigarette consumption compared to other educational attainments. Female adults of the 15-24 age group experienced the most dramatic change by moving towards consuming fewer tobacco products compared to other age groups. Besides, after the smoking ban in workplaces in 2009, employed women increased their probability of being a current smoker by around 6 pp while the employed male showed a more significant decline in cigarette consumption by 6 pp.

Table 1. Prevalence rates of smoking by gender (%)

	Female					**Male**			
	2008		**2012**			**2008**		**2012**	
Variable	Non-smoker	Current smoker	Non-smoker	Current smoker		Non-smoker	Current smoker	Non-smoker	Current smoker
Female	86.03	13.97	88.29	11.71		-	-	-	-
Male	-	-	-	-		52.31	47.69	60.13	39.87
Education									
Primary or less	89.39	10.61	91.28	8.72		51.77	48.23	60.17	39.83
Middle school	83.33	16.67	84.71	15.29		53.22	46.78	59.50	40.50
High school	71.93	28.07	79.73	20.27		48.44	51.56	55.90	44.10
University+	75.91	24.09	82.71	17.29		60.81	39.19	66.67	33.33
Age group									
15-24	86.83	13.17	92.73	7.27		60.08	39.92	66.72	33.28

25-44	80.62	19.38	81.49	18.51		40.97	59.03	48.43	51.57
45-64	88.77	11.23	89.42	10.58		55.07	44.93	61.91	38.09
65 and over	98.14	1.86	97.95	2.05		78.21	21.79	83.51	16.49
Urban	79.78	20.22	82.92	17.08		52.35	47.65	57.74	42.26
Employed	84.24	15.76	78.92	21.08		46.74	53.26	52.43	47.57
Source: Author calculations from the Global Adult Tobacco Surveys 2008 and 2012.									

We present the linear probability model estimates of the combined impact of extending smoke-free enclosed public places and workplaces in July 2009 and an increase in special consumption tax on tobacco products in January 2010 in Turkey in Table 2 for all individuals, females, and males. In this study, we examine the effects of the anti-tobacco regulations, including both price and non-price measures on the probability of smoking. Then, we examine the impact of the regulations by looking at the heterogenous effects for females and males.

When we estimate the models for all individuals, we find that there exists a significant positive relationship between the recent tobacco control policies and the probability of being a current smoker. The estimates of the regulations for the female sample indicate that the anti-tobacco policies led to a decline in the likelihood of being a current smoker by about 2 pp. However, the result suggests a more considerable decline for males, which corresponds to a 5 pp reduction in reporting being a current smoker.

It is a fascinating finding that for females in Turkey, there exists a statistically significant positive relationship between more education and smoking-that is, obtaining more education will increase the probability of smoking for females. However, the magnitude of the effect declines (although it is only significant at 10% level) for those with a university (or higher) degree suggesting more educated females are highly aware of the danger that smoking causes. Besides, another significant result indicates that the probability of males being current smokers declines with more education where the university or higher educational attainment led to a more significant decline in smoking participation.

Table 2. Results of Linear Probability Model

Variables	**All individuals**		**Females**		**Males**	
	Coeff.	St. Err.	Coeff.	St. Err.	Coeff.	St. Err.
Regulations	-0.030***	0.006	-0.018***	0.007	-0.052***	0.011
Female	-0.264***	0.007	-	-	-	-
Education						
Primary or less	Ref		Ref		Ref	
Middle school	0.023**	0.011	0.072***	0.015	-0.035**	0.016
High school	0.036***	0.010	0.105***	0.014	-0.036**	0.015
University+	-0.084***	0.012	0.031*	0.017	-0.168***	0.017
Age group						
15-24	Ref		Ref		Ref	
25-44	0.126***	0.011	0.117***	0.013	0.145***	0.019
45-64	0.043***	0.011	0.066***	0.013	0.022	0.019
65 and over	-0.078***	0.012	0.002	0.013	-0.189***	0.021
Urban	0.056***	0.006	0.088***	0.007	0.010	0.011
Employed	0.089***	0.008	0.040***	0.010	0.092***	0.013
Constant	0.308***	0.013	-0.006	0.013	0.387***	0.021
N	18653		10061		8592	
R^2	0.174		0.066		0.080	

Notes: * p < 0.10, ** p < 0.05, *** p < 0.01. Robust standard errors reported. Dependent variable is the

tobacco consumption status of individuals on whether they are currently smoking. Regulations is the dummy variable taking a value of 1 if the year is 2012, which is after the policies went into effect, otherwise 0. Male, Primary or less education, age group 15-24, rural, and unemployed are reference categories.

The smoking participation reveals similar patterns among different age groups for both females and males. Both women and men in age groups 25-44 and 45-64 are more likely to smoke in comparison to those in the age group 15-24. However, this behavior shows a declining pattern in magnitude as age increases suggesting less smoking for older adults. For the male age group 65 and above, the estimates turn to negative, which indicates a negative relationship between smoke participation and age among males.

Another critical finding in this study for policymaking is that females in urban areas are more likely to smoke compared to their peers who live in a rural neighborhood. The reason could be that females in urban participate in the workforce and earn a salary, which would give them more freedom to smoke. Another possible explanation would be that it is more stressful to live in a crowd, which also yields a positive relationship between smoking participation and being female. We could also argue that in Turkey, the social environment will differ between urban and rural areas where there are more freedom and openness in urban in comparison to rural. Interestingly, being employed for both males and females are positively (statistically significant) associated with smoking participation.

IV. DISCUSSION

Tobacco is accepted as one of the most significant causes of death and a growing epidemic worldwide. More than 5 million people a year die because of tobacco use, and this death toll will increase to more than 8 million by 2030 if necessary precautions are not taken (Mathers & Loncar, 2006; Murray & Lopez, 1997; Organization & Control, 2008). The last decade has witnessed countries implementing public policies to fight against the tobacco epidemic. Governments across the world have taken actions to protect their people from the dangers of tobacco and provide their citizens with a healthy environment.

In this study, we model the outcome variable by implementing linear probability model to examine the effect of the recent Turkish anti-tobacco reforms implemented in July 2009 to extend the smoke-free environment to the hospitality sector and in January 2010 to increase the special consumption tax by a significant amount on tobacco products on smoking participation of adults. We look at the effects of the two crucial tobacco control policies in Turkey on smoking prevalence in terms of gender perspective as is well known that the anti-tobacco policies would have different impacts on cigarette consumption for both women and men (Kilic & Ozturk, 2014).

Overall results indicate that there exists a statistically significant reduction in the probability of smoking decision by 3 pp after both non-price and price tobacco control policies, which were introduced in July 2009 and in January 2010. This finding is essential in the sense that the smoke-free policies in Turkey have yielded a positive outcome in fighting the tobacco epidemic. Results also reveal that people who live in urban areas are less likely to quit smoking participation in comparison to those in the rural area, which suggests that there need to be various

targeting mechanisms for both urban and rural to reduce tobacco consumption as both have different dynamics. Another critical finding reveals that females are more inclined to reduce their tobacco use by 26 pp compared to men. This outcome suggests examining the smoking behavior of women and men separately as the decision to smoke can be different for both genders.

Looking at gender-specific findings, we observe that the anti-tobacco regulations in 2009 and 2010 would reduce the probability of smoking participation less for female adults compared to male adults. This finding reveals that male adults benefit more from the anti-smoking policy in the form of declining their cigarette consumption in comparison to female adults. One probable explanation for this could be that in Turkey, male adults are more likely to appear in enclosed public places and social environments such as Turkish teashops and coffee houses where they used to smoke freely before the anti-tobacco policy. However, now, individuals will have less chance to smoke at these places, and this will reduce the smoking prevalence rates for males more compared to females. Policymakers should take this result into account to determine gender-specific anti-tobacco policies and address the current policy's weaknesses in this regard.

Findings also indicate that there is a positive relationship between educational levels and smoking participation for females. With more education as compared to primary or less education, female adults are less likely to reduce their smoking participation, which is consistent with the findings of Kilic and Ozturk (2014) for Turkey. However, this is contrary to the common belief that females with lower socioeconomic status are more likely to smoke. In the US, for example, a critical study shows that less educated (less than high school) women are more likely to be current smokers than their peers with a college degree (Levy, Mumford, & Compton, 2006). One possible explanation for this relationship in Turkey could work through the income channel. It is much easier for educated women to find a job and earn their income. As a result, they would have a higher socio-economic status among their counterparts and more freedom to control their economic resources.

More interestingly and contrary to female adults, male adults with more education levels are more likely to be current non-smokers. This finding is consistent with the evidence that in most developed and developing nations, smoking is seen among less-educated individuals (Kilic & Ozturk, 2014). Especially when a person has a university or a higher degree, this effect becomes more significant for male adults in Turkey. These distinct behaviors of females and males indicate that policymakers should consider them separately and take various measures in addressing the tobacco epidemic among men and women.

In terms of the relationship between age and smoking participation, we observe similar behaviors among older female and male adults. In both groups, those who are 65 or more show similar attitudes towards the lower probability of smoking relative to the 15-24 age group. However, the effect is much more significant for older male adults. One necessary explanation for this could be that when female or male individuals became older, they are more likely to worry about

their health conditions. Therefore, in order to avoid the tobacco-related diseases, they respond to the tobacco epidemic by being non-current smokers at later ages.

Also, female adults in age groups 25-44 and 45-64 behave in a way that they are less likely to reduce their smoking participation, which can be explained by gender inequality in low- and middle-income countries (Waldron, 1988). One possible explanation for this could be that once they get older, they have more power to behave freely such that they participate in smoking.

Another significant result is that female adults in urban areas are more likely to participate in smoking. In this context, there should be public policies aiming at informing, especially females, with higher educational attainments and who live in urban areas about the danger of smoking at early stages. This targeting mechanism could start in schools or universities by creating awareness about smoking's danger to health, their family's health arose in the form of second-hand smoking, and economic costs that they have to incur.

Two things were essential to investigate Turkey in this issue: first, Turkey has a high smoking prevalence rate among its population. Second, Turkey has made a great effort to prevent smoking among its people in the last decade after ratifying WHO FCTC in 2005 by taking a series of measures.

This study has some limitations. We are aware that increases in special consumption tax on tobacco products may cause individuals to consume illegal tobacco products. Unfortunately, however, we can not incorporate the amount of smuggling on tobacco products into our analysis as we do not have regional identifiers in the datasets. The other limitation is that we cannot separately differentiate the effects of the two anti-tobacco regulations on being a current smoker. That is why we looked at the combined effect of these two policy reforms.

Notwithstanding limitations, findings indicate that understanding the gender aspect is vital in fighting against the tobacco epidemic. Although the anti-tobacco policies undertaken between 2009 and 2010 reduce the likelihood of being current smokers for both genders, it yielded a more significant impact on reducing the smoking prevalence rates of males. Therefore, policymakers should address this issue by considering gender-related measures. In particular, programs addressing educated women and females living in urban areas can help address the smoking prevalence rates of women in Turkey.

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