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Club Convergence in Cigarette Consumption and Health Policies in Pre-Pandemic Period

Pandemi Öncesi Dönemde Sigara Tüketimindeki Kulüp Yakınsaması ve Sağlık Politikaları

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ABSTRACT

Aim: Turkey introduced price and non-price measures in recent years to reduce smoking. The government banned smoking in all enclosed workplaces and public places. Then, they extended the ban to include all restaurants, cafeterias, and the hospitality sector in 2009 and increased the Special Consumption Tax dramatically on tobacco products by 20 percent in 2010. This study aims to examine regional disparities in cigarette consumption across Turkish cities employing provincial-level data by utilizing a club convergence test.
Material and Methods: We report some descriptive results for the smoking trend for sub-regions of Turkey. Then, we explore regional disparities in smoking across Turkish provinces, employing monthly provincial-level data, through a club convergence test in pre-pandemic period, 2009-2017.
Results: Our results suggest that the initial effects of the anti-tobacco policies resulted in a substantial decline in smoking. It seems that distinct regions behave differently to the policy changes in a way that some areas reduce their cigarette consumption considerably while some regions did not. Club convergence test results demonstrate that it is not proper to conduct a common tobacco control policy in Turkey since there is more than one convergence club in the analyses.
Conclusion: We encourage authorities to decentralize power by including local agencies and municipalities in enforcing the anti-tobacco law. We urge authorities to take different policy measures for different regions. Besides, from a pandemic perspective, one can argue that the regional disparities in cigarette consumption is also a signal for the need of diversified health policies across regions in Turkey.
Keywords: Cigarette consumption; club convergence; tobacco control; Turkey; COVID-19.

ÖZ

Amaç: Türkiye son yıllarda tütün talebinin azaltılmasında özellikle fiyat önlemleri ve fiyat dışı önlemler olmak üzere iki çeşit politika uygulamıştır. Hükümet, öncelikle kapalı tüm işyerlerinde ve halka açık yerlerde sigara içilmesini yasakladı. Sonrasında, 2009 yılında yasağı tüm restoranları, kafeteryaları ve konaklama sektörünü kapsayacak şekilde genişleterek tüm ülkeye yaydı. 2010 yılına gelindiğinde ise tütün ürünleri için özel tüketim vergisi yüzde 20 arttırıldı. Bu çalışma, bir kulüp yakınsama testi kullanarak Türkiye'deki şehirler arasında sigara tüketimindeki bölgesel farklılıkları incelemeyi amaçlamaktadır.
Gereç ve Yöntemler: Bu çalışmada, Türkiye'deki sigara tüketiminin yıllık değişimleri betimsel sonuçlar halinde bölgesel bazda rapor edilmiştir. Daha sonra ise sigara tüketimindeki bölgesel farklılıklar, aylık il düzeyinde veriler kullanılarak ve kulüp yakınsaması analizinden faydalanılarak, pandemi öncesi dönemi kapsayacak şekilde 2009-2017 yılları için araştırılmıştır.
Bulgular: Bu çalışmadan elde edilen sonuçlar tütün karşıtı politikaların ilk etkilerinin sigara kullanımında önemli bir düşüşe neden olduğunu göstermektedir. Ayrıca, farklı bölgelerdeki tüketicilerin politika değişikliklerine aynı tepkileri vermediği görülmüştür. Kulüp yakınsaması sonuçlarına göre tüm Türkiye için ortak bir tütün politikasını takip etmek doğru olmayacaktır çünkü Türkiye'deki sigara tüketimi ortak bir değere yakınsamamaktadır.
Sonuç: Elde edilen sonuçlara göre merkezi otoritenin yetki paylaşımı yapması ve yerel yönetimlerin tütün karşıtı politikalar konusunda inisiyatif alabilmesinin kolaylaştırılması sağlanmalıdır. Politika yapıcılara farklı bölgeler için farklı politika uygulamaları başlatmaları gerektiğini tavsiye etmekteyiz. Dahası, pandemi perspektifinden bakıldığında, sigara tüketimindeki bölge bazlı trendlerin pandemi döneminde uygulanacak politikaların bölgesel olarak farklılaşması gerekliliğini ortaya koyduğu söylenebilir.
Anahtar kelimeler: Sigara tüketimi; kulüp yakınsaması; tütün kontrolü; Türkiye; COVID-19.

INTRODUCTION

Tobacco consumption is one of the most harmful habits of human beings, which leads to numerous diseases such as cardiovascular diseases, chronic obstructive pulmonary diseases, and lung cancer (1). Tobacco use can give rise to an increase in health expenditures, which becomes a heavy burden that both smokers and governments must bear. Besides, heavy smokers were much more likely to be unemployed after some time in the private sector (2).

All these pave the way for governments' interventions to implement distinct national anti-tobacco policies to reduce cigarette consumption, such as anti-smoking campaigns, health warnings, smoking bans in public and workplaces (3). World Health Organization (WHO) indicates that there are two types of reduction policies regarding tobacco consumption (4). The first one is the core demand reduction, which consists of (i) price and tax measures and (ii) non-price measures. The second one is the core supply reduction policies, including illicit trade, sales to and by minors, and provision of support for economically viable alternative activities.

WHO initiated the first health treaty Framework Convention on Tobacco Control (FCTC) in 2005, which urged member countries to take precautions in order to reduce both supply and demand for tobacco-related products. After signing the treaty, Turkey implemented two fundamental tobacco control policies. First, as a non-price measure, in May 2008, the government banned smoking in all enclosed workplaces and public places, then in the second phase, the smoking ban was extended in July 2009 with the expansion of the smoke-free law to include all restaurants, cafeterias, Turkish tea houses, and the hospitality sector. Second, in 2010, as a price measure, the government increased the Special Consumption Tax on tobacco products by 20 percent (1,5,6). These anti-tobacco policy interventions have shown a significant reduction in cigarette sales in Turkey (6).

Turkish Statistical Institute (TurkStat) reports the share of never-smokers over the total population, only 37 percent in 2016 (7). On the other side, the share of daily smokers is 27 percent in Turkey, of which 40 percent of males are daily smokers, while females' share is only 13 percent. Also, Turkey is the seventh most cigarette-consuming country regarding total consumption in the world, with 105,762 billion cigarettes in 2016. Besides, Turkish citizens consumed about 2 percent of the world's total cigarette consumption. China, Indonesia, and Russia are the top three cigarette-smoking countries with 41.9%, 5.6%, and 5%, respectively (8). All these show that tobacco consumption is a crucial phenomenon for serious health problems in Turkey. According to the Tobacco Atlas data, 26.06% of the deaths in Turkey are caused by tobacco in 2016. Smoking depends on distinct social and economic factors. For instance, in 2016, the distribution of reasons behind why people start smoking can be listed from highest to lowest share as follows: desire, peer effect, interest, personal problems, family problems, and fun (7).

On the other hand, the burst of the coronavirus disease 2019 (COVID-19) pandemic also increased concerns for the detrimental impact of smoking on public health. Beyond it is adverse individual and public health effects, disparities in smoking behavior can also be a signal for the need for diversified health policies in the COVID-19 period.

In this study, we examine regional disparities in cigarette consumption across Turkish cities employing provincial-level data by utilizing a club convergence test developed by Phillips and Sul (9). To the best of our knowledge, this is the first study investigating whether per capita cigarette consumption across Turkish cities converges or not. We do the same analysis for 12 and 26 regions of Turkey. One of the most distinctive advantages of this methodology is that it enables the determination of the convergence to a common steady state, divergence, and club convergence (10).

The organization of this paper is as follows. In the 2nd section, an overview of cigarette consumption in Turkey is provided. Section 3 presents a literature review on tobacco consumption. Section 4 provides the data and methodology, while Section 5 presents the empirical findings of the paper. The last section concludes the study.

AN OVERVIEW OF CIGARETTE CONSUMPTION IN TURKEY BEFORE AND AFTER THE ANTI-TOBACCO POLICY CHANGES

In this section, the study presents some quantitative data on cigarette consumption in Turkey based on both regional and provincial bases.

Cigarette Consumption by 26 Subregions of Turkey

Figure 1 presents the yearly pattern and percent changes for average cigarette consumption by 26 subregions of Turkey for the years 2009 and 2010. Turkey introduced comprehensive anti-tobacco policy changes in July 2009 with extending smoke-free environment to the hospitality sector and all enclosed workplaces and public spaces, and in January 2010 by increasing special consumption tax on tobacco products by 20 percent. After these significant anti-smoking policies, cigarette consumption in Turkey for all subregions declined. Notably, the Istanbul subregion (-13.40%), Adana subregion (-8.06%), Van subregion (-7.85%), and Sanliurfa subregion (-13.70%) had seen large impacts on reduced cigarette consumption after the policy changes.

When we make the comparison between 2009 and the recent year 2017 for 26 regions (Figure 2), we still observe the reduced impact of anti-tobacco policies on cigarette consumption for all subregions except for the Konya subregion (1.30%) and the Erzurum subregion (0.20%). However, it appears that the impact of policies has declined over time for the Istanbul subregion (-6.83%), Adana subregion (-2.49%), Van subregion (-3.72%), and Sanliurfa subregion (-5.13%).

Cigarette Consumption by Provinces

In this section, we present the results for the five highest cigarette consuming provinces in 2017. Figure 3 shows the trend for the average cigarette consumption by the five highest cigarette consuming provinces based on the recent values in 2017. What stands out in the figure is that after comprehensive smoke-free legislation in July 2009 and a tax increase in January 2010, average cigarette consumption went down for all provinces. While the declining impact continues to hold for some provinces (Istanbul, Izmir, Kayseri) until the end of 2011, at the end of 2017, we observe that the reduced effect of policy changes faded away, and even for some provinces average consumption slightly went up.

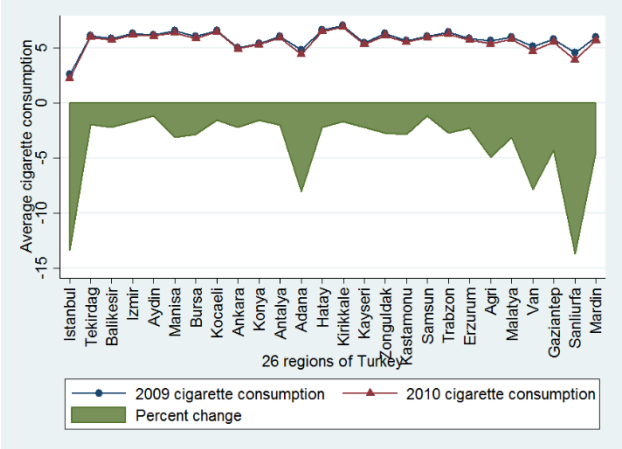

Figure 1. Average cigarette consumption by 26 subregions of Turkey, 2009-2010
Source: Department of Tobacco and Alcohol. Authors' calculations

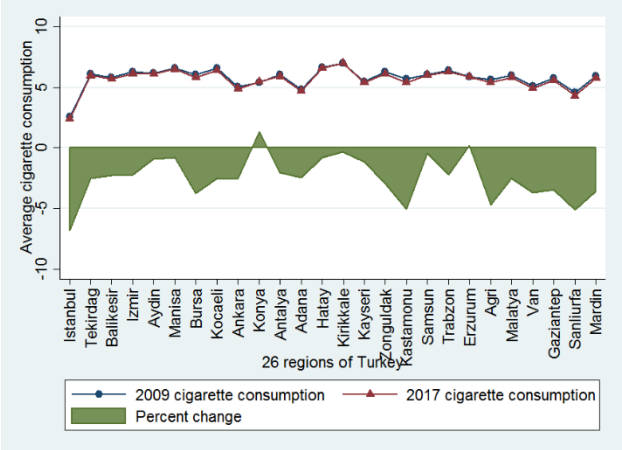

Figure 2. Average cigarette consumption by 26 subregions of Turkey, 2009-2017
Source: Department of Tobacco and Alcohol. Authors' calculations

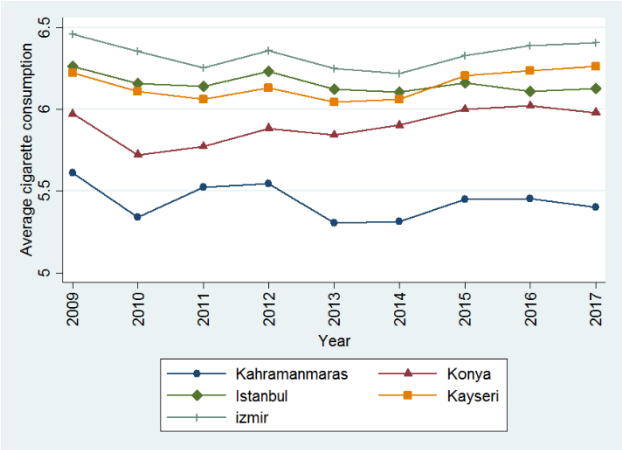

Figure 3. Average cigarette consumption by five highest cigarette consuming provinces
Source: Department of Tobacco and Alcohol. Authors' calculations

Table 1 shows percent changes in average cigarette consumption by the five highest cigarette consuming provinces. Results suggest that the highest declining impact after the combined anti-tobacco policies, including smoke-free public places and workplaces and a 20% increase in special consumption tax, occurred in Kahramanmaras and Konya provinces by 5% and 4%, respectively, right after the policy changes. However, the impact does not last for long, and in some instances, percent changes become even positive. When we come to 2017, it seems that the effect of anti-tobacco policies faded away for three of the provinces, including Izmir, Kayseri, and Istanbul.

Table 1. Percent changes of average cigarette consumption by five highest cigarette consuming provinces

Year	Izmir	Kayseri	Istanbul	Konya	Kahramanmaras
2010	-1.64	-1.82	-1.71	-4.19	-4.88
2011	-1.55	-0.75	-0.29	0.87	3.42
2012	1.69	1.13	1.52	1.94	0.47
2013	-1.76	-1.43	-1.79	-0.70	-4.36
2014	-0.45	0.31	-0.31	1.03	0.14
2015	1.71	2.35	0.95	1.66	2.53
2016	1.02	0.49	-0.82	0.36	0.13
2017	0.25	0.40	0.27	-0.69	-0.99

Source: Department of Tobacco and Alcohol. Authors' calculations

LITERATURE REVIEW

Since cigarette consumption is one of the serious health problems around the world, there are many studies examining cigarette consumption and demand. The literature on this issue might be divided into two strands. The first set of studies aims to explore various factors affecting cigarette demand. Of the preliminary studies, Hondroyiannis and Papapetrou (3) estimated the short-run and long-run price and income elasticities of cigarette consumption in Greece over the period 1960-1990. They used cointegration techniques and estimated vector error correction mechanisms to estimate the elasticities. They found that the price elasticity is negative, while the income elasticity of cigarette consumption is positive. They also showed that the long-run elasticities are higher in magnitude relative to short-run elasticities. Cameron and Collins (11) found that cigarette consumption, real GNP per capita, real cigarette price, and the school enrolment ratio have a long-run relationship in Turkey, and the 1981 health warning is significant on the cointegrated relationship.

Hsieh et al. (12) estimated elasticities for domestic and imported cigarettes in Taiwan during 1966-1995. Their study employed seemingly unrelated regressions methodology. They showed that domestic cigarettes are price inelastic, while the demand for imported ones is price elastic. Their findings also demonstrated that health regulations had a significantly negative impact on cigarette consumption. Nikolaou and Velentzas (13) analyzed the cigarette demand elasticities in Greece over the period between 1960 and 1990. Their findings showed that the magnitude of long-run price and income elasticities are higher than the short-run elasticities. They also provided a piece of evidence favoring the role of health warning packages in reducing cigarette consumption in Greece.

Fallahi et al. (14) examined the relationship between human development indicators and cigarette consumption in Malaysia throughout 1980 and 2012. They used Autoregressive Distributed Lag (ARDL) model and showed that education, income level, and the price of the cigarette is insignificant on cigarette consumption while the life expectancy at birth has a significantly negative impact on cigarette consumption. By employing household survey data and utilizing the two-stage least square model, Kidane et al. (15) found that the effect of the price changes is significantly negative in all income groups in Tanzania. They also demonstrated that age and education level are other significant factors explaining cigarette consumption. In another attempt to estimate the price and income elasticity of cigarette demand, Martinez, et al. (16) focused on Argentina and used monthly data over the period between 1994 and 2010. They found that the cigarette is a normal good with a positive income elasticity, and the cigarette demand is price inelastic in the long run. They also confirmed that the long-run elasticities are higher than the short-run elasticities in Argentina.

By employing the probit model, Sáez et al. (17) examined the impact of health expenditures, life expectancy at birth, income level, education level, marital status, occupational status, and social relationship on tobacco mortality in Spain. They confirmed that most of these factors are significant and are of the expected sign. In another existing study, Chang et al. (18) examined the causal relationship between cigarette consumption and happiness index in Japan, France, Germany, the UK, and the United States covering the period between 1961 and 2003. They utilized the panel causality and found the way of a causal relationship in each sample countries. Their findings demonstrated that the way of causality differs in sample countries. They found that there is a bidirectional causal relationship between cigarette consumption and happiness index in France, while the causality runs from happiness to cigarette consumption in Japan and the UK. However, their findings exhibited no causal relationship between cigarette consumption and happiness in Germany and the US. Zheng et al. (19) attempted to find the relationship between tobacco products by using a two-stage budgeting demand model in the United States. They found that the price elasticity of all tobacco products is negative. Also, they confirmed that e-cigarettes are substitutes for cigarettes, while smokeless tobacco is a complement for cigarettes.

Rodríguez-Iglesias et al. (20) aimed to estimate the price and income elasticity of cigarette demand and to examine the impact of tax increases on cigarette consumption and government tax revenues in Argentina. They employed cointegration tests and used the vector error correction mechanism. The price elasticity of demand seems to be inelastic, and the cigarette is found to be a normal good for Argentinian consumers in the long run. Their simulation results also confirmed that a hundred percent increase in the price of cigarettes via taxes results with a decline in cigarette consumption, but the government revenue would increase. Of the more recent studies, Jovanovic et al. (21) aimed at estimating the price and income elasticity of tobacco products in Serbia for the period between 2002 and 2016. They demonstrated that the price elasticity of tobacco products is inelastic, while the income elasticity seems to be positive. Besides, Tingum and Parrott (22) examined the price and income elasticity of domestic and imported cigarettes in Rwanda. They used both ARDL and the seemingly unrelated regression models. They estimated that the price elasticity of cigarette demand for imported ones is greater in magnitude than the domestic cigarettes. They also found that an increase in tax rates on cigarettes have a significantly negative impact on cigarette consumption. Lastly, Yıldız (23) found that income level, urbanization, and anti-tobacco policies increase cigarette consumption in Turkey, covering the period between 1960 and 2016. Moreover, his empirical results suggested that an increase in cigarette prices and education level mitigate cigarette consumption.

The second group of studies investigated the effectiveness of smoking banks and regulations on reducing cigarette consumption. Of these studies, Reinhardt and Giles (24) evaluated the impact of the tax increases on cigarette consumption in Canada. They argued that tax hikes seem to be more useful to reduce the number of cigarettes consumed than smoking bans. Adda and Cornaglia (25) investigated the role of taxes and smoking bans to mitigate passive smoking in the United States. They found that taxes are more effective than smoking bans. Warren et al. (6) examined the role of smoking banks in mitigating cigarette sales in Turkey. They confirmed that smoking banks decreased cigarette sales in the first six-month period.

Jones et al. (26) aimed at examining the impact of smoking bans on the level of smoking in the United Kingdom and Scotland. They employed the difference-in-difference panel fixed effects model and found that there is no significant impact of the smoking banks on the level of smoking. In another study, Verguet et al. (27) argued that the rise in the price of cigarettes through an increase in taxes would increase life gains and a tax gain for a government in China. San and Chaloupka (1) investigated the impact of tobacco control policies on the spending patterns of Turkish citizens. They found that the rise in smoking expenditures creates a crowding-out effect on food, durable, non-durable, and education expenditures. Lastly, Gonzalez-Rozada and Ramos-Carbajales (28) found that the rise in cigarette taxes does not result in a more significant decline in the smoking of relatively low-income families in Peru. Thus, these results imply that an increase in cigarette taxes are regressive in Peru.

MATERIAL AND METHODS

We utilize provincial monthly cigarette sales (in billions) data provided by the Department of Tobacco and Alcohol (TADB). We proxy monthly net cigarette sales data of producers for aggregate cigarette consumption, which covers the period of January 2009 through December 2017. Our primary outcome of interest here is per capita tobacco consumption across provinces, which we found by dividing monthly cigarette consumption by population using the annual population estimates from TurkStat. All the data are in logarithmic forms.

Phillips and Sul (9) propose a new technique on convergence analysis; namely, club convergence. There are some significant advantages of this test (9,29-31):

- It considers the full sample average and measures its relative convergence.
- It takes into account heterogeneities, which are based on a non-linear time-varying factor model.

- It considers heterogeneities, which is hinged on a non-linear time-varying factor model.
- It is robust to the unit root properties of the series.
- The results are unbiased and consistent.
- It eliminates the necessity of the ex-ante sample separation since it has a new data-driven algorithm to determine convergence subgroups' clusters.

Y_{it} is a variable for panel data where $i = 1, 2, \dots, N$ and $t = 1, 2, \dots, T$. N is the number of cross-section units, while T is the sample size. Generally, Y_{it} is decomposed into two components:

$$Y_{it} = g_{it} + a_{it} = \left(\frac{g_{it}+a_{it}}{u_t}\right) u_t = \vartheta_{it} u_t \quad [1]$$

where g_{it} is systematic, a_{it} is transitory components. Also, ϑ_{it} is a time-varying idiosyncratic element, while u_t is a common element. ϑ_{it} measures the distance between Y_{it} and u_t. So, one can test the convergence by testing whether ϑ_{it} converge to a constant, ϑ, by taking ratios. For this purpose, Phillips and Sul (9) define the relative transition parameter, h_{it}, that measures the loading coefficient relative to the panel average at time *t*:

$$h_{it} = \frac{Y_{it}}{\frac{1}{N}\sum_{i=1}^{N} Y_{it}} = \frac{\vartheta_{it}}{\frac{1}{N}\sum_{i=1}^{N} \vartheta_{it}} \quad [2]$$

The above equation also shows that h_{it} converges to unity, and the cross-sectional variance (H_t) converges to zero in the long-run (30,32). The procedure offered by Phillips and Sul (9) allows us testing the null hypothesis of the convergence against the alternative of non-convergence through *Log t* regression:

$$\log\left(\frac{H_1}{H_t}\right) - 2\log\{\log(t)\} = a + b\log(t) + \varepsilon_t \quad [3]$$

If the coefficient of the log(t) is greater or equal to zero, the convergence exists. On the other hand, if b is smaller than zero, the divergence of the full panel exists. It can be tested through a t-test. If the convergence is rejected for the full sample, one should investigate for the clubs (30).

Statistical Analysis

In this paper, Stata 14 is used to make a descriptive and empirical analysis. For this purpose, we also use the Stata code of Du (30) to conduct the club convergence analysis.

RESULTS

In this study, we examine the convergence of per capita cigarette consumption in Turkey to determine provincial/regional disparities. For that purpose, this study employs club convergence analysis proposed by Phillips and Sul (9). This paper considers 81 provinces, 26 subregions, and 12 regions in the analyses, respectively. Empirical findings of the study show that the full sample does not converge to a common value in Turkey regarding cigarette consumption per capita. However, it can be the case that subgroup convergence might exist across provinces, subregions, or regions. Thus, we also investigate the club convergence in cigarette consumption and find that relevant cities of a club move from their disequilibrium positions to their club-specific steady state. We do not report the all the econometric steps of the club convergence analysis including log t-test, club merging test, and log t-test after club merging because of page limits. However, they can be provided upon request.

Figure 4, Figure 5, and Figure 6 display club classifications of Turkey regarding per cigarette consumption for Nomenclature of Territorial Units for Statistics (NUTS) 3, NUTS 2, and NUTS 1, respectively. It is seen that two clubs exist considering 81 provinces (NUTS 3), while there are four convergence clubs and one club which is not converging in the NUTS 2 analysis. Besides, there are two convergence clubs and one club which is not converging in the NUTS 1 analysis. According to the empirical findings of club convergence in Turkey may exhibit

Figure 4. Club convergence results for 81 provinces (NUTS 3)
Source: Department of Tobacco and Alcohol. Authors' calculations

Figure 5. Club convergence results for 26 subregions (NUTS 2)
Source: Department of Tobacco and Alcohol. Authors' calculations

Figure 6. Club convergence results for 12 regions (NUTS 1)
Source: Department of Tobacco and Alcohol. Authors' calculations

distinct social and economic factors across provinces, while geographical factors have a limited effect.

According to the empirical findings, it is seen that policymakers should not conduct a common tobacco control policy in Turkey since more than one convergence club exist, which converges to different equilibriums.

In detail, our empirical findings provide some curious results. For instance, Istanbul and some other eastern and south eastern cities belongs to the same convergence clubs (e.g., Adiyaman, Agri, Igdir, Van). One of the main reasons behind this fact is that people who live in these cities have similar economic or cultural structures. Even though one can think that Istanbul is one of the major cities in Turkey regarding economic conditions, it is a major migration hub in the country. The cultural and economic level of the people varies across districts because of multiculturalism and income distribution. Therefore, its convergence pattern of cigarette consumption can show some similarities with other cities. Indeed, it can be better to utilize district-based data for Istanbul for such analyses; however, we cannot employ it due to data unavailability.

DISCUSSION AND CONCLUSION

In this study, we investigated cigarette consumption trends by regions after the two significant anti-tobacco policies in Turkey, including extending smoke-free public places and workplaces and a tax increase. We analyzed how different regions behaved concerning declining cigarette consumption after comprehensive smoke-free legislation.

Results from our analyses suggest that the initial effect of the expanded smoke-free environment and the tax increase has yielded a significant decline in cigarette consumption in different parts of Turkey. It seems that distinct regions behave differently to the policy changes in a way that some regions reduce their cigarette consumption considerably while some of the regions did not. What appears to be the most significant outcome to convey our message here is that the initial effect of the policy changes led to a considerable decline in cigarette consumption in regions of Turkey.

It is of utmost importance to note that having smoke-free legislation will not be enough to reduce smoking ill unless the authorities enforce the laws. Based on the empirical results, it was found that, since the regions in Turkey, even at the province level, show different patterns to anti-tobacco policies, we encourage the authorities to give more power to the local agencies and municipalities in enforcing the law in fighting against tobacco consumption. For this purpose, they can introduce policies to encourage people to reach healthier lifestyles and increase public awareness of smoking-associated health risks.

It is also important to note that what we are doing in this paper does not yield a causal analysis. Also, we cannot disentangle the effects of the two significant policy changes, including extended smoke-free environment and the 20% increase in special consumption tax on tobacco products. We also know that there could be other factors affecting the tobacco consumption pattern in distinct provinces and regions.

Our findings also provide some inferences for pandemic period health policies. The obvious link between cigarette consumption and the spread of the COVID-19 is likely to demonstrate the usefulness of different health policies and health services across regions. In other words, our results are likely to indicate that the need for more health services might be critical in heavy smoker regions. These findings also imply that instead of common policies across regions, different health policies might be more effective to prevent the spread of the COVID-19 in Turkey.

Having said that, Turkey's action against tobacco consumption has reduced cigarette consumption considerably. Although the long-term positive impact of these anti-tobacco policies will be seen in the future, we could certainly state that Turkey has made its movement toward declining premature deaths related to tobacco consumption. In Turkey's case, the important thing is the strong enforcement of all tobacco control policies by all joining parties in order to keep the initial declining effect of anti-tobacco policies. Furthermore, Turkey's experience is relevant for low- and middle-income countries, which aim to introduce nationwide anti-tobacco programs.

Limitations and Directions for Future Research

Further research should be undertaken to investigate the convergence of disaggregated tobacco products such as pipe tobacco, cigarette, cigar, electronic cigarettes, and hookah. Hereby, more detailed policies on tobacco products can be designed and implemented. Also, in addition to club convergence analysis, unit root and cointegration analyses can be employed to find the convergence pattern of tobacco consumption both in time series and panel setting.

Ethics Committee Approval: Since our study was not an experimental study including human or animal subject, ethics committee approval was not required.

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