Estimating the Optimal Excise Tax Rate on Cigarette in Iran

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Abstract

Background: Taxes are not only an important source of government revenue, but also one of the most important policy tools for tobacco control. The present study was designed to determine the optimal tax rate on cigarettes.

Methods: A descriptive-analytical study was conducted using the survey data from the Statistics Center of Iran from 2015 to 2019. The survey is carried out every year at the national level and households are selected by three-stage stratified sampling method. The inclusion criteria for our study were based on household information in the study period and its completeness and legibility. The Poisson regression model was used to estimate the factors affecting the quantity of cigarette demand in households with smoker members. The optimal tax rate on cigarettes was calculated based on the concept of Laffer curve. Statistical analysis was performed using Stata version 15.1.

Results: The study was performed on 191,648 Iranian households. The cigarette price elasticity of demand was around -0.24. There were statistically significant relationships between the cigarette demand and variables including having a member of 15-18 years in the family; having male member of 19-64 years; having a female member of 19-64 years old; the study periods; age, education level; and job status of the household head ($P<0.05$). According to the Laffer curve simulation, if cigarette tax rate is increased to account for 219% of the retail price, that will maximize incremental tax revenues at around US$2.39 billion.

Conclusion: The government can achieve public health goals as well as maximum tax revenues by raising cigarette taxes by almost 200% and raising the average price of a cigarette pack from $1 to about $3.

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Introduction

Tobacco consumption is one of the leading causes of preventable morbidity and mortality, posing a major challenge for public health in the world.[1] The most common type of tobacco consumption is cigarette smoking, which is known a major risk factor for a variety of conditions, including infectious, malignant, and cardiovascular diseases.[2]

The share of smoking in the global burden of disease as well as its economic cost is significant. For example, in 2012, the economic cost of smoking was estimated at about 1.8% of global gross domestic product (GDP), of which about 40% was in lower-middle income nations.[3] The increasing body of research on smoking has estimated the prevalence of cigarette consumption in Iran,[4-6] varying from 0.6 to 9.8% in women and 12.3 to 38.5% in men.[7]

Regardless of the high and growing prevalence, measures to reduce cigarette consumption in Iran

have not been taken successfully.[8] While tobacco taxation is the most effective approach for reducing tobacco demand, it has been weakly enforced in Iran so far compared to the other fractions of the World Health Organization (WHO) Eastern Mediterranean Region (EMR).[9, 10] On the other hand, the overall policy of the government in recent years has been in line with reduced budget reliance to oil revenues and increased the share of non-oil revenues, especially tax revenues through strengthening and modifying the tax system. Thus, taxes are not only an important source of government revenue, but also one of the most important policy tools for tobacco control.[11]

The efficiency of the taxation system and setting tax rates for different segments of a society so that it can have the highest revenue for governments by gaining maximum tax capacity is one of the concerns of governments and economic systems worldwide.[11] On the other hand, the government's action to earn tax revenue can have side effects. Therefore, taxes should be imposed in such a way that the least disruptive effect on the economic system is produced. The most important effect of tax disruption is to change the behavior of economic agents into the desired performance.[12]

Although previous studies have documented the prevalence and determinants of cigarette consumption as well as price elasticity of demand for it in Iran, no study has been conducted on estimating the optimal excise tax rate on cigarette. Therefore, the present study was designed to determine the optimal excise tax rate on cigarettes. The findings of this study can help the implementation of evidence-based policies by better understanding the tax capacity of cigarette as an important source of revenue for government and effective policy-making to reduce the prevalence of smoking and its consumption by smokers.

Methods

The present study was a descriptive-analytical study using the Households Income and Expenditure Survey (HIES) data from the Statistics Center of Iran (SCI) for the period from 2015 to 2019. The HIES is carried out every year at the national level and households are selected by three-stage stratified sampling method in both rural and urban areas. The tool used in the survey was the HIES questionnaire which was completed through an interview with the household head. The questionnaire collected data about the demographic, economic and social characteristics of household members. The details of the survey design are presented elsewhere (https://www.amar.org.ir/english). The inclusion criteria for our study were based on household information in the study period and its completeness and legibility.

First, the Poisson regression model was used to estimate the factors affecting the quantity of cigarette demand in households with smoker members. The number of cigarette sticks consumed by smokers were considered as the dependent variable. The independent variables included price per cigarette stick; income per adult equivalent per month; age, gender, education level, job and marital status of the head of the household; number of household members aged 15-18 years; number of male household members aged 19-64 years; number of female household members aged 19-64 years; and number of household members aged over 64 years. The coefficients of price and income variables obtained in this model were price elasticity of demand (PED) and income elasticity of demand (IED), respectively. Elasticity is the percentage of changes between two variables relative to each other. The PED and IED are very important elasticities in the economics. The PED is the percentage changes in the amount of demand for a good divided by the percentage changes in its price. In other words, the PED indicates the percentage decrease in the quantity of demand that would result from a 1% increase in the price. Likewise, IED is the percentage changes in the amount of demand for a good divided by the percentage change in income.[13]

Then, the optimal tax rate on cigarettes was calculated. In fact, the effects of the percentage increase in the retail price for a 20-stick pack of cigarettes were modeled.

The retail price of a cigarettes pack was calculated as follows:

$$P=P_P+T_E+T_{VAT}+T_0 \quad (1)$$

where P_p is net producer price, T_E is indirect tax added to a package, T_{VAT} is the value added tax, and T_0 is other taxes. In this model, we assume that all taxes are applied only to the retail price and also the effect of inflation on the producer price was considered constant. Therefore, the retail price of a cigarettes pack after taxation was calculated as follows:

$$P=P_P+T_E^*+T_{VAT}+T_0 \quad (2)$$

where T_E^* indicates the optimal tax rate.

When the price of a good increases through taxation, the consumer's reaction is to reduce the consumption of that good, where the magnitude of reduction depends on the PED. Therefore, by using the following formula, the amount of demand reduction and consequently supply reduction as a result of taxation (price increase) can be obtained:[14]

$$S^*=S\times(1+\Delta P\times\varepsilon_p) \quad (3)$$

Where S^* is the demand for cigarettes as a result of taxation, S is that before the taxation policy, ΔP is relative change in the retail price of cigarette, and ε_p is PED for cigarette.

In general, the government's revenue from cigarette tax is:

$$TR=t\times P\times Q(t) \quad (4)$$

where t stands for tax rate and Q for quantity demanded, which is a function of tax rate.

The optimal cigarette tax rate calculations were based on the concept of Laffer curve. The Laffer curve is a parabola that shows the relationship between the tax revenue and tax rate. This curve states that first by raising the tax rate from zero, the government tax revenue increases to a tax rate (t*) that maximizes the government tax revenue; and then with further tax increases, government tax revenues decrease. The Laffer curve is shown in Figure 1.[15]

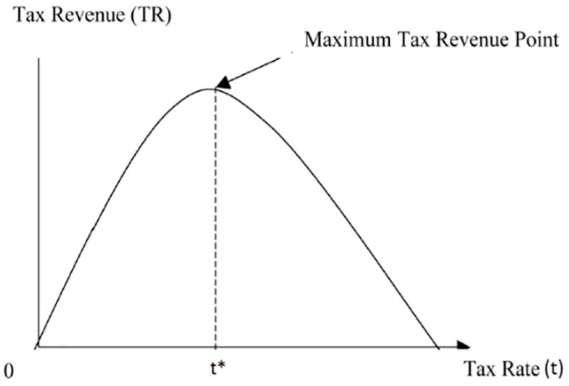

Figure 1: Laffer curve

Since it is assumed that the goal of the government is to maximize its revenue, differentiating equation (4) with respect to t (tax rate) gives the following first-order condition:

$$\frac{\partial R}{\partial t} = PQ + \left[tQ\ \frac{\partial P}{\partial t}(1 + \varepsilon)\right] \quad (5)$$

The change in tax revenue is obtained from the difference between the amount of sales before and after the taxation policy. Therefore, government revenues were calculated using the following formula:

$$TR = \sum S_{ante}\, Cig[t_2(1 + \varepsilon\Delta P) - t_1] \quad (6)$$

where TR is cigarette tax revenue, S_{ante} is the number of smokers before the taxation policy, *Cig* is the number of cigarette pack consumed per smoker per year, t_1 is the initial tax rate of a cigarettes pack (before the taxation policy), and t_2 is the secondary tax rate of a cigarettes pack (after the taxation policy).[16]

The average price of a cigarettes pack in Iran was extracted from a report of the WHO in 2019.[17] The number of cigarette sticks consumed per year were calculated by multiplying the average number of cigarette sticks consumed per smoker on 365 (number of days in a year) and the absolute number of smokers. The absolute number of smokers was calculated using the population at the age of 14 or above and the prevalence of smoking in both genders, which was extracted from the literature.[7] All statistical analyses were performed using Stata version 15.1 (StataCorp., College Station, TX, USA).

Ethics Statement

The study was approved by Zahedan University of Medical Sciences Ethics Committee (code: IR.ZaUMS.REC.1399.528).

Results

The study was carried out on 191,648 Iranian households using the HIES data from the SCI from 2015 to 2019. The mean income per adult equivalent per month was 25,200,000 (61,000,000) Rials for the samples. The mean price per cigarette stick was 1708 (7711) Rials. On average, one US dollar equaled 35,824 Iranian Rials by the governmental rate during the study period (https://www.cbi.ir/default_en.aspx). Approximately 63% of the household heads had diploma or less and about 67% of them were employed. Most of the household heads were aged 31-50 years (45.63%) and male (86.12%). Other descriptive statistics of the socio-economic variables of the samples are shown in Table 1.

Table 2 presents the factors affecting the amount of cigarette demand (cigarette sticks consumption) in households with smoker members. The Poisson regression analysis showed statistically significant relationships between the cigarette demand and price per cigarette stick (P=0.000). In other words, the cigarette PED was around -0.24, which means that 10% increase in real prices reduces the total cigarette consumption by 2.42%. There were also statistically significant relationships between the cigarette demand and variables including having a member aged 15-18 years (P<0.001), having a male member aged 19-64 years (P<0.001), having a female member aged 19-64 years (P=0.018), and the study periods (year 2017, P=0.031; year 2018, P<0.001; year 2019, P<0.001). In addition, the analysis showed statistically significant relationships between the cigarette demand and variables related to the household heads, including age (P<0.001), education level (associate/bachelor degree, P<0.001; master degree, P<0.001), and job status of the household head (retired/pensioner, P<0.001; other jobs, P=0.012).

The cigarette IED was around 0.007, which means that 100% increase in real income raised the consumption by 0.71%, but this relationship was not statistically significant (P=0.101). There were also no significant relationships between the cigarette demand and variables such as having a member aged over 64 years (P=0.452), marital status (widowed, P=0.047; divorced, P=0.352; single, p=0.154), and gender status of household head (P=0.793).

As shown in Figure 2, the optimal tax rate that can maximize the cigarette tax revenue of the government is 219%. In other words, the maximum potential cigarette tax revenue of the government through the implementation of the taxation policy will be around 2.39 billion USD.

Table 1: The descriptive statistics of the socio-economic variables of the samples

Variable	Values [a]
Income per adult equivalent per month [b] (IRR [c])	25,200,000±61,000,000
Having member of 15-18 years	19
Having male member of 19-64 years	80
Having female member of 19-64 years	88
Having member over 64 years	24
Having at least a smoker member	16
Cigarette stick consumption per smoker per month	503±322.21
Price per cigarette stick (IRR [c])	1708±7711
Education level of household head	
Illiterate	26
Diploma or less	63
Associate/bachelor	9
Master	1.7
PhD	<1
Job status of household head	
Employed	66.64
Unemployed	2.43
Retired/pensioner	27.82
Student	<1
House keeper	1.59
Others	1.46
Marital status of household head	
Married	84.63
Widowed	12.93
Divorced	1.23
Single	1.22
Age of household head	
13-30	7.21
31-50	45.63
51-70	34.02
<70	13.14
Gender of household head	
Male	86.12
Female	13.88

[a]Variables are expressed as percentage frequency or mean±SD. [b]It was calculated by dividing the total household income by the square of the household size. [c]Iranian rials

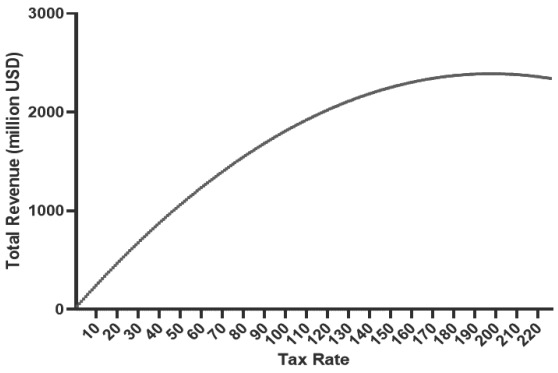

Figure 2: Laffer curve simulation in Iran

Discussion

There are various policies used to reduce the health and economic burden of smoking by controlling its consumption. One of the most important policies is to reduce the demand for cigarettes by adjusting their prices. Imposing different types of taxes is one of the main strategies of price regulation to prevent the start of smoking and increase the rate of smoking cessation. In addition, imposing high taxes increases the revenue of the government, which can be used to finance healthcare and different economic development programs.[18]

Based on our measurement, cigarette was price inelastic with coefficient around -0.24, which means that 10% increase in real prices reduces the total cigarette consumption by 2.42%. This result seems to be consistent with those of other researches performed in Iran which found the cigarette PED at -0.27 and -0.45.[19, 20] The results of a study conducted recently by Homaie Rad et al. also reported this figure between - 0.42 and - 0.56 for local brand cigarettes.[13] Moreover, the global evidence for cigarettes suggests that demand for it is inelastic.[21-25] Tobacco companies oppose to increase tobacco taxes and frequently argue that raising taxes on a cigarette brand may lead to substitution by less taxed, cheaper, or smuggled cigarettes; consequently, the reduction in consumption may be only for that brand and the government's

Table 2: Factors affecting the amount of cigarette demand in households with smoker members using Poisson regression

Variables		Coefficient	Standard error	Z	P>|z|	95% Confidence Interval	
						Lower	Upper
Dependent variable Cigarette stick consumption							
Independent variables							
IPAE[a]		0.00712	0.00433	1.64	0.101	-0.0014	0.01561
Price per cigarette stick		-0.2419	0.00962	-25.15	<0.001	-0.2607	-0.223
Age of household head		0.00237	0.00043	5.54	<0.001	0.00153	0.0032
Education level of household head	Illiterate[b]						
	Diploma and lower	-0.0064	0.02423	-0.26	0.791	-0.0539	0.04107
	Associate/bachelor	-0.1222	0.03002	-4.07	<0.001	-0.181	-0.0633
	Master	-0.2165	0.05166	-4.19	<0.001	-0.3178	-0.1153
	PhD	0.00901	0.13603	0.07	0.947	-0.2576	0.27562
Having member of 15-18 years	No[b]						
	Yes	0.0326	0.00749	4.35	<0.001	0.01792	0.04728
Having male member of 19-64 years	No[b]						
	Yes	0.07638	0.00544	14.04	<0.001	0.06571	0.08704
Having female member of 19-64 years	No[b]						
	Yes	0.01533	0.00646	2.37	0.018	0.00267	0.02799
Having member over 64 years	No[b]						
	Yes	0.00751	0.00999	0.75	0.452	-0.0121	0.0271
Job status of household head	Employed[b]						
	Unemployed	0.01439	0.01961	0.73	0.463	-0.024	0.05282
	Retired/ pensioner	-0.0646	0.01113	-5.81	<0.001	-0.0864	-0.0428
	Student	0.39011	0.20812	1.87	0.061	-0.0178	0.79802
	House keeper	-0.0387	0.06299	-0.61	0.539	-0.1621	0.0848
	Others	0.07408	0.02932	2.53	0.012	0.01661	0.13156
Marital status of household head	Married[b]						
	Widowed	-0.0527	0.02654	-1.98	0.047	-0.1047	-0.0006
	Divorced	0.03397	0.0365	0.93	0.352	-0.0376	0.1055
	Single	0.05881	0.04128	1.42	0.154	-0.0221	0.13971
Gender of household head	Male[b]						
	Female	-0.0078	0.02974	-0.26	0.793	-0.0661	0.05046
Period	2015[b]						
	2016	0.00395	0.0109	0.36	0.717	-0.0174	0.02532
	2017	0.02332	0.01078	2.16	0.031	0.00219	0.04445
	2018	0.1337	0.01856	7.2	<0.001	0.09732	0.17008
	2019	0.17865	0.01616	11.05	<0.001	0.14698	0.21033

Log pseudolikelihood=-2756307.2, Number of observations=28844, Wald chi2 (25)=1483.12, Prob>chi2=0.0000, Pseudo R2=0.0528

[a]Income per adult equivalent per month; [b]Reference group

revenue also decreases. Governments need to make sure that the tax system is properly designed to relieve these challenges. However, empirical evidence shows that increasing tobacco taxes, even in the case of substitution, increases the government revenues and may reduce the negative health and economic consequences. In addition to the PED, the potential revenue of the government also depends on the share of taxes on the price of cigarette.[26]

According to the results, as supported by other studies,[19, 20, 27, 28] there was an inverse relationship between the cigarette demand and education level of the household head. Evidence shows that education level is a factor affecting health literacy, and increasing the level of education can play a facilitating role in enhancing health literacy.[29] Therefore, less educated people usually underestimate the health outcomes of smoking and the risk of getting to be dependent on cigarettes.[27, 30]

The present findings demonstrated that there was a statistically significant positive relationship between the age of the household heads and cigarette demand. Also, as the number of household members aged 15-18 and 19-64 years increased, the demand for cigarettes increased. These results seem to be consistent with other studies which concluded that as people got older, the average number of cigarettes smoked per day increased.[31-34] According to a study conducted in Tehran, the prevalence of cigarette smoking in people aged 15 years and older increased with age, peaked at the age of 35-45 years, and then declined. Moreover, the findings of a study carried out in Sri Lanka indicated that tobacco consumption was mostly prevalent among middle-aged people.[28]

Although no regular pattern was found in the relationship between the cigarette demand and job status of the household head, the results revealed

that the cigarette demand was significantly lower in households with a retired or pensioner head than those with an employed head. The possible explanation is that retirees and pensioners have more leisure time and are usually older; thus, they have a longer history of smoking. Studies by Mohamadi et al.[19] and Gorji et al.[20] showed that rising unemployment rate increased cigarette smoking.

Our findings showed that there was a positive trend in cigarette demand compared to 2015 in households with smoker members. Other reports also suggest that cigarette smoking has increased among Iranian younger people in the last two decades.[35,36] Meanwhile, in a study by Meysamie et al., the trend of cigarette smoking was shown to have decreased in general population.[37] In spite of anti-tobacco laws, the sale of cigarettes is done in Iran in public places. Therefore, easy access and low price of cigarettes, along with the increase in the countrypopulation, can be the possible reasons for the increased cigarette demand.

According to the Laffer curve simulation (Figure 2), if cigarette tax rate is increased to account for 219% of the retail price, that will maximize incremental tax revenues at around US$2.39 billion. In other words, raising the tax rate up to this point will increase the revenue and raising beyond this point reduces the revenue. This is far from the current tax rate, which is 21% of the retail price. However, according to the WHO, the tax rates levied on tobacco products should be at least 70% of the retail price. Therefore, there is a lot of potential to increase the price of tobacco in Iran, but it has one of the lowest tobacco tax rates in the world; after Afghanistan, Iran has the lowest tobacco tax rate in the EMR.[38] Respective literature shows that many countries are still on the ascending part of the Laffer curve, meaning that raising tobacco tax rates will increase the government revenue. A study conducted by Mohamed Nor et al. in Malaysia using data from 1980 to 2009 found that the optimal cigarette tax rate was 21.56%.[15] In another study carried out by George in Malaysia also the optimal optimum tax rate was calculated at 35% and 35-42% for companies and individuals, respectively.[39] In a study by Rodríguez-Iglesias et al. in Argentina, the Laffer point was estimated at 146%, 212%, and 237% in the low-revenue, neutral, and favorable scenarios, respectively.[22] The results of another study in Argentina showed that if the cigarette tax rate is increased up to 87% of the price, the tax revenues will increase at US$1.6 billion.[19]

The main limitation of the study was that the estimates were according to a pooled consecutive cross-sectional data, so our investigation may not show the long-run effects. Secondly, we excluded the possibility of switching to cheaper cigarette brands and smuggling issue that may affect the tax revenues gains. Thirdly, it should be noted that owing to the scarcity of data our estimations do not include the role of predominant stakeholders and the Iranian tobacco tax structure.

Conclusion

Cigarette consumption can be reduced by implementing policies such as public education campaigns through the mass media and bans on promotion, advertisement, and sponsorship for tobacco companies. These policies are needed to couple with a dramatical increase in the cigarette taxes and, consequently, its price. The tax increase should include all tobacco products to prevent substitution. A one-time tax increase is not enough, and periodic adjustments are needed to offset the impacts of growing affordability in an inflationary condition like Iran.

Based on the findings of this study, the government can achieve public health goals as well as maximum tax revenues by raising cigarette taxes by almost 200% and increasing the average price of a cigarette pack from $1 to about $3. Determining the optimal tax rate on cigarettes is necessary but not sufficient for successful taxation policies. Tax structure analysis is essential for implementing sustainable and effective policies.

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Conflict of Interest: None declared

References

1 World Health Organization (WHO). Tobacco. https://www.who.int/news-room/fact-sheets/detail/tobacco. Accessed January 2, 2021.

2 Reitsma MB, Fullman N, Ng M, Salama JS, Abajobir A, Abate KH, et al. Smoking prevalence and attributable disease burden in 195 countries and territories, 1990–2015: a systematic analysis from the Global Burden of Disease Study 2015. Lancet. 2017;389(10082):1885-906. doi: 10.1016/S0140-6736(17)30819-X. PMID: 28390697; PMCID: PMC5439023.

3 Goodchild M, Nargis N, d'Espaignet ET. Global economic cost of smoking-attributable diseases. Tob Control. 2018;27(1):58-64. doi: 10.1136/tobaccocontrol-2016-053305. PMID: 28138063; PMCID: PMC5801657.

4 Nemati S, Rafei A, Freedman ND, Fotouhi A, Asgary F, Zendehdel K. Cigarette and water-pipe use in Iran: geographical distribution and time trends among the adult population; a pooled analysis of national STEPS surveys, 2006–2009. Arch Iran Med. 2017;20(5):295-301. PMID: 28510465.

5 Baheiraei A, Soltani F, Ebadi A, Foroushani AR, Cheraghi MA. Risk and protective profile of tobacco and alcohol use among Iranian adolescents: a population-based study. Int J Adolesc Med Health. 2016;29(3):1-9. doi: 10.1515/ijamh-2015-0089. PMID: 26982610.

6 Etemadi A, Khademi H, Kamangar F, Freedman ND, Abnet CC, Brennan P, et al. Hazards of cigarettes, smokeless tobacco and waterpipe in a Middle Eastern Population: a Cohort Study of 50 000 individuals from Iran. Tob Control. 2017;26(6):674-82. doi: 10.1136/tobaccocontrol-2016-053245. PMID: 27872345; PMCID: PMC5767941.

7 Moosazadeh M, Ziaaddini H, Mirzazadeh A, Ashrafi-Asgarabad A, Haghdoost AA. Meta-analysis of smoking prevalence in Iran. Addict Heal. 2013;5(3-4):140-53. PMID: 24494171; PMCID: PMC3905476.

8 Heydari GH, Ebn Ahmady A, Lando HA, Chamyani F, Masjedi M, Shadmehr MB, et al. A qualitative study on a 30-year trend of tobacco use and tobacco control programmes in Islamic Republic of Iran. East Mediterr Health J. 2016;22(5):335-42. doi: 10.26719/2016.22.5.335. PMID: 27553400.

9 Heydari GH, Talischi F, Algouhmani H, Lando HA, Ebn Ahmady A. WHO MPOWER tobacco control scores in the Eastern Mediterranean countries based on the 2011 report. East Mediterr Health J. 2013;19(4):314-9. PMID: 23882955.

10 Heydari GH, Ebn Ahmady A, Lando HA, Shadmehr MB, Fadaizadeh L. The second study on WHO MPOWER tobacco control scores in Eastern Mediterranean Countries based on the 2013 report: improvements over two years. Arch Iran Med. 2014;17(9):621-5. PMID: 25204478.

11 Tari F, Pourdehghan Ardakan M. Estimation of Regional Taxable Capacity Case Study: Yazd Province [in Persian]. QJERP. 2012;20(63):189-206.

12 Samimi AJ, Potanlar SK, Azami K. The Use of an Endogenous Growth Model to Calculate the Optimal Rate of Value Added Tax with Emphasis on Harmful Products and Waste [in Persian]. Q J Econ Model. 2016;10(34):95-113.

13 Homaie Rad E, Pulok MH, Rezaei S, Reihanian A. Quality and quantity of price elasticity of cigarette in Iran. Int J Health Plann Manage. 2020; 36(1):60-70. doi: 10.1002/hpm.3062. PMID: 32840879.

14 World Health Organization (WHO). WHO Report on the Global Tobacco Epidemic, 2017: Monitoring Tobacco Use and Prevention Policies. Geneva: World Health Organization; 2017.

15 Mohamed Nor N, Raja Abdullah NM, Rampal L, Mohd Noor Z. An Optimal Cigarette Tax in Malaysia. Int J Econ Manag. 2013;7(2):205-20.

16 Verguet S, Gauvreau CL, Mishra S, MacLennan M, Murphy SM, Brouwer ED, et al.The consequences of tobacco tax on household health and finances in rich and poor smokers in China: an extended cost-effectiveness analysis. In: Economics of Tobacco Control in China: From Policy Research to Practice. World Scientific; 2016:215-243. doi: 10.1142/10007.

17 World Health Organization (WHO). WHO Report on the Global Tobacco Epidemic, 2019; Country Profile Iran (Islamic Republic Of); 2019. https://www.who.int/tobacco/surveillance/policy/country_profile/irn.pdf. Accessed January 2, 2021.

18 World Health Organization (WHO). WHO technical manual on tobacco tax policy and administration. In: WHO Technical Manual on Tobacco Tax Policy and Administration. Geneva: World Health Organization; 2021.

19 Mohamadi T, Hoseini L. Demand For Smoking in Iran [in Persian]. Iranian Journal of Economic Research. 2010;15(44):173-198.

20 A Gorji H, Mohammadi T, Hosseini L. Cigarette price and smoking rate in 1983-2005 period in Iran [in Persian]. J Heal Adm. 2010;12(38):31-36.

21 Nguyen N, Nguyen AN. Price elasticity estimates of cigarette demand in Vietnam using survey data. Tob Induc Dis. 2021;19(1). doi: 10.18332/tid/140899.

22 Rodríguez-Iglesias G, Schoj V, Chaloupka F, Champagne B, González-Rozada M. Analysis of cigarette demand in Argentina: the impact of price changes on consumption and government revenues. Salud Publica Mex. 2017;59(1):95-101. doi: 10.21149/7861. PMID: 28423115.

23 Dauchy E, Ross H. The effect of price and tax policies on the decision to smoke among men in Kenya. Addiction. 2019;114(7):1249-63. doi: 10.1111/add.14623. PMID: 30912225.

24 Jha P, Chaloupka FJ. The economics of global tobacco control. Bmj. 2000;321(7257):358-61. doi: 10.1136/bmj.321.7257.358. PMID: 10926598; PMCID: PMC1118333.

25 Chaloupka FJ, Straif K, Leon ME. Effectiveness of tax and price policies in tobacco control. Tob control. 2011;20(3):235-8. doi: 10.1136/tc.2010.039982. PMID: 21115556.

26 Blecher E. Increasing tobacco taxes significantly will increase revenues. A Tobacconomics Policy Brief. Tobacconomics, Heal Policy Center, Inst Heal Res Policy. 2018.

27 Armoutaki AG. Empirical research and analysis on cigarette consumption, excise taxation and government revenues. Doctoral Thesis. Pireas: University of Piraeus; 2020. doi:10.26267/unipi_dione/301.

28 Arunatilake N, Opatha M. The economics of tobacco in Sri Lanka. Washington, DC: World Bank; 2003. doi: 10.11588/xarep.00003860.

29 Aljassim N, Ostini R. Health literacy in rural and urban populations: A systematic review. Patient Educ Couns. 2020;103(10):2142-154. doi: 10.1016/j.pec.2020.06.007. PMID: 32601042.

30 Siahpush M, Heller G, Singh G. Lower levels of

occupation, income and education are strongly associated with a longer smoking duration: multivariate results from the 2001 Australian National Drug Strategy Survey. Public Health. 2005;119(12):1105-10. doi: 10.1016/j.puhe.2005.03.004. PMID: 16085150.

31 Hu L, Sekine M, Gaina A, Nasermoaddeli A, Kagamimori S. Association of smoking behavior and socio-demographic factors, work, lifestyle and mental health of Japanese civil servants. J Occup Health. 2007;49(6):443-52. doi: 10.1539/joh.49.443. PMID: 18075204.

32 Emami H, Habibian S, Salehi P, Azizi F. Pattern of smoking habit in an urban area in Tehran, 2001: Tehran glucose and lipid study [in Persian]. Research in Medicine. 2003;27(1):47–52.

33 Graham H, Der G. Patterns and predictors of tobacco consumption among women. Health Educ Res. 1999;14(5):611-8. doi: 10.1093/her/14.5.611. PMID: 10510069.

34 Farshi S, Sedaghat M, Meysamie A, Abdollahi E. Association of socio-demographic characteristics and cigarette smoking: savodjbolaq city inhabitants [in Persian]. Tehran Univ Med J. 2008;65(14):32-40.

35 Sadeghi-Gandomani HR, Derakhshanjazari M, Salehiniya H. Cigarette Smoking – a threat to development in Iran. JAMA. 2014;311:183-92. doi: 10.32113/wcrj_201712_968.

36 Mohammadpoorasl A. Increasing the trend of smoking in iranian adolescents. Iran J Public Health. 2013;42(10):1197-8. PMID: 26060632; PMCID: PMC4436552.

37 Meysamie A, Ghalehtaki R, Ghodsi S, Esteghamati A, Mohammad K, Etemad K, et al. Trend of cigarette smoking in Iranian adult population from 2000 to 2011 based on four national surveys. Soc Determ Heal. 2017;3(3):148-59. doi: 10.22037/sdh.v3i3.18273.

38 World Health Organization (WHO). WHO report on the global tobacco epidemic 2019: offer help to quit tobacco use. Geneva: World Health Organization; 2020.

39 George S, Agil SOS. The effects of tax rates on its revenue and growth:A case study of Malaysia. J Glob Bus Econ. 2013;6(1):18-48.