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Article

Breaking the habit: The impact of tobacco taxation on smoking behavior

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Abstract: Objective: This study investigates the influence of tobacco prices on consumption habits among 200 smokers in Lisbon, Portugal, focusing on generational preferences and perceptions of tobacco taxes. **Methods:** A cross-sectional survey was conducted using a quantitative approach. Participants were categorized by generational cohort, and data on tobacco consumption types, awareness of tobacco taxes, and opinions on tax increases were collected. Statistical analyses were used to explore relationships and predictors. **Results:** Findings reveal that 46.5% of participants favored heated tobacco, 37.0% smoked cigarettes, and 16.5% consumed other types like roll-your-own tobacco and electronic cigarettes. Significant generational differences were observed, with older cohorts predominantly smoking cigarettes (51.5%), while Generation Z showed a preference for heated tobacco (55.2%). Most smokers (79.5%) were aware of tobacco taxes, with diverse opinions on their purpose: revenue generation (44.0%), consumption reduction (44.5%), and indifference (11.5%). Despite this awareness, 60.5% reported no change in consumption habits due to tax increases. **Conclusion:** The study underscores the complexity of tobacco consumption behaviors influenced by price and generational factors. While heated tobacco gains popularity among younger smokers, traditional cigarettes remain prevalent among older cohorts. The findings highlight challenges in tobacco control policies, suggesting a need for comprehensive strategies integrating price measures with targeted educational and cessation interventions to effectively reduce tobacco use across different generations.

Keywords: tobacco taxation; smoking behavior; public health; consumer behavior

1. Introduction

Smoking remains a significant global health issue, with the World Health Organization (WHO, 2023) reporting that tobacco kills more than 8 million each year, including 1.3 million non-smokers who are exposed to second-hand smoke.

These numbers are projected to escalate, with tobacco-related deaths expected to surpass eight million per year by 2030 (Prigitano et al., 2020). The persistent rise in tobacco consumption and its associated mortality underscores the urgency of understanding factors that can mitigate this public health crisis (Holipah et al., 2020). Therefore, a series of economic measures have been implemented, encompassing stringent regulations on the sale and consumption of tobacco products as well as pricing strategies aimed at discouraging consumption (Sheikh et al., 2023).

According to Nargis et al. (2021), increasing the cost of tobacco products significantly reduces consumption by making them less accessible, particularly among younger populations lacking financial autonomy. This premise is corroborated by a body of research (Alotaibi and Alsanea, 2022; He et al., 2018; Merkaj et al., 2024)

suggesting that price increases through taxation can exert a substantial influence on tobacco consumption behaviors.

Numerous studies worldwide have explored this topic, with the United States conducting a long-term study from 1970 to 2006, providing clear indications of how taxes function. These taxes offer a dual benefit to governments: reducing tobacco consumption and funding treatments for tobacco-related effects. However, there is a reason for the lack of prohibition or more significant tax increases, namely smuggling. Governments must strike a balance to avoid significant disruptions, as increased smuggling often accompanies such measures.

Furthermore, empirical studies have underscored the role of tobacco taxation as a potent tool for tobacco control. Research by Guindon et al. (2003) emphasizes the efficacy of higher tobacco prices in reducing tobacco use, saving lives, and generating revenue, particularly in regions like South-East Asia. Similarly, Jha and Chaloupka (2000) shed light on the global economic implications of tobacco control policies, emphasizing the potential for substantial public health gains through taxation.

Moreover, the effectiveness of tobacco taxation is not uniform across all demographic groups. Differential responses to price changes among various populations, as highlighted by studies such as those by Blecher and van Walbeek (2004) and Cummings et al. (2009), underscore the importance of equity considerations in designing tobacco control strategies. Understanding the socioeconomic determinants of smoking behavior is crucial for crafting policies that effectively reduce tobacco use while minimizing disparities.

In addition to taxation, comprehensive tobacco control strategies often incorporate a range of interventions, including smoking bans, public education campaigns, and smoking cessation programs. Systematic reviews by Hoffman and Tan (2015) and Hopkins et al. (2010) provide robust evidence supporting the effectiveness of smoke-free policies and mass media campaigns in reducing smoking prevalence. These findings underscore the importance of adopting a multifaceted approach to tobacco control, leveraging synergies between various interventions to maximize impact.

According to the Portuguese Special Consumption Tax Code, Chapter III, Article 101, tobacco tax applies to cigars, cigarillos, cigarettes, smoking tobaccos (including fine-cut tobacco for rolling cigarettes), and other smoking tobaccos, excluding water pipes, water pipe tobacco, snuff, chewing tobacco, heated tobacco, liquid with or without nicotine in containers used for charging and recharging electronic cigarettes, reusable or not. The tobacco tax, as outlined by Tapadas (2023), serves the dual purpose of revenue generation and discouraging the consumption of tobacco products due to the societal costs associated with tobacco use, which are not factored into their pricing by private economic agents but should be borne by consumers. Moreover, this tax serves an extra-fiscal purpose, acting as an instrument of sectoral policies, particularly in health and environmental sectors. Martinez (2024) supports this perspective, emphasizing that the primary motivation behind imposing such taxes is to influence and alter consumption behaviors. By increasing the costs of harmful products, governments aim to deter excessive consumption.

Government intervention becomes imperative, either through awareness campaigns or, more effectively, by reducing consumers' purchasing power through

higher taxes. As Chaloupka (1999) argues, tobacco consumption follows basic economic principles: higher prices lead to reduced consumption.

Initially, restrictions on tobacco brand advertising were imposed, followed by the implementation of consumption taxes. These measures succeeded in curbing tobacco consumption, as evidenced by Philip Morris's statement that increases in consumption taxes had an adverse impact on cigarette sales. However, concerning tobacco consumption among youth, DeCicca, Kenkel, and Mathios found that tax increases might have different impacts on initiation behaviors in youth compared to cessation behaviors in adults. Their analysis suggests that tobacco prices have little influence on youth initiation, prompting the need for alternative policies to prevent youth initiation.

Overall, the theoretical framework surrounding tobacco taxation and control policies is multifaceted, drawing upon insights from economics, public health, and behavioral science. By synthesizing evidence from diverse disciplines, policymakers can develop strategies that effectively reduce tobacco consumption, improve public health outcomes, and promote social equity.

This investigation falls within this theme and aims primarily to analyze whether the price of tobacco affects consumption habits. Additionally, it seeks to determine if the type of tobacco smoked by participants is associated with their generational cohort and to understand the relationship between the type of tobacco and consumption habits. By addressing these objectives, the research aims to contribute valuable information for the development of effective tobacco control policies. Understanding these dynamics is crucial for public health officials and policymakers who strive to design interventions that reduce smoking prevalence and mitigate its harmful health impacts. The findings of this study could provide strategies that utilize economic tools to promote healthier behaviors and reduce the global burden of tobacco-related diseases.

2. Theoretical framework

2.1. Tobacco consumption in adolescence: Challenges and implications

Adolescent tobacco consumption presents a significant public health challenge with profound implications across short, medium, and long-term timescales (Cullen et al., 2018). The adolescent brain undergoes critical developmental processes, rendering it particularly susceptible to the neurobiological impacts of nicotine addiction (Leslie, 2020). Initiation of tobacco use during this developmental period increases the likelihood of early nicotine dependence, potentially establishing a lifelong trajectory of tobacco consumption. This prolonged exposure elevates the risk of developing severe health conditions, including malignancies and respiratory diseases (McGrath-Morrow et al., 2020).

Recent statistics reveal that the first contact with tobacco often occurs during adolescence, with many occasional users becoming regular smokers (Centers for Disease Control and Prevention [CDC], 2020). According to the WHO, in 2020, one in seven boys and one in eight girls in Generation Z used some form of tobacco. Pavlikova et al. (2023) reported that Europe had approximately 3.9 million adolescent tobacco users a year ago.

The type of tobacco consumed exhibits generational variability, reflecting the evolution of cultural, socioeconomic, and marketing dynamics over time. Older smokers, who matured during an era when traditional cigarettes were heavily marketed and widely accepted socially, predominantly prefer conventional cigarettes (Kraus et al., 2022). Conversely, the younger generation of smokers exhibits a growing predilection for alternative tobacco products such as e-cigarettes and vaping devices (O'Brien et al., 2021). This shift can be largely attributed to marketing strategies promoting these products as less harmful alternatives to traditional cigarettes.

Moreover, the convenience, diverse flavor options, and technological advancements associated with vaping devices appeal to a younger demographic that values innovation and the personalization of their consumption experience (Perikleous et al., 2018). Supporting this trend, a meta-analysis by Sun et al. (2022) revealed that adolescents are more likely to consume heated tobacco products compared to older smokers. Based on these observations, the following research hypothesis is posited:

Hypothesis 1: The type of tobacco consumed is related to the generation to which smokers belong.

2.2. Relationship between types of tobacco and consumption patterns

The relationship between types of tobacco and consumption patterns is mediated by several factors, including individual preferences, cultural influences, and market trends (Ramanarayanan and Rajeev, 2020). Traditional cigarettes remain prevalent, particularly among older generations who exhibit brand loyalty and consistent consumption behaviors over time (Adermark et al., 2021).

Approximately a decade ago, the market witnessed the introduction of electronic cigarettes and heated tobacco products, which have since gained substantial popularity, especially among younger demographics (O'Brien et al., 2021). These products, which offer a variety of flavors and are perceived as less harmful than conventional cigarettes, have attracted new consumers and significantly altered consumption patterns (Kraus et al., 2022).

The consumption of smokeless tobacco is generally favored by individuals seeking alternatives to traditional cigarettes due to health concerns or smoking restrictions in certain environments (Polosa, 2021). Additionally, these products are frequently adopted by those attempting to quit smoking or explore new forms of tobacco. Prigitano et al. (2020) highlight that approximately 20% of ex-smokers successfully quit smoking with the aid of electronic cigarettes. These observations lead to the formulation of the second research hypothesis:

Hypothesis 2: The type of tobacco is related to consumption habits.

2.3. Influence of prices on consumption habits: The role of tobacco taxation

Tobacco taxation operates within a complex interplay of economic, public health, and behavioral factors (Verguet et al., 2021). The economics of smoking have been extensively studied, with numerous studies (Alotaibi and Alsanea, 2022; Nargis et al., 2021; Ngo et al., 2024) demonstrating a significant relationship between tobacco prices and consumption behavior. Research conducted by Merkaj et al. (2024) offers

comprehensive insights into the price elasticity of cigarette demand among various populations, underscoring the critical role of price sensitivity in determining the efficacy of tobacco tax policies.

Peruga et al. (2021) argue that tobacco taxation constitutes a potent tool for controlling tobacco consumption. Alotaibi and Alsanea (2022) emphasize that these measures are effective; as tobacco prices increase, consumption decreases. These initiatives contribute not only to saving lives and generating revenue but also to the broader economic implications of global tobacco control policies, highlighting the potential for substantial public health gains through taxation.

The effectiveness of tobacco taxation is not uniform across all demographic groups, with varying responses to price increases across different generations (Nargis et al., 2021). Understanding the socioeconomic determinants of smoking behavior is crucial for developing policies that effectively reduce tobacco consumption (Ramanarayanan and Rajeev, 2020). In addition to taxation, comprehensive tobacco control strategies include smoking bans, public education campaigns, and smoking cessation programs. Studies by Flor et al. (2021) provide robust evidence supporting the effectiveness of these policies and social media campaigns in reducing smoking prevalence. These findings highlight the importance of a multifaceted approach that leverages the synergies of various interventions to maximize control over tobacco consumption (Le Foll et al., 2022).

Tobacco taxes serve the dual purpose of generating revenue and discouraging the consumption of tobacco products (Tapadas, 2023). Additionally, this tax serves an extra-fiscal purpose by functioning as an instrument for sectoral policies, particularly in health and the environment. Martinez (2024) supports this perspective, emphasizing that the primary motivation behind imposing such taxes is to influence and change consumption behaviors. By increasing the costs of harmful products, governments aim to dissuade excessive consumption (He et al., 2018).

The issue of tobacco use has become increasingly sensitive due to its adverse health effects, including lung cancer, heart disease, strokes, and chronic respiratory conditions such as chronic obstructive pulmonary disease (COPD). Despite widespread awareness of the negative and addictive consequences of tobacco, consumption continues to rise, particularly among young people (Perikleous et al., 2018). Therefore, government intervention is imperative, whether through awareness campaigns, advertising restrictions on tobacco brands, or reducing consumers' purchasing power via higher taxes (Merkaj et al., 2024). These measures have proven highly successful in reducing tobacco consumption, as evidenced by Nargis et al. (2021). These taxes offer a dual benefit to governments: they reduce tobacco consumption and finance treatments related to tobacco use (Sheikh et al., 2023).

A study by the International Agency for Research on Cancer (WHO, 2023) indicates that price increases significantly reduce tobacco consumption. Ngo et al. (2024) further state that a one percentage point increase in tobacco taxes decreases per capita cigarette consumption by 9.0%. Based on the available evidence, the following research hypothesis was formulated:

Hypothesis 3: Tobacco prices influence consumption habits.

The global economic implications of tobacco control policies emphasize the potential for substantial public health gains through taxation (Perikleous et al., 2018).

Furthermore, the effectiveness of tobacco taxation is not uniform across all demographic groups. Differential responses to price changes among diverse populations highlight the importance of equity considerations in designing tobacco control strategies (Ramanarayanan and Rajeev, 2020). Understanding the socioeconomic determinants of smoking behavior is crucial for designing policies that effectively reduce tobacco consumption while minimizing disparities (Merkaj et al., 2024).

3. Methodology

To study the relationship between the variables involved, a cross-sectional experimental study was conducted. A quantitative methodology was adopted, employing a hypothetico-deductive approach. The data was collected from a convenience sample. This sampling method was chosen due to the ease of access to participants and their availability to participate in the research (Mweshi and Sakyi, 2020).

The main objective of this study was to evaluate whether the increase in tobacco prices affects consumption habits. To thoroughly explore this theme, three specific objectives were established: (i) to determine if the type of tobacco smoked by participants is associated with their generational cohort; (ii) to understand the relationship between the type of tobacco and consumption habits; and (iii) to ascertain if tobacco prices influence consumption habits.

It's important to make concepts explicit, namely the generations and age ranges and major characteristics, according to Williams and Page (2011) (see **Table 1**):

Table 1. Generations.

Generation	Age range	Who are they?
Baby Boomers	Born between 1946–1964 (60 to 78 years old)	Born during the baby boom period, the time when the birth rate increased in several countries such as the USA, Canada and New Zealand after the Second World War ended.
Generation X	Born between 1965–1977 (47 to 59 years old)	Born during the reconstruction of Europe after the Second World War. Their lives were not easy, as finding a job after a turbulent period was a major challenge. Working and producing was their philosophy of life, idealism aside. Individualism, ambition and dependence on work-or workaholism-are the values that those born in this generation grew up with.
Generation Y or millennials	Born between 1978–1994 (30 to 46 years old)	Also known as digital natives, technology is part of their daily lives: all their activities take place on a screen. However, they weren't born in the technological age. They lived in the analog era and have migrated to the digital world. Unlike previous generations, the world, due to the economic crisis, has required them to be better prepared to get a job, as competition has increased. However, this generation live with the label of being lazy, narcissistic and spoiled.
Generation Z	Born after 1995 (less than 29 years old)	They are a group of people marked by the Internet. It's part of their DNA: It invades their homes, their education and their way of socializing. It's very difficult for them to find work. Their mastery of technology perhaps makes them less concerned about their interpersonal relationships, although they are the ones who give the most voice to social causes on the Internet. They like to have everything they want immediately, a consequence of the digital world in which they are immersed. Their lifestyle is also marked by YouTubers.

The research hypotheses mentioned in the previous chapters are represented in the model shown in **Figure 1**.

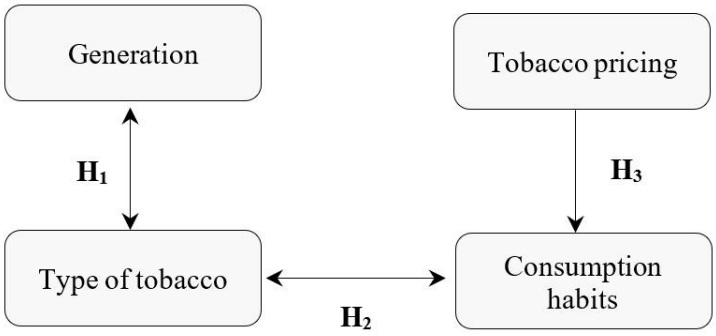

Figure 1. Research model.

3.1. Measure

Data were collected through a questionnaire survey comprising six questions specifically formulated for this study, informed by a literature review (Nargis et al., 2020; Pavlikova et al., 2023; Wang et al., 2021). The first questions aimed to determine the type of tobacco consumed by participants, their awareness of the tobacco tax, the impact of the price increase on their consumption habits, and the price threshold at which they would cease purchasing tobacco. The remaining questions explored smokers' opinions on the government's intent to raise tobacco taxes and alternative measures perceived to be more effective than tax increases in reducing tobacco consumption. Additionally, socio-demographic questions (e.g., sex, age) were included to characterize the sample.

3.2. Procedures

Questions were integrated into the Google Forms platform, and the survey link was distributed via email to researchers' contacts and shared on their professional networks (e.g., LinkedIn). Participants were briefed on the research objectives, and anonymity and confidentiality of responses were ensured. Also, participants had to agree with their participation by ticking an informed consent. Quantitative data were analyzed using the SPSS statistical software (Statistical Package for Social Sciences). MAXQDA was employed for the content analysis of open-ended questions.

4. Results

At **Table 2** we can notice that the study involved the participation of 200 smokers aged between 16 and 67 years. The majority are male (51.5%) and reside in the Lisbon Metropolitan Area. To homogenize group sizes, participants were grouped based on their generation, revealing that only 33.0% do not belong to Generation Z.

Table 2. Sample.

	Gender			**Age**					
	Male	**Female**	**Other**	**16–24**	**25–35**	**36–45**	**46–55**	**56–65**	**More than 65**
Frequency	103	96	1	134	26	12	13	12	3
%	51.5	48	0.5	67	13	6	6.5	6	1.5

The data analysis revealed that nearly half of the participants smoke heated tobacco (46.5%), 37.0% smoke cigarettes, and 16.5% consume other types of tobacco, namely roll-your-own tobacco (9.0%) and electronic cigarettes (4.5%) (**Table 3**).

Table 3. Types of tobacco smoked.

Types of tobacco	Answers	%
Cigarettes or cigarillos	3	1.5
Cigarettes	74	37
Heated tobacco	93	46.5
Chewing tobacco	0	0
Poll-your-own tobacco	18	9
Pipe tobacco	2	1
Snuff	1	0.5
Electronic cigarettes	9	4.5

Given this, it was deemed relevant to explore the relationship between the type of tobacco consumed by respondents and their generational cohort. Results showed that participants from older generations (Baby Boomers, Generation X, and Generation Y) predominantly smoke cigarettes (51.5%), while Generation Z consumes more heated tobacco (55.2%), a relationship found to be statistically significant (V = 0.254, $p < 0.05$; Hypothesis 1).

Next, the study aimed to understand the relationship between tobacco type and consumption habits. Findings indicated no significant relationship between these variables ($\rho s = 0.057$, $p = 0.454$; Hypothesis 2). Different tobacco types may attract different consumer profiles but do not exert a significant influence on consumption habits. Tobacco choice appears to be driven by personal preferences rather than nicotine dependency.

When asked about awareness of tobacco taxes, 79.5% of smokers responded affirmatively, although 21.5% indicated disinterest in the matter. Consequently, it was deemed pertinent to explore participants' opinions on why the government is increasing tobacco taxes.

To analyze responses from open-ended questions, procedures recommended by Bardin (2011) were followed, including: (a) pre-analysis, organizing content for systematic processing; (b) exploration of information, defining categories and analyzing their frequency; and (c) treatment and interpretation of results.

Qualitative analysis allowed the extraction of three categories. It was found that 44.0% of individuals believe that tobacco tax serves solely to increase fiscal revenue, 44.5% consider it aims to reduce consumption, and 11.5% have no formed opinion on the matter. The following statements helped corroborate these findings:

"*It is a failed attempt for people to quit smoking [and] an opportunity for the government to increase fiscal revenue*."[1]

"*It helps reduce the number of smokers and the diseases associated with tobacco consumption*."[2]

"*The goal is revenue generation, but it is disguised with concern for health*."[3]

"*It's another state initiative to profit from our vices*."[4]

Following these responses, it was considered relevant to understand if participants believe that increasing tobacco prices is an effective alternative to reduce consumption, and 45.5% responded affirmatively. On the other hand, 20.0% of individuals consider that there are other more effective measures, namely primary prevention, subsidized medication, and limiting the quantity of tobacco that can be purchased within a specified time period. In this context, participants noted that:

"*There should be greater awareness of the negative effects of tobacco*."[5]

"*It is important to control tobacco sales by limiting the number of units sold per week*."[6]

"*Implement primary prevention starting from elementary school, with multidisciplinary teams raising awareness about the consequences of tobacco consumption*."[7]

"*There is already a lot of information available, and it is not having the desired effect. Therefore, I believe there should be investment in subsidized smoking cessation medication, given its high cost*."[8]

In light of the above, the objective was to ascertain whether the increase in tobacco tax is altering consumption habits, and 60.5% of smokers reported that it is not, as evidenced by the following accounts:

"*I have not changed my consumption habits* (...) *I started buying in countries where tobacco is cheaper*."[9]

"*Little has changed* (...) *I began by switching brands and now have switched from the traditional pack to a cheaper one*."[10]

It was found that regardless of the price, 13.0% of the individuals reported never intending to quit smoking, while 7.0% would be willing to pay €15 for a pack of cigarettes. Therefore, the aim was to determine if tobacco prices influence consumption habits. Given that the dependent variable is dichotomous (tobacco price does not influence consumption habits *versus* tobacco price influences consumption habits), a binary logistic regression was conducted. The results indicated that the probability of price influencing consumption habits is statistically significant (B = 0.154; $\chi^2_{\text{Wald (1)}}$ = 5.839; $p < 0.05$). The positive sign of the regression coefficient B (*logged odds*) suggests that as tobacco prices increase, their impact on consumption habits also increases.

5. Discussion

The conclusions of the study align with the existing literature on tobacco consumption patterns and fiscal effects, providing a nuanced understanding of how these factors influence smoker behavior across different generations. The conducted data analysis revealed a prevalence of heated tobacco product use among Generation Z, thereby validating Hypothesis 1, this is consistent with the studies by O'Brien et al. (2021), which indicate a growing preference for alternative tobacco products among younger populations. Following this notion, Sun et al. (2022) suggest that this propensity may be due to the diversity of flavors and the perception that these products are less harmful than conventional cigarettes, this shift is noteworthy as it suggests a potential divergence from traditional smoking habits observed in older generations (Adermark et al., 2021). Moreover, the trend highlights the importance of targeted

public health strategies that address the unique preferences and perceptions of younger smokers. Kraus et al. (2022) add that smokers from Baby Boomer, Generation X and Generation Y cohorts are less inclined to try new things compared to Generation Z, underscoring the generational gap in tobacco product adoption. This generational divide necessitates differentiated approaches to tobacco control policies to effectively address the evolving landscape of tobacco use.

Hypothesis 2, which postulated a significant relationship between the type of tobacco and consumption habits, was not corroborated, as no statistical evidence supporting such a correlation was found. The results of this study suggest that consumption habits are more influenced by personal preferences than by the type of tobacco used, as postulated by Ramanarayanan and Rajeev (2020). On the other hand, Polosa (2021) argues that different tobacco products can influence consumption behavior due to personal or social reasons, such as peer influence or perceived social acceptability. Similar conclusions were found by Prigitano et al. (2020), whose studies reveal that it is not uncommon for people to quit smoking after using electronic cigarettes. Following this premise, Kraus et al. (2022) argue that this situation may be due to the perception that this type of tobacco is less harmful than traditional cigarettes. Furthermore, the convenience and variety of flavors offered by electronic cigarettes might also play a role in their popularity, potentially leading to a shift in consumption patterns among younger demographics seeking alternatives to conventional smoking.

Regarding perceptions of tobacco taxation, the study revealed that a significant majority of participants were aware of tobacco taxes, with varied opinions on their purpose and effectiveness. These findings resonate with the research of Tapadas (2023), which underscores the role of taxation both in revenue generation and in reducing tobacco consumption, albeit with divergent public perceptions regarding its efficacy. Interestingly, awareness and perceptions varied across different demographic segments, reflecting diverse socio-economic and cultural backgrounds.

The results also indicated that about half of the study participants believe that increasing tobacco prices effectively reduces consumption, thereby validating Hypothesis 3. However, it was found that a segment of respondents believed that other measures, such as primary prevention and subsidized cessation aids, could have a greater impact. This conclusion highlights the multifaceted nature of tobacco control strategies, as postulated by Ramanarayanan and Rajeev (2020). Similarly, Flor et al. (2021) present robust evidence demonstrating the effectiveness of policies and media campaigns in reducing tobacco consumption habits. Le Foll et al. (2022) add that only through the combination of synergies can tobacco consumption be effectively discouraged. Similar conclusions were obtained by Merkaj et al. (2024), suggesting that it is important to combine awareness-raising actions with tobacco price increases to make governmental measures more effective. Therefore, a holistic approach integrating economic, educational, and regulatory measures is essential for the success of tobacco control policies. Study shows that tobacco consumption is influenced by both generational differences and pricing, which suggests that policies focused solely on increasing costs aren't enough. Older generations tend to favor traditional cigarettes, while younger ones prefer alternatives like heated tobacco, showing clear generational patterns. While higher taxes do affect behavior, many smokers adapt by

finding cheaper options, meaning price alone isn't always effective in reducing consumption.

This calls for a mix of strategies—combining tax increases with education and cessation programs. Tailored approaches, addressing the specific habits and beliefs of each generation, can lead to more meaningful reductions in smoking rates. The findings suggest that a comprehensive approach is necessary, rather than relying solely on economic measures.

5.1. Theoretical and practical contributions

Theoretically, this study contributes to advancing knowledge on tobacco consumption patterns and perceptions of taxation among its sample population, aligning with the literature cited in the literature review (Flor et al., 2021; Martinez, 2024; Merkaj et al., 2024; O'Brien et al., 2021; Tapadas, 2023). The findings underscore the complex interaction between policy measures, consumption behaviors, and public health outcomes. The study provides insights into understanding differences in tobacco consumption across generations, highlighting how preferences and behaviors related to tobacco vary with age. Furthermore, this research reinforces the economic theory of price elasticity and demonstrates that price increases through taxation can effectively reduce tobacco consumption, especially among younger populations and those with lower purchasing power. These conclusions validate the efficacy of fiscal policies in shaping consumption behaviors.

From a practical perspective, this investigation highlights that implementing economic strategies and enforcing restrictive regulations contribute to reducing tobacco consumption. The results emphasize the importance of smoking cessation programs and primary prevention efforts, indicating that subsidized cessation interventions and educational campaigns in schools can complement pricing policies to achieve better outcomes in tobacco consumption reduction. Participants' perceptions regarding tobacco taxation and its effectiveness suggest the need to raise public awareness about the objectives of these policies. This could help align public opinion with government initiatives and enhance the acceptance and effectiveness of tobacco control policies. The identification of a growing preference among young people for alternative tobacco products suggests that marketing regulations need adaptation to address these new products.

5.2. Limitations and suggestions for future studies

The use of a convenience sample and the lack of geographic diversity preclude the generalization of results, as they may not reflect the attitudes and behaviors of smokers in other regions. The sample size may not have sufficient statistical power to detect small differences or relationships between variables, and the self-report nature of the questionnaire may have influenced responses. Additionally, the questionnaire items may not have captured all relevant nuances and variables pertaining to tobacco consumption habits and perceptions of taxation. It is noteworthy that information on participants' income, education, and health status was not controlled for, potentially impacting the results.

To address these identified gaps, future studies should consider increasing the number of participants and employing a stratified random sample to ensure greater population representativeness. Conducting longitudinal studies would be beneficial to analyze changes in consumption habits over time and infer causal relationships. It would also be valuable to assess the effectiveness of various interventions (e.g., educational campaigns, cessation programs) in conjunction with tobacco taxation and to conduct comparative studies across different countries to evaluate the impact of various fiscal policies on tobacco consumption.

6. Conclusion

The data analysis revealed significant differences in tobacco consumption preferences across generational cohorts. The older generations (Baby Boomers, Generation X, and Generation Y) predominantly favor cigarettes, while Generation Z leans more towards heated tobacco. This relationship was statistically significant, indicating a clear generational divide in tobacco preferences. Despite these generational preferences, the study found no significant relationship between the type of tobacco consumed and overall consumption habits. The correlation analysis showed that different types of tobacco did not significantly influence how much tobacco was consumed. This suggests that tobacco choice is driven more by personal preference rather than by dependency on nicotine, highlighting the diverse consumer profiles that each tobacco type attracts.

Awareness of tobacco taxes was high among participants. The study explored participants' perceptions of why the government increases tobacco taxes. The qualitative analysis revealed the existence of three main categories: revenue generation, consumption reduction, and lack of opinion. These perceptions reflect a divided understanding of the government's motives behind tobacco taxation.

Participants' opinions on the effectiveness of increasing tobacco prices as a measure to reduce consumption were divergent. Although most respondents agree that this measure is effective, alternative measures were also mentioned, such as primary prevention, subsidized medicines, and sales limitations. These alternatives highlight the need for a multi-faceted approach to tobacco control, encompassing awareness campaigns, regulated sales, and affordable smoking cessation aids, to comprehensively address the issue.

The study also investigated whether increased tobacco taxes are altering consumption habits. A significant proportion reported that their consumption habits remained unchanged despite the higher prices. Qualitative responses indicated that some smokers sought cheaper alternatives, such as purchasing tobacco from countries with lower prices or switching to cheaper brands. These findings suggest that price increases alone may not be sufficient to drive significant changes in smoking behavior.

Notably, a small fraction of individuals reported a steadfast intention to continue smoking regardless of price increases. Others indicated a willingness to pay substantially higher prices for cigarettes. This prompted further analysis to understand if and how tobacco prices influence consumption habits. A binary logistic regression revealed that price increases do have a statistically significant impact on consumption

habits. The positive regression coefficient indicates that as tobacco prices rise, their influence on reducing consumption habits also increases.

In conclusion, the study provides valuable insights into the complex dynamics of tobacco consumption across different generations. While price increases have some impact on consumption habits, the findings suggest that a combination of strategies, including economic tools, education, and support for smoking cessation, is necessary for effective tobacco control. Policymakers and public health officials can leverage these insights to design more targeted and comprehensive interventions to reduce smoking prevalence and mitigate the associated health risks. The findings of this study align with existing research on tobacco control policies and highlight the complex interplay between price increases, generational preferences, and public health outcomes. By contextualizing findings from existing literature, policymakers and public health professionals can implement measures that effectively reduce tobacco consumption and mitigate associated health risks across different age groups.

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Notes

1 Participant 7.
2 Participant 28.
3 Participant 168.
4 Participant 188.
5 Participant 4.
6 Participant 86.
7 Participant 156.
8 Participant 29.
9 Participant 28.
10 Participant 26.

References

Adermark, L., Galanti, M., Ryk, C., Gilljam, H., and Hedman, L. (2021). Prospective association between use of electronic cigarettes and use of conventional cigarettes: a systematic review and meta-analysis. ERJ Open Research, 7(3), 1–11. https://doi.org/10.1183/23120541.00976-2020

Alotaibi, H., and Alsanea, N. (2022). Impact of taxation policy on tobacco consumption in Saudi Arabia. Annals of Saudi Medicine, 42(1), 1–7. https://doi.org/10.5144/0256-4947.2022.1

Centers for Disease Control and Prevention (CDC, 2020). Youth and Tobacco Use. https://www.cdc.gov/tobacco/data_statistics/fact_sheets/youth_data/tobacco_use/index.htm

Cullen, K., Ambrose, B., Gentzke, A., Apelberg, B., Jamal, A., and King, B. (2018). Notes from the field: Use of electronic cigarettes and any tobacco product among middle and high school students United States, 2011–2018. Morbidity and Mortality Weekly Report, 17, 1276–1277. https://doi.org/10.15585/mmwr. mm6745a5

Flor, L., Reitsma, M., Gupta, V., Ng, M., and Gakidou, E. (2021). The effects of tobacco control policies on global smoking prevalence. Nature Medicine, 27(2), 239–243. https://doi.org/10.1038/s41591-020-01210-8

Guindon, G. E., Perucic, A. M., and Boisclair, D. (2003). Higher tobacco prices and taxes in South-East Asia: An effective tool to reduce tobacco use, save lives and generate revenue. World Bank Economics of Tobacco Toolkit.

He, Y., Shang, C., and Chaloupka, F. (2018). The association between cigarette affordability and consumption: an update. PLoS One, 13(12), 1–14. https://doi.org/10.1371/journal.pone.0200665

Holipah, H., Sulistomo, H., and Maharani, A. (2020). Tobacco smoking and risk of all-cause mortality in Indonesia. PloS One, 15(12), 1–12. https://doi.org/10.1371/journal. pone.0242558

Kraus, L., Möckl, J., Lochbühler, K., Rauschert, C., Seitz, N., and Olderbak, S. (2022). Changes in the use of tobacco, alternative tobacco products, and tobacco alternatives in Germany. Deutsches Ärzteblatt International, 119(31–32), 535–541. https://doi.org/ 10.3238/arztebl.m2022.0252

Le Foll, B., Piper, M., Fowler, C., Tonstad, S., Bierut, L., Lu, L., Jha, P., and Hall, W. (2022). Tobacco and nicotine use. Nature Reviews Disease Primers, 8(1), 1–16. https://doi.org/10.1038/s41572-022-00346-w

Leslie, F. (2020). Unique, long-term effects of nicotine on adolescent brain. Pharmacology Biochemistry and Behavior, 197, 1–10. https://doi.org/10.1016/j.pbb.2020.173010

Martinez, A. (2024). Taxes on harmful consumption: between public health and the risk of disguised protectionism. Revista de Direito Tributário da APET, 49, 223–237.

McGrath-Morrow, S., Gorzkowski, J., Groner, J., Rule, A., Wilson, K., Tanski, S., Collaco., J., and Klein, J. (2020). The effects of nicotine on development. Pediatrics, 145(3), 1–12. https://doi.org/10.1542/peds.2019–1346

Merkaj, E., Zhllima, E., Imami, D., Gjika, I., Guerrero-López, C., and Drope, J. (2024). Impact of cigarette price and tobacco control policies on youth smoking experimentation in Albania. Tobacco control, 33(2), 38–43. https://doi.org/10.1136/tc-2023-058196

Mweshi, G., and Sakyi, K. (2020). Application of Sampling Methods for The Research Design. Archives of Business Review, 8(11), 180–193. https://doi.org/10.14738/abr.811.9042

Nargis, N., Michal Stoklosa, M., Shang, C., and Drope, J. (2021). Price, Income, and Affordability as the Determinants of Tobacco Consumption: A Practitioner's Guide to Tobacco Taxation. Nicotine & Tobacco Research, 23(1), 40–47. https://doi.org/10.1093/ntr/ntaa134

Ngo, A., Drope, J., Guerrero-López, C., Siu, E., and Chaloupka, F. (2024). As countries improve their cigarette tax policy, cigarette consumption declines. Tobacco Control, 33, 91–96. https://doi.org/10.1136/tc-2022-057486

O'Brien, D., Long, J., Quigley, J., Lee, C., McCarthy, A., and Kavanagh, P. (2021). Association between electronic cigarette use and tobacco cigarette smoking initiation in adolescents: a systematic review and meta-analysis. BMC Public Health, 21(1), 954–964. https://doi.org/10.1186/s12889-021-10935-1

Pavlikova, B., Baska, T., Freel, L., and Van Dijk, J. (2023). Smoking is a risk factor for generation Z, too: The evolution of the attitudes. International Journal of Public Health, 68, 1–9. https://doi.org/10.3389/ijph.2023.1604760

Perikleous, E., Steiropoulos, P., Paraskakis, E., Constantinidis, T., and Nena, E. (2018). Ecigarette use among adolescents: an overview of the literature and future perspectives. Frontiers in Public Health, 6, 86–95. https://doi.org/10.3389/fpubh.2 018.00086.

Peruga, A., López, M., Martinez, C., and Fernández, E. (2021). Tobacco control policies in the 21st century: achievements and open challenges. Molecular oncology, 15(3), 744–752. https://doi.org/10.1002/1878-0261.12918.

Polosa, R. (2021). Examining the evidence for the health impact of combustion-free products: progress and prospects for tobacco harm reversal and reduction. Internal and Emergency Medicine, 16(8), 2043–2046. https://doi.org/10.1007/s11739-021-02837-2

Prigitano, A., Binda, S., Pariani, E., Destrebecq, A., Castaldi, S., Cogliati, M., Esposto, M., and Romanò L. (2020). Tobacco and e-cigarette smoking habits among Italian healthcare students. Annali di Igiene, 32(6), 608–614. https://doi.org/10.7416/ai.2020.2382.

Ramanarayanan, V., and Rajeev, K. (2020). Sociodemographic profile of tobacco use and its predictors in Kerala, India. Population Medicine, 2, 1–6. https://doi.org/10.18332/ popmed/128324

Sheikh, Z., Branston, J., and Gilmore, A. (2023). Tobacco industry pricing strategies in response to excise tax policies: a systematic review. Tobacco Control, 32(2), 239–250. https://doi.org/10.1136/tobaccocontrol-2021-056630

Sun, T., Anandan, A., Lim, C., East, K., Xu, S., Quah, A., Rutherford, B., Johnson, B., Qi, Y, Stjepanovic, D., Leung, J., Connor, J., Gartner, C., Hall, W., and Chan, G. (2023). Global prevalence of heated tobacco product use, 2015–22: A systematic review and meta-analysis. Addiction, 118(8), 1430–1444. https://doi.org/10.1111/add.16199

Tapadas, R. (2023). Harmonization in excise duties: the special case of tobacco [Doctoral dissertation]. ISCAL.

Verguet, S., Kearns, P., and Rees, V. (2021). Questioning the regressivity of tobacco taxes: a distributional accounting impact model of increased tobacco taxation. Tobacco Control, 30(3), 245–257. https://doi.org/10.1136/tobaccocontrol-2019-055315

Wang, R., Shenfan, L., Song, Y., Wang, Q., Zhang, R., Kuai, L., and Li, B. (2023). Smoking relapse reasons among current smokers with previous cessation experience in Shanghai: A cross-sectional study. Frontiers in Public Health, 9, 1–12. https://doi.org/10.3389/fpubh.2021.740476

Williams, K. C., and Page, R. A. (2011). Marketing to the Generations. Journal of Behavioral Studies in Business, 5(1), 1–17.

World Health Organization (WHO, 2020). Tobacco taxes and the reduction of tobacco consumption. https://www.who.int/health-topics/tobacco#tab=tab_1

World Health Organization (WHO, 2023). Cancer-Focused Teams Oral Cancer Team (OCT). https://www.iarc.who.int/teams-oct/

World Health Organization (WHO, 2023). WHO report on the global tobacco epidemic, 2023: Protect people from tobacco smoke, https://iris.who.int/bitstream/handle/10665/372043/9789240077164-eng.pdf?sequence=1