

Heated Tobacco Products Use in Montenegro

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Abstract

Background

The purpose of this research is to thoroughly examine the market and trends related to heated tobacco products (HTP) in Montenegro from 2020 to 2023. The study aims to provide insights into the market dynamics of HTP use, to analyze consumption patterns, and to evaluate the regulatory environment for these products.

Methodology

To analyze the market for HTPs in Montenegro, we used sales and price information for HTPs and cigarettes by brand from 2020 to 2023 as well as taxation and tobacco survey data. The methodological procedure includes descriptive statistics, fixed-effects regression to estimate tax pass-through effects, and logistic regression to assess the sociodemographic profile of HTP smokers.

Results

The study showed that HTP sales in Montenegro have grown significantly, with a sixfold increase in sales from 2020 to 2023. The prevalence of HTP use among adults has increased from 0.2 percent in 2019 to 3.9 percent in 2022, with higher consumption observed among females, urban residents, and individuals with secondary and higher education. Despite substantial tax increases, the prices of HTPs have not increased proportionally, suggesting an under-shifting of HTP tax. Specifically, if HTP taxes increase by €1 per pack, it only results in a €0.26 increase in the HTP prices. At the same time, there is a high correlation between HTP prices and prices in the middle and lower range of the premium segment of the cigarette market. The gap between HTP and cigarette prices has narrowed but remains significant, indicating that lower taxes on HTPs result in lower government revenues.

Conclusions

The product novelty and rapid growth of the HTP share in the tobacco market in Montenegro, combined with inconsistent regulatory practices and high under-shifting of HTP taxes on their prices, underscore the need for policy adjustments. To achieve effective tobacco control, it is crucial to harmonize tax rates across all tobacco products and address discrepancies in current regulations by adopting recommendations given in the World Health Organization's Framework Convention on Tobacco Control (WHO FCTC). These steps will ensure equitable tax burdens, prevent revenue loss, and better regulate the changing tobacco market. Furthermore, conducting additional empirical research and data collection is essential to gain a better understanding of the economic impacts of HTPs and the effectiveness of tax policies.

JEL Codes: B21, C31, C53, H71, K34, N34

Keywords: Heated tobacco products, cigarettes, tax pass-through, excise tax

Introduction

Per the World Health Organization (WHO), heated tobacco products (HTPs) are described as products “that release nicotine from tobacco by heating it at temperatures lower than those of traditional cigarettes.”¹ Since 2014, there has been significant growth in the HTP market, with three multinational tobacco companies—Philip Morris, British American Tobacco, and Japan Tobacco International—taking the lead. Projections indicate that global sales will maintain an upward trajectory, with the global market value expected to surge from US\$ 6.3 billion in 2018 to US\$ 22 billion by 2024 (WHO, 2023). The emergence of HTPs has added complexity to the task of categorizing, understanding, and effectively regulating tobacco products and their components. Additionally, the effects of exponential growth in the demand for HTPs on the demand for combustible factory-made cigarettes remain unclear.

The primary regional markets for HTPs are located in South-East Asia, which collectively represent more than half of the total global value by 2020. Notably, Japan stands out as the largest individual country market for HTPs, with its market share expanding fivefold from 2016 to 2019, rising from 6.5 percent to 32.5 percent (O’Connor et al., 2022). During this period, prevalence in Japan also surged from 0.2 percent in 2015 to 11.0 percent in 2019 (Hori et al., 2020). In the European Union (EU), even though HTPs have not been commercialized in some member states, their sales are rapidly increasing from €13 million in 2015 to €10 billion in 2022, constituting approximately 50 percent of the market for tobacco products other than cigarettes and fine-

¹<https://iris.who.int/bitstream/handle/10665/368022/9789240042490-eng.pdf?sequence=1>

This process, known as pyrolysis, involves heating tobacco at a slightly lower temperature than combustion. The rationale behind this approach is that many of the most harmful chemicals are released during combustion. However, evidence confirming that this method significantly reduces harm is still inconclusive. In fact, HTP emissions contain chemicals not present in cigarette smoke, with largely unknown health effects. Independent analyses have identified more than 20 harmful or potentially harmful chemicals in HTP emissions at significantly higher levels than those found in conventional cigarette smoke (Lempert & Glantz, 2021). This underscores the urgent need for further research into the health impacts and risks associated with HTP exposure (WHO, 2021).

cut tobacco. Furthermore, sales of HTPs in the EU are projected to continue seeing robust growth over the next few years, with annual growth rates estimated at 19.2 percent, 16.6 percent, and 14.5 percent for 2025, 2026, and 2027, respectively (López Nicolás, 2023).

Taxation of tobacco products in the EU is governed by the Tobacco Tax Directive, or the TTD (European Union, 2011), a legislative measure designed to meet the EU's obligations under the World Health Organization (WHO) Framework Convention on Tobacco Control (WHO FCTC, 2003). However, the current TTD does not include provisions for HTPs. As a result, member states where HTPs are commercialized have implemented excise taxes based on various criteria. This discrepancy indicates that the WHO recommendation (WHO, 2023)—which recognizes HTPs as tobacco products and advocates for applying the same level and method of taxation as for cigarettes—is not consistently followed in the fiscal policies of EU member states. These circumstances highlight the necessity for a review of the current EU directive and the fiscal treatment of all tobacco products to ensure effectiveness in deterring consumption and providing a high level of health protection.

There is an evident lack of empirical studies focusing on the economic costs of HTP use and economic effects of taxation, especially in developing countries. Most research pertains to the analysis of legal and policy frameworks related to these products (López-Nicolás, Á., 2024; Chaloupka & Tauras, 2022), or the evaluation of prevalence and patterns of HTP use based on survey data (Gallus et al., 2022; Hwang et al., 2019). The issue of tobacco pricing strategies within the HTP market was examined by Dauchy & Shang, (2023), in a comprehensive study that utilized data from 54 countries with HTP sales. This research revealed HTP tax under-shifting to prices and demonstrated a strong correlation between HTP and cigarette prices. Due to the novelty of the product and the short time series of available data, there is an absence of empirical estimations of the elasticity of HTP demand in response to price changes. This gap highlights the need for more

comprehensive research on the economic impacts of HTP use and the effectiveness of tax policies in influencing consumption patterns.

HTPs emerged in the Montenegrin tobacco market in the latter half of 2019. Since then, alongside the high prevalence of classic tobacco users in Montenegro, there has been a notable increase in the demand for HTPs. The consumption and sale of these products experienced rapid growth, causing a transformation in the tobacco market. Due to that fact, this study's objective is to conduct a comprehensive analysis of the market and trends concerning HTPs in Montenegro, covering the period from 2020 to 2023. The study aims to offer insights into the prevalence of HTP use, analyze consumption patterns and tobacco industry pricing strategies, and assess the regulatory framework related to these products. The study will provide recommendations to enhance overall tobacco control measures and public health policies in Montenegro.

Methodology

Data

To analyze the market of HTPs in Montenegro, we will utilize aggregate data on the price per pack for each brand from 2020 to 2023, sourced from the Directorate for Issuing Permits for the Production, Processing, and Trade of Tobacco Products of the Ministry of Finance (Tobacco Agency). This data set includes information on HTP sales by brand, presented in the number of packs on a monthly basis. The number of different brands (including brand variants) in the Montenegro HTP market has increased from eight in 2020 to 26 in the first quarter of 2024. All brands are imported, with two importers operating in the market. They are typically sold in packs of 20 sticks, with a total weight of 5.4 grams per pack. Brands produced by Philip Morris International² (HEETS, FIIT, TERE) represent the highest share in the market (96 percent).

² Philip Morris has an affiliate in Montenegro, Philip Morris Montenegro D.O.O. Podgorica, primarily engaged in the wholesale trade of tobacco and tobacco products.

Additionally, for the purpose of comparing HTPs with the cigarette market, we will use aggregate data on the retail price and sales in kilograms of manufactured cigarettes over the same period, as provided by the Tobacco Agency. Similar to HTP data, these figures are collected on a monthly basis, and all cigarette brands are imported and sold in packs of 20 sticks. In the cigarette market, there are three active importers and a significantly larger number of brands (102 in 2023).

Furthermore, to estimate the pass-through effect of HTP and cigarette taxes on HTP prices we used data on excise taxes for HTP and cigarettes from 2020–2023, as stipulated by the excise calendar given in the Law on Excise Taxes (Law on Excise Tax, 2023).

HTP affordability trends are assessed using two key metrics commonly employed in existing literature for cigarettes: the relative income price (RIP) and minutes of labor (MoL). The RIP is calculated as the percentage of GDP per capita required to purchase 100 packs of HTPs from 2020 to 2023, with higher values indicating reduced affordability, following the methodology outlined by Blecher & van Walbeek (2004).³ Additionally, we determine the MoL required to purchase one pack of HTPs, using the HTP weighted average price and the average hourly wage in Montenegro as proxies for income, as per Guindon's approach (2002). The necessary macro data for these calculations are given in Table 1.

³ We were unable to calculate RIP using disposable income as the income measure due to the unavailability of data for 2023.

Table 1. Nominal GDP per capita and average net wage, 2020–2023

Year	Nominal GDP per capita (in €)	Nominal average monthly net wage (in €)	Nominal net average hourly wage (in €)
2020	6,737	524	3.11
2021	8,002	532	3.15
2022	9,598	712	4.27
2023	11,120	792	4.75

Source: Statistical Office of Montenegro (Monstat)

Note: Data on nominal net average hourly wages are calculated using information on the official number of working hours per month in each observed year. Net wage represents wage after the deduction of taxes and social contributions.

The prevalence of HTP use among adults (ages 18 and older) in Montenegro, as well as the sociodemographic characteristics of HTP smokers, are assessed using data from the Survey on Tobacco Consumption in Southeastern Europe (STC-SEE) and Montenegro (STC-MNE) surveys conducted in 2019 and 2022, respectively. The study on tobacco use among Montenegro’s adult population in 2019 was integrated into the larger STC-SEE project spanning the region, occurring during September and October of that year. A subsequent survey was conducted in February 2022 to track shifts in the market.

Both surveys were administered in person at households and encompassed adults ranging from 18 to 85 years old. The sample consisted of 1,000 individuals, including both smokers and non-smokers, with both surveys utilizing similar methodologies and questionnaires. Sampling procedures were based on data from the most recent census conducted in Montenegro in 2011. The questionnaire primarily utilized the Global Adult Tobacco Survey (GATS) Core Questionnaire as its foundation, complemented by additional inquiries from recent International Tobacco Control (ITC) and Pricing Policies and Control of Tobacco in Europe (PPACTE) surveys (version 2.0, November 2010, and version 3.0, January 2019).

Due to limited cases for certain categories, the 2022 survey covered questions related to four categories of tobacco products: manufactured cigarettes, hand-rolled cigarettes, electronic cigarettes, and heated tobacco products. However, a major limitation of this sample is the small number of observations, with only 43 individuals in 2022 reporting current HTP use, and 317 current smokers of cigarettes.

Empirical approach

A comprehensive analysis of the market and consumption patterns related to HTPs will consist of three main components: market description, demand analysis, and regulatory framework related to HTPs. Due to data constraints and small sample sizes, the descriptive analysis will be primarily applied across all three parts of the research to present the main features of the HTP market, regulatory environment, prevalence, and demographic and socioeconomic profile of HTP smokers. Nevertheless, in some parts of the analysis, we will also use an empirical procedure, subject to data availability.

In part of the market analysis, to estimate the coefficients of HTP and cigarette tax pass-through to HTP prices, we applied the fixed-effects regression technique, incorporating time- and brand-fixed effects to unbalanced panel data. Following the literature (Dauchy & Shang, 2023; Cotti et al., 2022), adjusting the methodology to our available data, we estimate equations as shown below:

$$P_{it}^{HTP} = \beta_1 T_{it}^{HTP} + \beta_2 X_{it} + \varepsilon_{it} \quad (2)$$

$$G_{it}^P = \beta_1 G_{it}^T + \beta_2 X_{it} + \varepsilon_{it} \quad (3)$$

where P_{it}^{HTP} represents prices of i brand of HTP in month t from 2020 to 2023, while T_{it}^{HTP} represents excise tax per pack of HTP brand for corresponding periods. Besides the direct effect of HTP tax pass-through to HTP prices, we

will also estimate the indirect effect of cigarette taxes on HTP prices. Estimation of this effect is done using taxes per pack of cigarettes in the mid-range and premium segments of the market instead of T_{it}^{HTP} .

To assess the influence of the tax gap between cigarettes and HTPs on their price gap, we will use equation (3), where G_{it}^P represents the difference between prices and G_{it}^T the difference between total excise tax (specific and ad valorem) per pack of cigarettes in the mid-range market segment and excise per pack of HTP. In both equations X_{it} represents vector of control macro variables, including rate of wage growth and consumer price index.

In part of the demand analysis we will use logistic regression with clustered standard errors and weights to identify the factors affecting the probability of being an HTP smoker. This will help evaluate the influence of sociodemographic characteristics (gender, age, education, settlement type, region, economic activity, income) and smoking behavior (current and former smokers of cigarettes) on the likelihood of HTP use. The probability (Pr) will be estimated using equation (1):

$$\Pr(Y_i = y_i) = f(X\beta) \quad (1)$$

where Y_i represents a binary variable, taking the value of 1 if the respondent is a current HTP smoker and 0 otherwise, while X stands for a group of independent variables.

Given the small sample size, this study employs the penalized maximum likelihood (PML) method in addition to the maximum likelihood (ML) as a sensitivity check. In small samples, ML estimates tend to be substantially biased away from zero (Long, 1997; Rainey & McCaskey, 2021), which can lead to poor performance. Therefore, PML is used as an alternative approach (Firth, 1993; Rainey & McCaskey, 2021). A Monte Carlo simulation comparing the distribution of PML and conventional ML revealed that the former

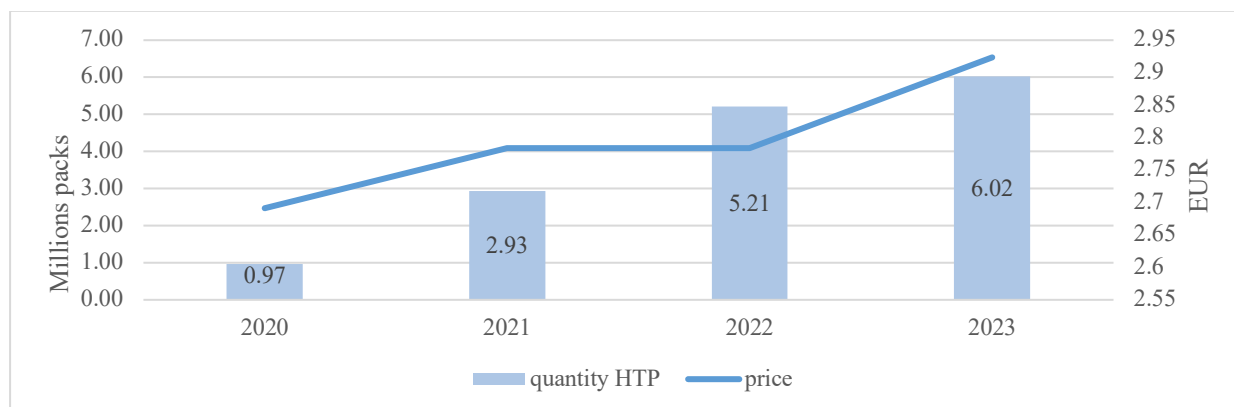
demonstrates less bias in small samples while also significantly reducing variance.

Results

HTP market description

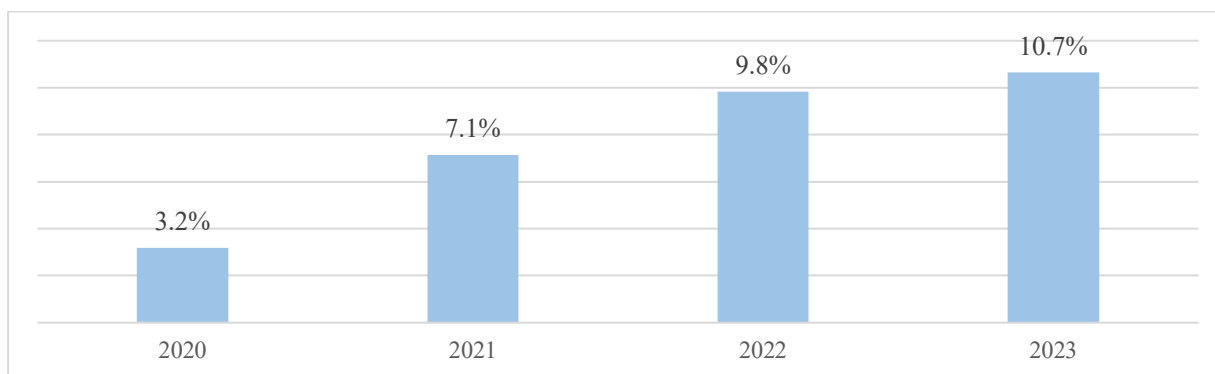
Despite tax increases, sales of HTPs in Montenegro, being relatively new products, are experiencing rapid growth driven by various market forces. Figure 1a displays HTP sales in Montenegro, showing the annual quantity of packs sold from 2020 to 2023, along with the nominal weighted average price (WAP) of HTPs. The figure revealed that the price increases were considerably smaller compared to the growth in sales and consumption. In 2020, only 0.97 million HTPs were sold in Montenegro, accounting for merely 3.2 percent of the size of the legal cigarette market (with 30.4 million cigarette sticks sold). However, by 2023, the number of HTPs sold had increased sixfold compared to 2020, representing 10.7 percent of the manufactured cigarette market (Figure 1b). In the first quarter of 2024, a total of 1.55 million packs of HTPs have already been sold, reflecting an 18.39-percent increase compared to the first quarter of 2023.

Figure 1a. Quantity of HTP packs sold and nominal WAP 2020–2023



Source: Ministry of Finance

Figure 1b. HTP packs sold as a share of packs sold in legal cigarette market



Source: Ministry of Finance

Note: Weighted average price of HTP is calculated using quantity of HTP packs sold per brand as weights.

Table 2 outlines the trend of tobacco taxes from 2020 to 2023, alongside the WAP⁴ per year. Between 2020 and 2022, prices for the HTP most-sold brand remained relatively stable with minimal fluctuations. However, in 2023, the prices of a majority of brands saw slight increases occurring twice—initially at the start of the year and later in the second half. It is important to note that changes in HTP prices did not consistently correspond with adjustments in the excise calendar. It is evident that the excise tax burden surged significantly from 5.19 percent per HTP pack in 2020 to 33.67 percent in 2024 without an adequate increase in nominal prices. Real prices presented in Table 2 indicate that the slow increase in nominal prices presents a decrease of the prices in real values (using 2020 as a base year), which contributed to higher sales and consumption.⁵

⁴ To calculate the excise tax burden per pack of HTP, we used the WAP of HTP, as this price represents the entire market, closely aligns with the price of the most-sold HTP, and is most comparable to WAPC. In similar research covering a large number of countries (CTFK, 2023), the price of the most-sold HTP was used to estimate the excise tax burden, with comparisons made to the cigarette market using the price of Marlboro. Given that HTP prices in Montenegro are closest to the prices of cigarettes in the mid-range market segment as well as the whole market average, in this part of the research we opted to use WAPC for a more accurate comparison between products in two markets.

⁵ Estimating price elasticity is beyond the scope of this research; however, extensive literature confirms the negative relationship between price increases and cigarette consumption (Martín Álvarez et al., 2020; Chaloupka & Tauras, 2022; Golestan et al., 2021). Similarly, for other tobacco products like HTPs, evidence from studies (such as Dauchy & Shang, 2023) supports this relationship.

Furthermore, upon comparing excise tax burdens on HTPs with those on cigarettes, it is apparent that the gap between them is narrowing but remains significant (reducing from 57.20 percentage points in 2020 to nearly 26 percentage points in 2024).

Table 2. Excise tax calendar and WAP of HTPs and cigarettes

Date	Excise tax (€/kg of tobacco mixture)	Excise tax - € per pack of HTP	Excise tax - € per pack of cigarettes (on WAPC)	Excise tax burden (% of WAP of HTP pack)	Excise tax burden (% of WAPC of cigarette pack)	Excise tax burden gap (%)	WAP of HTP (nominal)	WAP of HTP (real)	WAPC (nominal)	WAPC (real)
Jan – Dec 2020	26.21	0.14	1.31	5.19%	62.38%	57.20%	2.70	2.70	2.10	2.10
Jan – Dec 2021	29.30	0.16	1.46	5.71%	58.40%	52.69%	2.80	2.73	2.50	2.44
Jan – May 2022	30.50	0.16	1.49	5.71%	59.60%	53.89%	2.80	2.42	2.50	2.16
June – Dec 2022	100.00	0.53	1.56	18.93%	60.00%	41.07%	2.80	2.42	2.60	2.25
Jan – June 2023	145.00	0.77	1.61	26.55%	59.63%	33.08%	2.90	2.31	2.70	2.15
July – Dec 2023	145.00	0.77	1.67	26.55%	59.64%	33.09%	2.90	2.31	2.80	2.23
Jan – Dec 2024	190.00	1.01	1.72	33.67%	59.31%	25.64%	3.00**	2.30	2.90	2.22

Source: Ministry of Finance

Notes: *Pack weight: 5.3 grams; **Price for the first quarter of 2024; WAP of HTP is computed using the quantity of sold packs as weights. Real WAP prices for HTP and WAPC are calculated using the annual consumer price index with the 2015 base year provided by Monstat and given in Table A1 in the Appendix. Nominal prices are deflated using CPI with 2020 as a base year.

Closing the excise tax disparity between HTPs and cigarettes has the potential to substantially increase government revenues from HTPs. Specifically, in 2023, revenues were €5.75 million lower than they would have been if HTPs had borne an equivalent tax burden per cigarette pack. It is important to note

that these potential tax revenue estimates may be overstated, as higher taxes and resulting price increases are expected to reduce consumption. While this could slightly lower revenue, it would also bring significant public health benefits by decreasing tobacco use. Based on data from Table 3, it is evident that the most substantial rise in government revenues was observed in 2022 when compared to the previous year. This rise can be attributed to the effective implementation of measures aimed at combating illicit trade of cigarettes and the increase in excise taxes on both HTP and cigarettes.

Table 3. Government revenues from all tobacco products and from HTPs (in millions of €)

Year	HTP (estimates)	All tobacco products
2020	0.14	45.56
2021	0.47	60.47
2022	2.76	92.08
2023	4.64	100.23
2024(Q1)	1.56	19.33

Source: Ministry of Finance

Note: As no official information is available on the amount of government revenues collected from HTP excise taxes, we estimate these amounts using information on the tax burden per pack of HTPs and the number of packs sold annually. It is important to note that government excise revenues from all tobacco products are typically lower in the first quarter compared to other quarters. However, in Q1 2024, revenues were 6.7 percent higher relative to Q1 2023.

The price structure of the WAP of HTPs, as detailed in Table 4, comprises several components: excise tax per pack (as outlined in Table 3), a 21-percent⁶ value-added tax (VAT), and the net-of-tax (NoT) portion. Notably, the total tax and VAT burden rose from 22.50 percent in 2020 to nearly 51 percent in 2024. Despite this significant increase in tax burden, the tobacco industry has managed to keep prices relatively stable, closely following cigarette prices.

⁶ In Montenegro a value-added tax is applied. The tax is added onto the cost of goods sold.

This trend is reflected in the decreasing NoT component, which has been reduced over the years to mitigate the impact of rising taxes.

Table 4. Price structure of the WAP of HTP per pack, 2020–2024

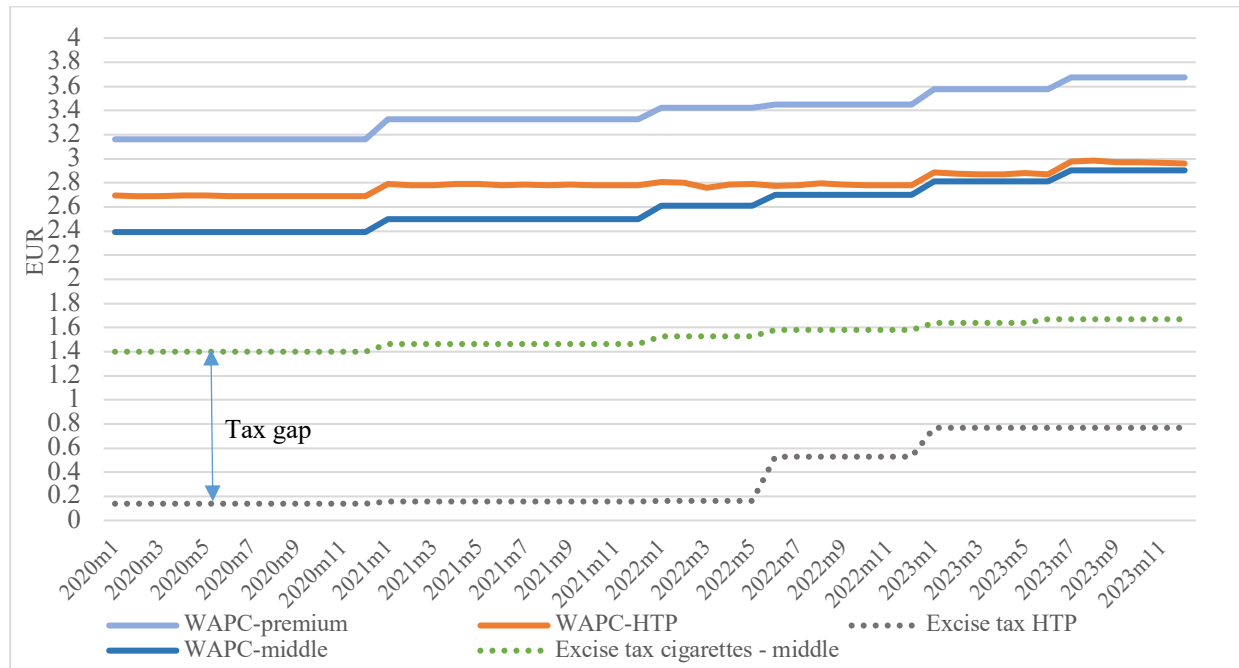
	Jan – Dec 2020	Jan – Dec 2021	Jan – May 2022	June – Dec 2022	Jan – Dec 2023	Jan – March 2024
Price (in €)	2.7	2.8	2.8	2.8	2.9	3
Excise tax per pack (in €)	0.14	0.16	0.16	0.53	0.77	1.01
VAT (in €)*	0.47	0.49	0.49	0.49	0.50	0.52
Net-of-tax price (in €)	1.93	1.99	1.98	1.62	1.45	1.29
Excise tax	5.14%	5.55%	5.77%	18.93%	26.50%	33.57%
Excise tax +VAT	22.50%	22.91%	23.13%	36.29%	43.86%	50.93%

Source: Authors' calculations based on data provided by the Ministry of Finance

Note: In 2023, the excise tax was increased in January, with no further increases implemented throughout the year.* VAT rate is 21% of retail price.

The data presented in Figure 2 indicate that the prices of HTPs align closely with those in the middle and lower price ranges of the premium cigarette market. Specifically, the most-sold HTP brand had a price range of €2.7 to €3 over the observed period, while the most-sold brand in the cigarette market was priced between €2.4 and €2.9. (Table A1 in the Appendix provides a more detailed insight into the prices of the most-sold, cheapest, and most expensive HTP brands). Furthermore, the high correlation coefficients of 0.92 between the prices of HTP and the cigarettes in the mid-range segment and 0.96 between HTP and cigarettes in the premium segment provide additional evidence of the similar price trends for these products. When it comes to the relation between taxes per pack of these two tobacco products, a much higher difference is visible.

Figure 2. HTP and cigarette prices and taxes gap, January 2020 – December 2023



Source: Authors’ calculations based on Ministry of Finance data

The efficacy of tax policies largely relies on their ability to raise prices significantly. This dependency predominantly hinges on the market influence of the tobacco industry and its decision-making with regard to tax pass-through to consumers (full pass-through, under-shifting, or over-shifting). To demonstrate the effectiveness of the implemented tax system related to HTP in Montenegro, an assessment of the pass-through effect of HTP and cigarette tax on HTP prices is provided in Table 5. A robustness analysis with included macro variables is given in Table A2 in the Appendix.

The coefficient from the first column of Table 5 shows that taxes are under-shifted to HTP prices. Specifically, if HTP taxes increase by €1 per pack, it only results in a €0.26 increase in the HTP price. Conversely, the results indicate a much larger indirect pass-through effect of cigarette taxes to HTP prices, with coefficients of 0.87 and 1.06 for the middle and premium segments, respectively.

Considering that previous research (Mugoša et al., 2023) indicates that taxes on Montenegro's cigarette market are almost fully passed through to cigarette prices in the middle segment and over-shifted in the premium segment, these estimates of the indirect tax pass-through to HTP prices empirically confirm the price relations presented in Figure 2. This underscores the tobacco industry's strategic pricing adjustments, ensuring that the relative price of HTPs remains competitive and aligned to cigarette prices, thereby affecting consumption patterns. Additionally, until mid-2022, when the tax burden was particularly low, the industry's pricing strategy of maintaining HTP prices at the level of mid-priced cigarettes enabled them to generate especially high profits from this tobacco market segment. Additional confirmation of large under-shifting of HTP taxes to HTP prices can be seen from the difference between the retail HTP price in nominal values and the expected price that should be at the market in the case of full pass-through, presented in Figure A1 in the Appendix.

Estimates in the last two columns of Table 5 show that the tax gap between cigarette and HTP prices in absolute terms (in €) is under-shifted to the price gap, with a coefficient of 0.33. Meanwhile, the coefficient of the tax burden gap has almost no influence on the price gap. These results indicate that a larger tax gap between these products does not lead to a sufficiently large price gap between them.

Consequently, maintaining low taxes on HTPs is unlikely to achieve policy objectives. Even though there is no conclusive scientific evidence regarding the relative harm of HTPs versus cigarettes, some countries have debated keeping HTP prices low to promote switching from cigarettes—perceived as a “more harmful” and expensive product—to HTPs, seen as “less harmful” and less expensive (Jun et al., 2022; Liber, 2019; Dauchy & Shang, 2023). However, our results show that keeping HTP taxes low would not facilitate this product switching, because a substantial tax gap does not translate into a significant difference in prices. Furthermore, given that HTP prices are mostly aligned with changes in cigarette tax and prices, maintaining HTP

taxes lower compared to cigarette taxes will only result in less revenue for the government and increased profits for tobacco companies. The policies should aim to harmonize tax rates across tobacco products to ensure equitable tax burdens and prevent revenue loss.

Table 5. Pass-through effect of HTP and cigarette tax on HTP prices

Variables	HTP price	HTP price	HTP price	Price gap	Price gap
HTP tax	0.261***				
	(0.006)				
Cigarette tax - middle segment		0.874***			
		(0.035)			
Cigarette tax - premium segment			1.062***		
			(0.042)		
Tax gap				0.329***	
				(0.046)	
Tax burden gap					0.007***
					(0.001)
Fixed effects	YES	YES	YES	YES	YES
Constant	2.523***	1.264***	0.588***	-0.248***	-0.170***
	(0.004)	(0.056)	(0.076)	(0.047)	(0.037)
Observations	615	615	615	615	615

Source: Authors' calculations

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Robustness analysis, including macro variables, confirmed the consistency of results. The results are provided in Table A2 in the Appendix.

Demand analysis

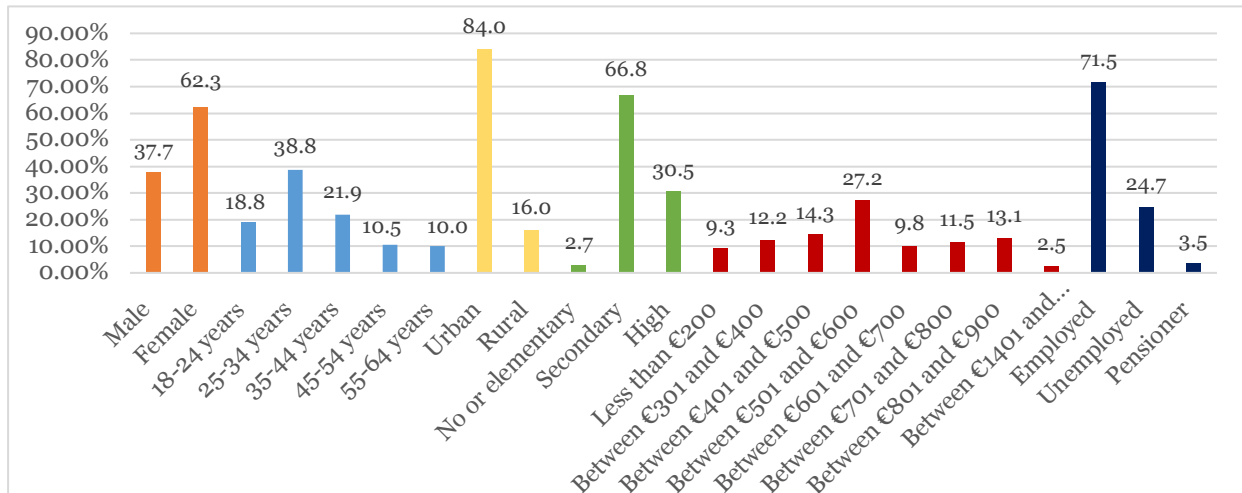
As HTPs are relatively new to Montenegro's market, there is a notable scarcity of data on the prevalence and consumption patterns among HTP smokers. The only available data sources are the STC-SEE and STC-MNE surveys

conducted in 2019 and 2022, which have limitations due to the small sample size of HTP smokers (only 43 respondents without weights in the 2022 survey). Given that HTPs entered the market in late 2019, we utilized the 2019 survey data primarily to establish a baseline prevalence, while the STC-MNE data were employed for more detailed analysis. In addition to providing information on prevalence, this data collection was utilized to provide a deeper understanding of smoking behaviors across different demographic segments, including gender, age, education level, and settlement type, as well as economic factors such as the most recent price paid for tobacco products, personal and household income, and tobacco expenditure.

Overall smoking prevalence of HTP among adults in Montenegro rose sharply from 0.2 percent in 2019 to 3.9 percent in 2022, as can be seen from Table A3 in the Appendix. The most notable increases in HTP smoking were seen among females, urban residents, those with secondary education, and respondents in the Center region.

Based on the provided data represented in Figure 3, we can draw several insights into the sociodemographic characteristics of HTP smokers in Montenegro. The data reveal that HTP smokers in Montenegro are predominantly female (62.3 percent) and mostly aged 25–34 years (38.8 percent). Most smokers live in urban areas (84 percent) and commonly have secondary education (66.83 percent). Their income levels vary, with many earning €501–600 (27.2 percent) or €801–900 (13.1 percent), and the majority are employed (71.7 percent). These findings provide valuable insights into the demographic makeup of HTP smokers in Montenegro, facilitating a deeper understanding of the factors influencing HTP use in the country (Table A4 in the Appendix).

Figure 3. Percentage distribution of current HTP smokers in 2022 by sociodemographic characteristics

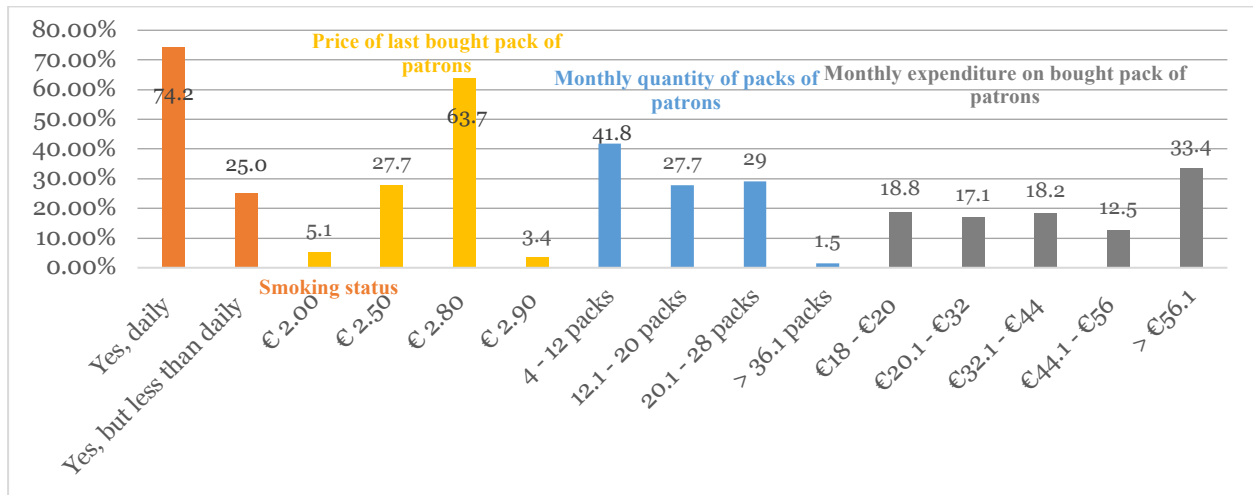


Source: Authors' calculations based on STC-MNE data

Note: There is a statistically significant difference among categories of each demographic characteristic, except between age categories 45–54 and 55–64 years (Table A4.1 in the Appendix). The high level of education refers to respondents who have completed advanced degrees such as bachelor's degree, master's degree or PhD.

The provided survey data also shed light on the smoking behavior of HTP users in terms of their smoking frequency, the quantity of HTP packs used, and monthly expenditure (Figure 4). Most HTP smokers in Montenegro smoke daily (74.2 percent) and buy packs priced at €2.8 (63.7 percent). Monthly consumption is mainly 4–12 packs (41.8 percent) or 20.1–28 packs (29.0 percent). Spending varies, with many smokers paying between €18–20 (18.8 percent) or more than €56.1 (33.4 percent) per month on HTPs (Table A5 in the Appendix).

Figure 4. Percentage distribution of current HTP smokers in 2022 by smoking behavior



Source: Authors' calculations based on STC-MNE data

Note: There is a statistically significant difference among categories of smoking status and price, while in the case of the quantity of packs consumed and monthly expenditure, the only significant difference is between the highest subcategory of quantity (or expenditure) and the others (Table A5.1 in the Appendix).

The findings reveal a prevalent practice of dual smoking in Montenegro, wherein 29.8 percent of HTP users also smoke manufactured cigarettes. Furthermore, 38.2 percent of HTP users are former smokers of traditional manufactured cigarettes (Table A6 in the Appendix). These statistics align with the primary motivations for HTP usage identified by respondents: 59.2 percent cited the ability to use HTPs in non-smoking areas (as they are excluded from current smoke-free regulation), 47.9 percent mentioned using HTPs to prevent reverting to traditional tobacco smoking, and 23.3 percent perceived HTPs as less harmful than smoking traditional tobacco (Table A7 in the Appendix).

Factors affecting the probability of being a smoker of HTPs

Logistic regression is utilized to explore the influence of sociodemographic characteristics on the probability of HTP use, employing data from STC-MNE. We estimated four distinct models and, based on information criteria, selected

Model 1 as the most suitable (Table A8 in the Appendix). Additionally, to address the challenges stemming from a limited number of observations and rare events, we supplemented our analysis with the PML method. The alignment of results between the logit and PML models reinforced the identified associations (see Table A9 in the Appendix). Furthermore, the model's validity was confirmed through several post-diagnostic tests (tables A10–A12 in the Appendix).

The data presented in Table 7 demonstrate that individuals with higher household incomes and current or former users of manufactured cigarettes are more likely to be HTP smokers. Conversely, older age groups exhibit a lower likelihood of being HTP smokers compared to individuals aged 24–35. Although not statistically significant, the magnitude of coefficients suggests that females are more inclined to smoke HTPs than males. This pattern is also observed among individuals with higher education levels compared to those with primary education, and among residents of the Center and South regions compared to those in the North. Additionally, individuals in rural areas and those who are unemployed or retired are less likely to be HTP smokers.

It has been observed that a higher income is correlated with an increased likelihood of being an HTP smoker. With the significant growth in wages in Montenegro since 2022, it is important to evaluate the impact of this income increase, alongside a slower rise in HTP prices, on the affordability of these products. Table 6 illustrates that both HTP affordability indicators decreased during the observed period, indicating a substantial rise in affordability. In 2023, the RIP experienced a reduction of nearly 35 percent, and the MoL witnessed a decrease of approximately 30 percent compared to 2020. The comparison between HTPs and mid-priced cigarettes reveals an increasing affordability trend for both products, with HTPs showing a notably steeper rise in affordability during 2022–2023 compared to 2020 levels. This disparity primarily stems from minimal HTP price increases and the diminishing price gap between HTPs and mid-range cigarettes. This considerable increase in affordability raises concerns regarding a potential rise in HTP consumption,

along with a notable upsurge in cigarette use, particularly if fiscal expansion continues in the years ahead.

Given the dynamics of Montenegro’s tobacco market and the growing prevalence of HTPs, it is essential to monitor their affordability and integrate these metrics into tobacco control policies. HTP tax rates should be adjusted annually to outpace income growth and inflation, ensuring these products become less affordable over time.

Table 6. Affordability indicators

Year	RIP - HTP	Rate of change HTP RIP (Yt/Yt-1)	MoL- HTP	Rate of change HTP MoL (Yt/Yt-1)	Rate of change RIP (Yt/Y2020)	Rate of change of cigarette mid-price segment RIP (Yt/2020)
2020	4.01%	-	52.15	-	-	-
2021	3.50%	-12.72%	53.26	2.13%	-12.72%	-12.6%
2022	2.92%	-16.57%	39.33	-26.15%	-27.18%	-22.3%
2023	2.61%	-10.62%	36.62	-6.89%	-34.91%	-24.5%

Source: Authors’ calculations based on Ministry of Finance and Statistical Office of Montenegro data

Policy and legal framework

Recognizing the complexities surrounding the definition, classification, and regulation of novel and emerging tobacco products such as HTPs, an important part of this research entails a comprehensive analysis of these products’ global and national regulatory framework.

Global and EU regulative framework

As an EU accession country and a signatory of the WHO FCTC (WHO FCTC, 2003), Montenegro is actively working to align its regulatory framework with EU directives and is committed to meeting the fundamental requirements set forth in the articles of the WHO convention.

Effectively taxing HTPs involves challenges similar to those encountered with traditional tobacco products. HTPs are sold in more than 40 countries, with fewer than 10 banning them, yet regulatory frameworks differ widely across jurisdictions. In most cases, HTPs are taxed at lower rates than cigarettes, typically using the weight of tobacco as the tax base under specific or mixed excise systems, which complicates enforcement due to difficulties in assessing the tobacco content per stick. Interestingly, Liber (2019) shows that, despite lower tax rates, HTPs are priced higher than cigarettes in numerous countries.

Heated tobacco products (HTPs) are tobacco products and should be regulated under the same provisions that apply to all tobacco products. If HTPs are not prohibited they have to be subject to strict regulation similar to conventional cigarettes and should be taxed at the same level and in the same manner as cigarettes, as emphasized by WHO and the FCTC guidelines (WHO HTP, 2020; FCTC/COP8, 2018; WHO, 2023). Some countries, such as Azerbaijan, Colombia, Japan, and Ukraine, have already implemented policies to tax HTPs per stick at equivalent rates to traditional cigarettes. To address market complexities, governments are advised to standardize product definitions, define a “unit” for each HTP, limit the range of allowed products, and consider imposing taxes on devices used for HTP consumption (WHO, 2021).

Non-price and administrative control measures should also be attained by enacting laws that include provisions like the following:

- A comprehensive ban on advertising, promotion, and sponsorship of HTPs, including HTP devices.
- Prohibition of the sale of HTPs with attractive flavors.
- Prohibition of HTP use in smoke-free areas, such as work and public spaces.
- Enforcement of more stringent regulations for HTPs and their devices, including banning misleading packaging and labeling, and requiring pictorial health warnings that cover at least 50 percent of the packaging. Governments should also consider implementing plain packaging.
- Introduction of strict licensing requirements for all participants in the supply chain, such as retailers, importers, and manufacturers, alongside the development of a tracking and tracing system for HTPs, ideally integrated with systems already in place for cigarettes (WHO, 2021).

The existing EU Tobacco Tax Directive, however, currently lacks specific provisions pertaining to emerging products such as HTPs, resulting in a varied approach to taxation across member states. Some countries categorize HTPs under other smoking tobacco, applying specific excise taxes based on weight. In contrast, certain countries, such as Lithuania and Croatia, impose specific excise taxes on a per-stick basis. Meanwhile, Germany, Portugal, France, and Spain employ a combination of specific and ad valorem taxes. Nonetheless, the minimum excise tax threshold for HTPs typically remains substantially lower than that for traditional cigarettes (López-Nicolás, 2024; Perucic et al., 2023).

The European Commission is proposing revisions to the TTD that involve creating separate tax categories for new tobacco products, including HTPs. Additionally, they are recommending significant rate increases for traditional products and adjustments to account for inflation and purchasing power disparities among member states (López Nicolás, 2023). In the draft proposal,

the tax structure and rates for HTPs are proposed as follows: reaching either a fixed amount of €91 per 1,000 cigarettes or a relative minimum of 55 percent of the retail sale price. It is important to note that offering a choice between these criteria and establishing the relative minimum as a percentage of the retail price could create an opportunity for possible emergence of cheap HTP brands (Smoke Free Partnership, 2022).

Relevant national legislation governing HTPs

In Montenegro, the institutional and legal framework for tobacco policies principally comprises four laws: the Law on Excise Taxes (Law on Excise Tax, 2023), the Law on Limiting the Use of Tobacco Products (Law on Limiting Use of Tobacco Products, 2023), the Law on Tobacco (Law on Tobacco, 2015), and the Law on Ratification of the World Health Organization Framework Convention on Tobacco Control (Law on Ratification of the WHO FCTC, 2005).

HTPs are predominantly subject to regulation under two tobacco control laws: the Law on Excise Tax and the Law on Limiting the Use of Tobacco Products, wherein they are classified as smokeless tobacco. However, the recent introduction of HTPs, coupled with the absence of revisions to the Law on Tobacco since 2015, has resulted in incomplete coverage of these new products within its provisions. Furthermore, comprehensive guidelines concerning the issue of smokeless tobacco use are notably absent in national health and other pertinent strategies. These regulatory gaps underscore the critical need for updated policies to address the increasing prevalence and consumption of HTPs effectively.

Smokeless tobacco products were introduced by amendments to the Law on Excise Tax in 2020 in such a way that the words “non-burning tobacco”⁷ are

⁷ The category of non-burning tobacco was introduced by amendments to the Law on Excise Taxes in 2017. This category includes products intended for vapor inhalation without combustion, which can be considered substitutes for traditional tobacco products and contain processed tobacco meant for heating.

replaced by “smokeless tobacco products”. From 2020 until June 2022, the Law specified that excise duty for smokeless tobacco (in which category HTP is classified) is levied per kilogram of net weight, amounting to 40 percent, of the minimum excise duty on 1,000 cigarettes sticks determined for the WAPC. From June 2022, excise duty on smokeless tobacco products is calculated based on the euro amount specified per kilogram of tobacco mixture, as outlined in Articles 49a and 80k:

- From June 1st to December 31st, 2022, the excise duty was €100 per kilogram.
- From January 1st to December 31st, 2023, the excise duty was €145 per kilogram.
- From January 1st, 2024, the excise duty is €190 per kilogram.

The Law on Limiting the Use of Tobacco Products addresses the most important issues related to non-price tobacco control measures. It encompasses provisions related to advertising, promotion, sponsorship regulations, sales prohibition, and disclosure requirements pertaining to both combustible and smokeless tobacco products.

In accordance with this legislation, smokeless tobacco products are defined as those that do not involve combustion, including chewing tobacco, snuff, and oral tobacco. Under the disclosure requirements outlined in Article 47, it is mandated that a health warning text be prominently displayed, covering a minimum of 30 percent of the largest side of the product’s surface. Stricter provisions apply to combustible tobacco, where a 65-percent coverage of combined pictorial and text warnings is required. Furthermore, as in the case of cigarettes, each package of smokeless tobacco products entering the market must bear an excise stamp containing a letter mark for tobacco products, the coat of arms of Montenegro, an identification number, a hologram strip, and a security QR code.⁸

⁸ More details also available in The regulation on the labeling of tobacco products and alcoholic beverages excise stamp (*Official Gazette of Montenegro*, no. 028/19 from 23.05.2019, 028/21 from 12.03.2021, 064/23 from 26.06.2023)

As per Article 10 of this Law, the sale of tobacco products, including smokeless tobacco, to individuals under the age of 18 is strictly prohibited. Retailers must display a visible sign within the premises prohibiting the sale of tobacco products to individuals under the age of 18. The prohibition of tobacco use in enclosed public and working spaces, as outlined in Article 15 of this law, exempts HTPs. This exemption is due to the classification of HTPs as smokeless tobacco that is not “lit” during use, leading to their exclusion from current smoke-free regulations.

Also, according to the Law on Limiting the Use of Tobacco Products, heating devices are not explicitly covered and do not fall under the classification of tobacco products, similar to the regulations in many other countries (Heated tobacco products: Global regulation, 2023). Consequently, it can be considered that they are not subject to bans on advertising, promotion, and sponsorship of tobacco products, as defined in Article 6. Despite the prohibition of advertising cigarettes and HTP packs, tobacco companies can still market the brand of heating devices and bypass existing restrictions on tobacco advertising.

Manufacturers and importers of new tobacco products are obligated to electronically notify the Ministry of Health and the European Commission no later than six months before introducing a new tobacco product to the market. They must also submit all available scientific evidence that the devices designed for the consumption of smokeless tobacco products do not burn tobacco and do not produce tobacco smoke that is actively or passively inhaled or exhaled (Article 53).

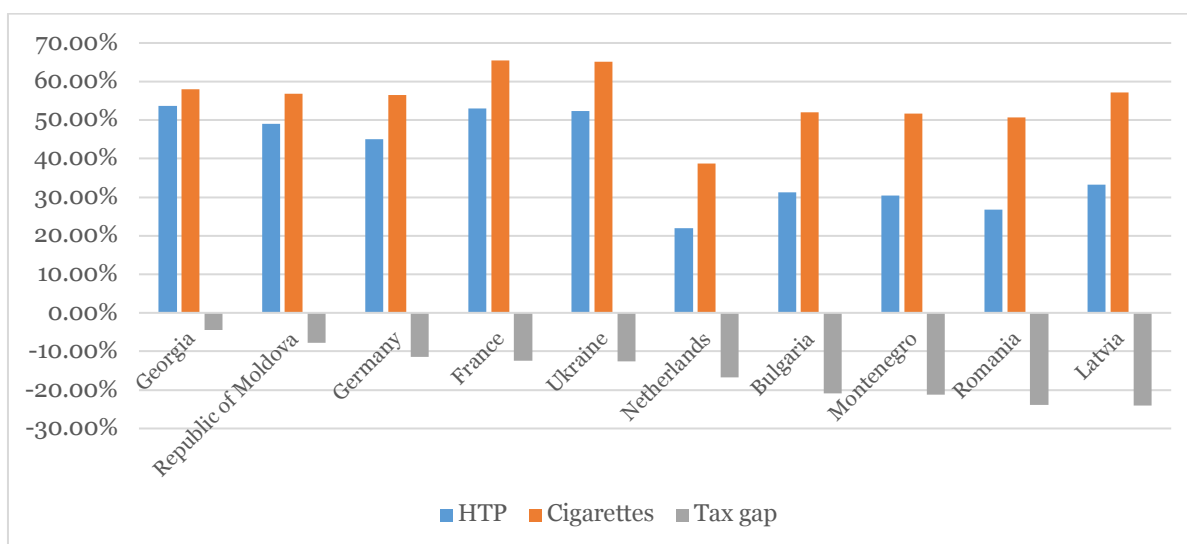
Table A14 in the Appendix details the comparison between regulations governing HTPs and traditional cigarettes, alongside an evaluation of compliance with WHO FCTC recommendations. In summary, significant disparities are evident in regulations concerning the presentation of health

warnings on HTPs and cigarettes, the implementation of smoke-free laws, and restrictions on advertising and promotional activities.

HTP and cigarette tax burden in Montenegro and European countries

Throughout Europe, excise taxes on HTPs are generally lower than those on cigarettes. This discrepancy is evident in the tax burden gap between cigarettes and HTPs, which ranges from -4.39 percent in Georgia to -69.19 percent in Andorra (detailed data per country are provided in Table A13 in the Appendix). Figure 5 illustrates the top 10 countries with the smallest tax gaps, showing that Montenegro ranks 8th with a tax difference of -21.22 percent.⁹

Figure 5. Tax gap and tax burden for HTP and cigarettes, 2023



Source: Data for all countries except Montenegro were obtained from CTFK (2023). For Montenegro, data were calculated using Ministry of Finance data and the level of excise tax stipulated in the Law on Excise Tax for 2023, applying the same methodology¹⁰ as in (CTFK, 2023) to ensure comparability.

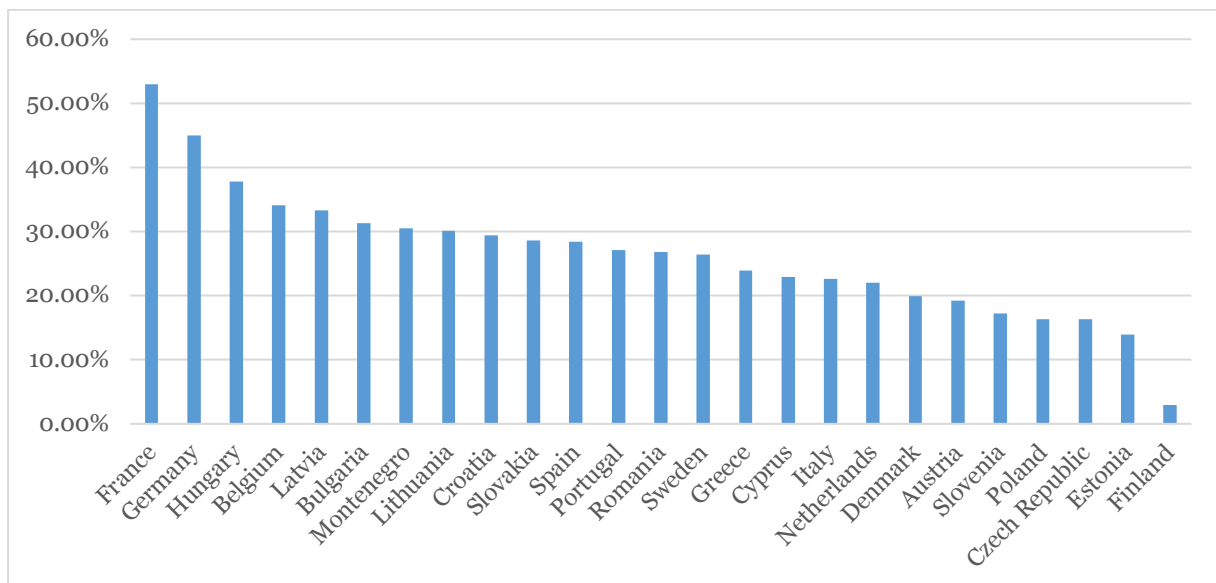
Upon review of the tax burdens associated with HTPs across European countries, it is evident that Georgia (53.61 percent) and France (52.94

⁹ The tax burden figure for Montenegro differs from the one provided in Table A13 due to a different base used for the calculation.

¹⁰ The tax burden on HTP is calculated for each country based on the assumption that the weight of an HTP pack is 6.1 grams and using the price of the most-sold HTP cigarette. For comparing the tax burden on cigarettes, the price of a pack of conventional Marlboro cigarettes is utilized.

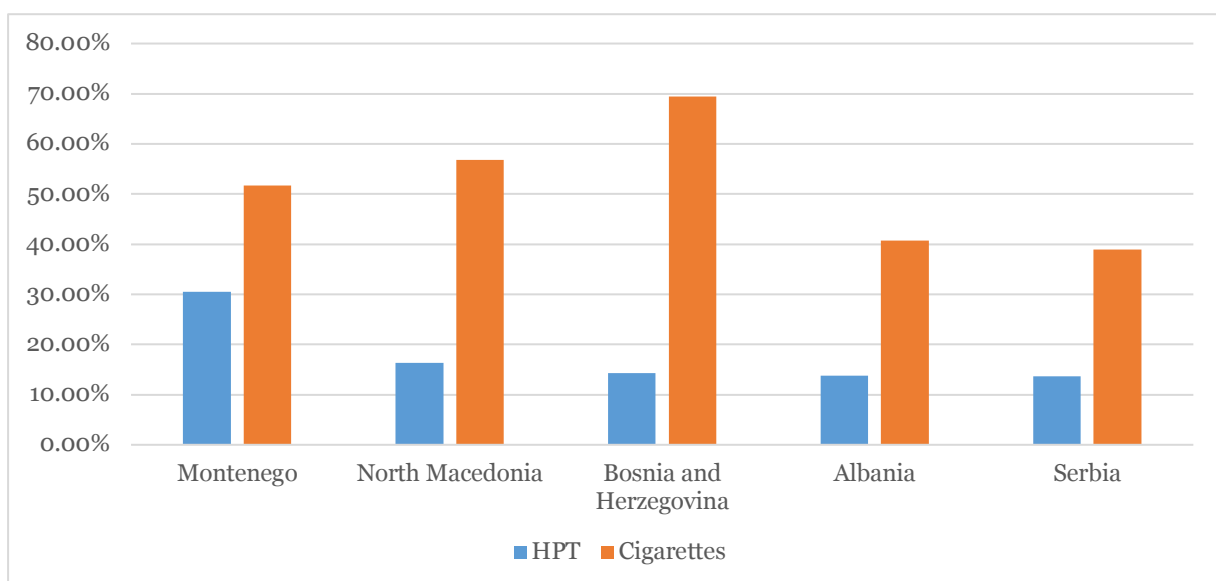
percent) bear the highest tax burdens, while Finland (2.90 percent) and Andorra (2.30 percent) exhibit the lowest. Montenegro, with a tax burden of 30.50 percent, ranks thirteenth in Europe, seventh among EU countries (Figure 6), and first within its region (Figure 7).

Figure 6. HTP tax burden in EU countries, 2023



Source: (CTFK, 2023) and Ministry of Finance of Montenegro

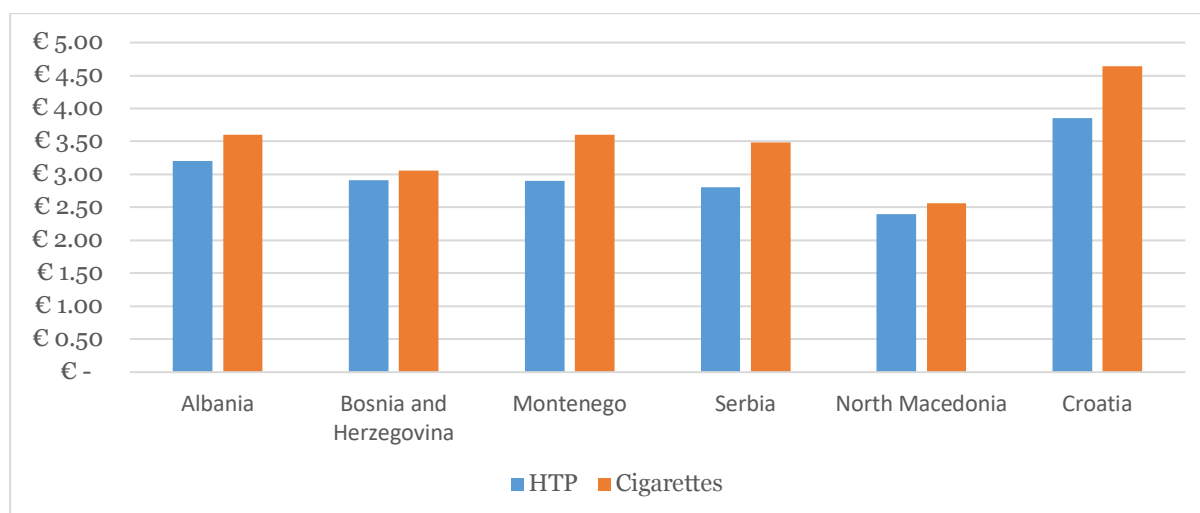
Figure 7. HTP tax burden in Montenegro and neighboring countries, 2023



Source: (CTFK, 2023) and Ministry of Finance of Montenegro

In Montenegro and its neighboring countries—Serbia, Croatia, Bosnia and Herzegovina, North Macedonia, and Albania—in 2023, the price of the most-sold HTP brand is lower than that of cigarettes, with the premium brand Marlboro serving as the basis for comparison. In North Macedonia, the price is the most competitive, standing at €2.40, while Croatia has the highest price at €3.85. In Montenegro HTP is priced at €2.90, positioning it in the middle price range within this region (Figure 8). Comparison of HTP prices in international dollar purchasing power parity is given in Figure A2 in the Appendix.

Figure 8. Price of HTP and cigarette packs in Montenegro and countries in region in 2023



Source: Price of HTP in local currency is obtained from (CTFK, 2023); prices are converted into euros using the official exchange rate (*Xe Currency Converter - Live Exchange Rates Today*, n.d.)

Conclusions

Discussion

In Montenegro, the market for HTPs has shown rapid growth since its introduction in late 2019, rising from 3.2 percent of the legal cigarette market share in 2020 to almost 11 percent by 2023. Despite increases in excise taxes, the sales of HTPs have surged, reflecting changes in consumer preferences

within the tobacco market and the growing popularity of these products. Tobacco industry pricing strategies, marked by modest HTP price increases and misleading claims of “harmlessness,” have created an environment that attracts new users, including young people—a particularly concerning trend. These tactics have may incentivized some former smokers to take up HTPs and led others back to cigarette use, resulting in dual usage of both HTPs and cigarettes. Consequently, the prevalence of HTP use has increased from 0.2 percent in 2019 to nearly 4 percent in 2022. This sharp rise in prevalence aligns with the increased affordability of HTPs, indicating the importance of also considering affordability metrics in policy decisions, as price alone may not fully capture the accessibility of HTPs to consumers.

Montenegro’s HTP market can be characterized as a near monopoly, with a 96-percent share of one tobacco company’s products, which also has a considerable share of the cigarette market. Consequently, it is expected that the tobacco industry will apply a pricing strategy to maximize profit in both tobacco products markets. The pricing of HTPs in Montenegro closely aligns with that of middle- to lower-range premium cigarettes, indicating a strategy by the tobacco company to position HTPs as competitive alternatives to cigarettes.

This strategy is reflected in the under-shifting of HTP taxes to prices, where a €1 increase in HTP taxes leads to only a €0.26 increase in prices. However, the indirect pass-through effect of cigarette taxes on HTP prices is significantly higher, indicating that changes in cigarette taxes influence HTP pricing more than direct tax changes do. These results align with previous similar research conducted by authors (Dauchy & Shang, 2023), demonstrating comparable pricing strategies in other countries as well. This highlights the interdependence of the cigarette and HTP tobacco markets and emphasizes the necessity of a comprehensive approach to policy decisions.

Research results also reveal that despite the increase in the excise tax burden on HTPs—from 5.14 percent per pack in 2020 to 33.57 percent in 2023—the

net-of-tax price component has been significantly reduced. This reduction mitigates the impact of rising taxes on retail prices, further supporting the findings that the industry's strategy is to keep HTP prices attractive to consumers. The persistent gap in tax burden between HTPs and cigarettes (nearly 26 percent in 2023) is an important point of concern, raising questions about the effectiveness of the current taxation strategy. Similarly, as concluded in previous research (Liber, 2019), this study shows that the substantial tax advantage of HTPs relative to cigarettes does not result in a proportional price difference due to the low correlation between HTP tax and price. Moreover, maintaining lower taxes on HTPs compared to cigarettes provides the tobacco industry with larger profits, as they charge similar prices for HTPs and mid-priced cigarettes, while simultaneously leading to lower government revenues.

Currently, in Montenegrin legislation, HTPs are recognized and classified as smokeless tobacco, which lacks adequate regulatory coverage compared to cigarettes. For example, provisions related to smoke-free legislation are not applied to HTPs, so there is no ban on the use of these products in enclosed public spaces. Additionally, there are insufficient measures to regulate the taxation and promotion of the devices used to heat tobacco. Given Montenegro's commitment as a signatory to the WHO FCTC, the challenges posed by novel tobacco products like HTPs should be recognized and adequately addressed by necessary adjustments in tobacco legislation.

Although limited by small sample sizes, the demographic analysis reveals important insights into the profile of HTP users, which can serve as valuable insights for targeted public health interventions. Research shows that HTP smokers in Montenegro are predominantly female, young adults, from urban settlements, and with secondary and higher levels of education. Furthermore, it is worrisome that a significant portion of HTP users continue to use traditional tobacco products, raising concerns about dual consumption. The high rates of dual HTP and cigarette use (29.8 percent) and transition from traditional cigarettes (38.2 percent of former smokers are current HTP

smokers) highlight the possibility that HTPs could complicate and even undermine, rather than support smoking cessation efforts. The primary motivations for HTP use, including the ability to use them in non-smoking enclosed public and working areas and the perception of reduced harm, point to significant gaps in public understanding and the regulatory framework related to these products. These findings suggest a need for both enhanced public education about HTPs' adverse health effects and more comprehensive smoke-free policies that explicitly address HTPs.

While this study provides valuable insights into the market dynamics and regulatory impacts of HTPs in Montenegro, several limitations should be acknowledged. The study covers the period from 2020 to 2023, which limits the ability to draw long-term conclusions about market trends and policy effectiveness. Additionally, the absence of comprehensive data on various factors of HTP consumption and market dynamics, such as detailed consumption patterns across different demographic groups, comprehensive data on the dual use of HTPs and cigarettes, and tobacco industry marketing strategy, constrains us from conducting a more in-depth analysis of factors affecting HTP use. Acknowledging these limitations, the study serves as an initial analysis of HTP market trends and its regulatory environment in Montenegro, which significantly contributes to the scarce literature on novel tobacco products in low- and middle-income countries, especially in the Western Balkan region. Future research should aim to address these constraints and expand the scope of analysis to provide a more detailed understanding of HTP dynamics.

Recommendations

Based on the findings of this study, the following recommendations are proposed for policy makers:

- *The government should review and adjust excise taxes and tax rates on HTPs to ensure they are roughly equivalent to those on cigarettes.* It is recommended that HTPs be taxed on a per-unit basis, at the same level as cigarettes. This should increase government revenues and discourage HTP use. Additionally, consideration should be given to taxing the devices used for HTP consumption. Effective tobacco tax administration is needed to support these measures.
- *After the initial calibration to match cigarette tax rates, the government should adjust tax rates annually by inflation and purchasing power parity changes at a minimum.* Ideally, the government should raise HTP tax rates annually by more than income growth and inflation so that they become less affordable over time to mitigate initiation, encourage quitting, and drive down overall consumption.
- *The government should align regulations for HTPs with the WHO FCTC recommendations.* The Law on Tobacco and other related legislation should be amended to address emerging tobacco products like HTPs comprehensively, by including provisions aligned with WHO FCTC recommendations. This involves implementing health warnings covering a minimum of 50 percent of the product packaging, enforcing strict advertising limitations, and imposing constraints on promotional activities associated with heating devices. Such measures are essential for mitigating the HTPs' attractiveness, particularly among young adults. Designed policies should be flexible and adaptable to future developments in tobacco products and market dynamics.
- *Tobacco control policies should be protected from tobacco companies' influence.* In accordance with Article 5.3 of the WHO FCTC, it is essential for policy makers to maintain caution against the tactics employed by tobacco and related industries, as well as their aggressive

promotion of these products and their misleading presentation as “healthier” alternatives to cigarettes.

- *The government should conduct public awareness campaigns about the health risks associated with HTPs and the importance of effective tobacco control measures.* There is currently no evidence proving that HTPs are less harmful than traditional tobacco products. Comprehensive public health campaigns aimed at educating the public about the risks associated with HTPs and the misconceptions surrounding their safety compared to traditional cigarettes should be conducted. Targeted messaging should focus on the dangers of dual use and the importance of cessation.
- *The government should promote independent research on HTP use and its health and economic impacts.* This covers investing in data collection related to the HTP consumption patterns necessary for conducting comprehensive empirical research. This is necessary to strongly support evidence-based policy decisions and improve the understanding of the economic impacts of HTPs and the effectiveness of related tax policies.

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Appendix

Table A1. Most-sold, most expensive, and cheapest HTP brand 2020–2023

Year	The most-sold brand	Price (n €)	The most expensive brand	Price (n €)	Cheapest brand	Price (n €)
2020	HEETS Silver Selection	2.7	All HEETS*	2.7	NUSO Heated Tobacco	2.5
2021	HEETS Silver Selection	2.8	All HEETS*	2.8	NUSO Heated Tobacco	2.5
2022	HEETS Silver Selection	2.8	HEETS Yugen (Dim)	3.0	NUSO Heated Tobacco	2.5
2023**	HEETS Silver Selection	3.0	HEETS Yugen (Dim)	3.2	NUSO Heated Tobacco	2.7

Source: Ministry of Finance, Tobacco Agency

Notes: *In 2020, all variants of the HEETS brand (Amber, Turquoise, Yellow, Bronze) had identical prices. However, in 2021, two new brands, Yugen and Apricity, were introduced to the market. These prices are provided in nominal terms. ** Reported prices for 2023 reflect an increase that occurred in the second part of the year.

Table A2. Pass-through effect of HTP and cigarette tax on HTP prices – robustness analysis

Variables	HTP price	HTP price	HTP price	Price gap	Price gap
HTP tax	0.263***				
	(0.007)				
Cigarette tax - middle segment		0.880***			
		(0.033)			
Cigarette tax - premium segment			1.164***		
			(0.037)		

Tax gap				0.372***	
				(0.043)	
Tax burden gap					0.008***
					(0.001)
Wage growth	0.000***	-0.000**	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CPI	0.002	-	-0.013***	-0.032***	-0.026***
	(0.001)	0.013***	(0.001)	(0.004)	(0.003)
Constant	2.516***	1.263***	0.578***	-0.248***	-0.151***
	(0.004)	(0.053)	(0.069)	(0.040)	(0.031)
Observations	598	598	598	598	598

Source: Authors' calculations

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Figure A1. Nominal retail HTP price and expected price in case of full pass-through



Source: Authors' calculations based on Ministry of Finance data

Table A3. Prevalence of current HTP smokers

Sociodemographic characteristic	Percentage of HTP smokers (95% CI) 2019	Percentage of HTP smokers (95% CI) 2022
Overall prevalence	0.2 (0.1, 0.7)	3.9 (2.9, 5.3)
Gender		
Male	0.1 (0.0, 1.0)	1.5 (0.9, 2.4)
Female	0.3 (0.1, 1.3)	2.4 (1.6, 3.6)
Age		
18–24 years	0.9 (0.1, 6.2)	0.7 (0.3, 1.5)
25–34 years	0.4 (0.1, 3.0)	1.5 (0.9, 2.4)
35–44 years	0.0 (0.0, 0.0)	0.8 (0.4, 1.6)
45–54 years	0.0 (0.0, 0.0)	0.4 (0.1, 1.1)
55–64 years	0.4 (0.1, 2.8)	0.4 (0.1, 1.0)
Type of residence		
Urban	0.4 (0.1, 1.2)	3.3 (2.3, 4.6)
Rural	0.0 (0.0, 0.0)	0.6 (0.3, 1.4)
Education level		
Primary or less	0.3 (0.0, 2.3)	0.1 (0.0, 0.7)
Secondary	0.3 (0.1, 1.1)	2.6 (1.8, 3.8)
High	0.0 (0.0, 0.0)	1.2 (0.7, 2.1)
Region		
Center	0.0 (0.0, 0.0)	2.1 (1.4, 3.2)
North	0.3 (0.1, 2.2)	0.8 (0.4, 1.6)
South	0.6 (0.2, 2.5)	1.0 (0.5, 1.8)
Household income per month (€)		
0–400	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
401–800	0.4 (0.1, 1.6)	1.0 (0.5, 1.8)
801.1–1,200	0.5 (0.1, 3.6)	1.8 (1.2, 2.9)
1,201–1,600	0.0 (0.0, 0.0)	0.7 (0.3, 1.4)
Above 1,600	0.0 (0.0, 0.0)	0.1 (0.0, 0.7)

Source: Authors' calculations based on STC-MNE data

Note: The high level of education refers to respondents who have completed advanced degrees such as bachelor's degree, master's degree, or PhD.

Table A4. Percentage distribution of current HTP smokers in 2022 by sociodemographic characteristics

Sociodemographic characteristic	Percentage of HTP smokers (95% Confidence Interval)
Gender	
Male	37.7 (23.7, 54.1)
Female	62.3 (45.9, 76.3)
Age	
18–24 years	18.8 (9.1, 35.0)
25–34 years	38.8 (24.4, 55.5)
35–44 years	21.9 (11.2, 38.3)
45–54 years	10.5 (3.8, 25.5)
55–64 years	10.0 (3.6, 25.0)
Type of residence	
Urban	84.0 (68.5, 92.7)
Rural	16.0 (7.3, 31.5)
Education level	
No or elementary	2.7 (0.4, 16.9)
Secondary	66.8 (50.3, 80.0)
High	30.5 (17.8, 46.9)
Personal income per month	
Less than €200	9.3 (3.0, 25.1)
Between €301 and €400	12.2 (4.6, 28.5)
Between €401 and €500	14.3 (5.9, 30.9)
Between €501 and €600	27.2 (14.7, 44.8)
Between €601 and €700	9.8 (3.3, 25.8)
Between €701 and €800	11.5 (4.2, 27.7)
Between €801 and €900	13.1 (5.2, 29.6)
Between €1401 and €1600	2.5 (0.3, 19.0)
Employment status	
Employed	71.7 (55.3, 84.0)
Unemployed	24.7 (13.5, 41.0)
Pensioner	3.5 (0.6, 17.4)

Source: Authors' calculations based on STC-MNE data

Table A4.1. Tests for proportion equality – sociodemographic characteristics

Gender	
Male vs. Female	$z = -1.9$ ($p = 0.026$)
Age	
18–24 years vs. 25–34 years	$z = -2.3$ ($p = 0.012$)
25–34 years vs. 35–44 years	$z = 1.6$ ($p = 0.059$)
35–44 years vs. 45–54 years	$z = 1.3$ ($p = 0.088$)
45–54 years vs. 55–64 years	$z = 0.7$ ($p = 0.250$)
Type of residence	
Urban vs. Rural	$z = 6.2$ ($p = 0.000$)
Education level	
No or elementary vs. Secondary	$z = -5.1$ ($p = 0.000$)
Secondary vs. High	$z = 6.17$ ($p = 0.017$)
Region	
North vs. Center	$z = -3.8$ ($p = 0.000$)
Center vs. South	$z = 3.3$ ($p = 0.000$)
Employment status	
Employed vs. Unemployed	$z = 5.6$ ($p = 0.000$)
Unemployed vs. Pensioner	$z = 2.5$ ($p = 0.001$)

Source: Authors' calculations

Table A5. Percentage distribution of current HTP smokers in 2022 by smoking behavior

Smoking intensity	
Yes, daily	74.2 (57.9, 85.8)
Yes, but less than daily	25.8 (14.2, 42.1)
Last paid price	
€2.5	32.8 (19.5, 49.7)
€2.8	63.7 (46.9, 77.7)
€2.9	3.4 (0.6, 17.8)
Monthly quantity of packs	
4–12	41.8 (26.9, 58.3)

12.1–20	27.7 (15.5, 44.5)
20.1–28	29.0 (16.5, 45.8)
36.1 and more	1.5 (0.1, 18.6)
Monthly expenditure	
Between €18 and €20	18.8 (9.1, 35.0)
Between €20.1 and €32	17.1 (7.9, 33.1)
Between €32.1 and €44	18.2 (8.6, 34.3)
Between €44.1 and €56	12.5 (5.0, 27.9)
€56.1 and more	33.4 (19.9, 50.2)

Source: Authors' calculations based on STC-MNE data

Table A5.1. Tests for proportion equality – smoking behavior

Smokers' behavior	Percentage of HTP smokers (95% Confidence Interval)
Smoking intensity	
Yes, daily vs. Yes, but less than daily	$z = 5.0$ ($p = 0.000$)
Last paid price (in €)	
2.5 vs. 2.8	$z = -3.7$ ($p = 0.000$)
2.8 vs. 2.9	$z = 6.2$ ($p = 0.000$)
Monthly quantity of packs	
4–12 vs. 12.1–20	$z = 0.9$ ($p = 0.181$)
12.1–20 vs. 20.1–28	$z = 0.5$ ($p = 0.314$)
20.1–28 vs. Above 36.1	$z = 3.1$ ($p = 0.001$)
Monthly expenditure (in €)	
18–20 vs. 20.1–32	$z = -0.0$ ($p = 0.865$)
20.1–32 vs. 32.1–44	$z = -0.0$ ($p = 0.913$)
32.1–44 vs. 44.1–56	$z = 0.4$ ($p = 0.531$)
44.1–56 vs. Above 56.1	$z = -2.0$ ($p = 0.020$)

Source: Authors' calculations based on STC-MNE data

Table A6. Smokers of HTP and manufactured cigarettes in 2022

	Percentage of HTP smokers (95% Confidence Interval)
HTP users who also smoke manufactured cigarettes	29.8 (17.3, 46.3)
HTP users who are former smokers of manufactured cigarettes	38.2 (24.1, 54.6)

Source: Authors' calculations based on STC-MNE data

Table A7. Why do you use/used to smoke heated tobacco products?

Answers	Percentage of HTP smokers (95% Confidence Interval)
To avoid returning to smoking tobacco	
Yes	47.9 (29.8, 66.5)
No	52.1 (33.5, 70.2)
Because you can/could use them in places where smoking tobacco is not allowed	
Yes	59.2 (39.8, 76.1)
No	40.8 (23.9, 60.2)
Less harmful than smoking tobacco	
Yes	23.3 (10.9, 43.1)
No	76.7 (56.9, 89.1)

Source: Authors' calculations based on STC-MNE data

Table A8. Factors affecting the probability of being a smoker of HTPs,
different test specifications

Independent variable	Model 1		Model 2		Model 3		Model 4	
	Coef.	Se	Coef.	Se	Coef.	Se	Coef.	Se
Employment status: Employed								
Unemployed	-0.5	(0.6)						
Pensioner	-1.0	(1.1)						
Education: Primary								
Secondary education level	0.3	(1.1)	0.4	(1.1)				
High education level	0.5	(1.2)	0.7	(1.1)				
Age: 24–34 years								
Less than 24 years	-0.8	(0.7)	-1.1*	(0.6)	-1.3**	(0.6)	-1.1**	(0.6)
35–44 years	-0.8**	(0.3)	-0.7**	(0.3)	-0.7**	(0.3)	-0.8**	(0.3)
45–54 years	-1.4***	(0.4)	-	(0.5)	-	(0.4)	-1.5***	(0.4)
More than 55 years	-1.3***	(0.5)	-	(0.4)	-	(0.5)	-1.8***	(0.5)
Gender: Male								
Female	0.4	(0.3)	0.4	(0.2)	0.4	(0.3)	0.4	(0.3)
Region: North								
Center region	0.7	(0.5)	0.6	(0.5)	0.6	(0.5)		
South region	0.1	(0.5)	0.1	(0.5)	0.1	(0.5)		
HH income: Less than €800								
Household income more than €801	1.0**	(0.4)	1.1***	(0.4)	1.2***	(0.3)	1.2***	(0.3)
Smoker of MCCs	0.4	(0.4)	0.4	(0.4)	0.4	(0.4)	0.5	(0.4)
Former smoker of MCCs	1.3**	(0.6)	1.3**	(0.6)	1.3**	(0.6)	1.3**	(0.6)

Settlement type:								
Urban								
Rural settlement type	-0.4	(0.3)	-0.4	(0.3)	-0.4	(0.3)	-0.5	(0.3)
Constant	-4.1***	(1.5)	-	4.3***	(1.4)	-	3.9***	(0.7)
AIC	294.9		289.5		288.0		287.1	
BIC	372.1		347.5		336.3		330.6	
r2_p	0.145		0.139		0.131		0.127	
ll	-131.5		-132.7		-134.0		-134.5	

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.

Table A9. Factors affecting the probability of being a smoker of HTPs – logit and PML model

Variables	ML (OR)		PML(OR)	
	Coef.	Se	Coef.	Se
Employment status: Employed				
Unemployed	0.615	-0.398	0.529	-0.313
Pensioner	0.358	-0.413	0.348	-0.342
Education: Primary				
Secondary education level	1.308	-1.511	0.986	-0.878
High education level	1.654	-1.983	1.382	-1.281
Age: 24–34 years				
Less than 24 years	0.457	-0.307	0.679	-0.48
35–44 years	0.462**	-0.149	0.524	-0.22
45–54 years	0.252***	-0.115	0.374**	-0.186
More than 55 years	0.258***	-0.13	0.330*	-0.187
Gender: Male				
Female	1.535	-0.418	1.287	-0.435
Region: North				
Center region	1.944	-1.019	1.48	-0.225

South region	1.097	-0.558	0.9	-0.238
HH income: Less than €800				
Household income more than €801	2.748**	-1.147	1.814	-0.68
Smoker of MCCs	1.506	-0.619	2.165*	-0.915
Former smoker of MCCs	3.568**	-2.051	4.203***	-1.759
Settlement type: Urban				
Rural	0.677	-0.224	0.768	-0.324
Constant	0.017***	-0.025	0.051***	-0.051

Source: Authors' calculations; Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table A10. VIF test

	Model 1
Mean VIF	2.36

Source: Authors' calculations

Table A11. Linktest

	Model 1			
	Coef.	Se	z	P>z
_hat	0.7	0.6	1.1	0.3
_hatsq	-0.0	0.1	-0.4	0.7
_cons	-0.3	0.8	-0.4	0.7

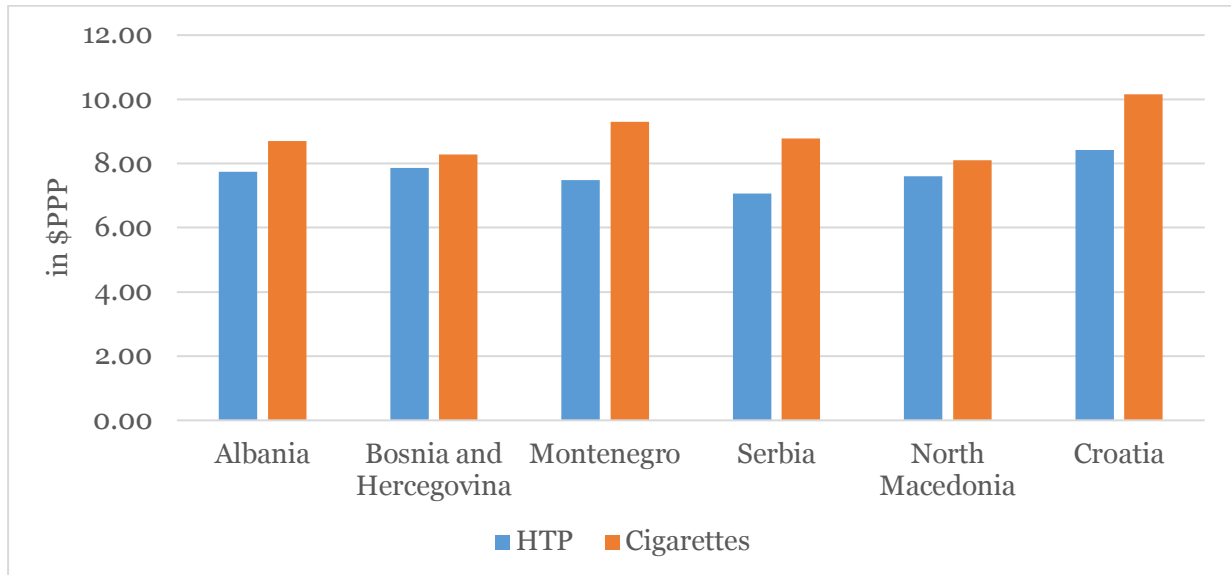
Source: Authors' calculations

Table A12. Hosmer and Lemeshow Goodness of Fit Test

	Model 1	
Observations	921	921
Groups	5	10
Chi2	2.9	3.9
p	0.4	0.9

Source: Authors' calculations

Figure A2. Price of HTP and cigarette packs in Montenegro and countries in region, 2023 (\$PPP)



Source: Price of HTP in local currency is obtained from (CTFK, 2023); Prices are converted in \$PPP using conversion rate from (IMF, 2023)

Table A13. Tax gap and tax burden for HTP and cigarettes, 2023

No.	Country	Tax burden		Tax gap
		Heated tobacco product	Cigarettes	
1	Georgia	53.61%	58.00%	-4.39%
2	Republic of Moldova	49.02%	56.86%	-7.84%
3	Germany	45.01%	56.45%	-11.44%
4	France	52.94%	65.41%	-12.47%
5	Ukraine	52.43%	65.09%	-12.66%
6	Netherlands	22.03%	38.73%	-16.70%
7	Bulgaria	31.28%	52.10%	-20.82%
8	Montenegro	30.50%	51.72%	-21.22%
9	Romania	26.80%	50.64%	-23.84%
10	Latvia	33.25%	57.22%	-23.97%
11	Estonia	13.89%	38.89%	-25.00%

12	Slovenia	17.26%	43.40%	-26.14%
13	Portugal	27.15%	53.67%	-26.52%
14	Albania	13.82%	40.66%	-26.84%
15	Hungary	37.84%	65.51%	-27.67%
16	Italy	22.60%	51.14%	-28.54%
17	Belarus	37.37%	66.00%	-28.63%
18	Russia	29.38%	58.17%	-28.79%
19	Denmark	19.90%	49.34%	-29.44%
20	Spain	28.40%	58.45%	-30.05%
21	Turkey	31.52%	61.87%	-30.35%
22	Sweden	26.43%	56.84%	-30.41%
23	Bosnia and Herzegovina	14.34%	47.25%	-32.91%
24	Belgium	34.06%	68.69%	-34.63%
25	Lithuania	30.10%	64.91%	-34.81%
26	Croatia	29.45%	64.71%	-35.26%
27	North Macedonia	16.27%	51.87%	-35.60%
28	United Kingdom	36.96%	72.91%	-35.95%
29	Poland	16.35%	53.55%	-37.20%
30	Cyprus	22.88%	60.23%	-37.35%
31	Greece	23.90%	61.50%	-37.60%
32	Switzerland	12.00%	54.22%	-42.22%
33	Slovakia	28.64%	71.60%	-42.96%
34	Austria	19.24%	62.73%	-43.49%
35	Finland	2.90%	52.97%	-50.07%
36	Serbia	13.62%	66.76%	-53.14%
37	Czech Republic	16.34%	69.50%	-53.16%
38	Andorra	2.30%	71.49%	-69.19%

Source: Data for all countries except Montenegro were obtained from (CTFK, 2023). For Montenegro, data were calculated using Ministry of Finance data and the level of excise tax stipulated in the Law on Excise Tax for 2023, applying the same methodology as in (CTFK, 2023) to ensure comparability.

Table A14. Regulations related to HTPs and cigarettes and compliance with WHO FCTC recommendations

	HTP and cigarettes regulation	WHO FCTC
Health warning	HTP packs – 30% text-only health warning (Article 42) Cigarettes – 65% combined health warning of the front and back of packages	Partially fulfilled - Article 11 - Each Party is obliged to adopt and implement effective measures on the packaging and labeling of tobacco products.
Labeling uses misleading terms such as “low tar”, “light”, “ultra-light”, or “mild”	HTPs – ban on sale of those products (Article 12) Cigarettes – not permitted sale of those products (Article 12)	Fulfilled - Article 11 – Tobacco product packaging and labeling do not promote a tobacco product by any means that are likely to create an erroneous impression about its characteristics, health effects

Smoking in closed work and public spaces	HTPs – not prohibited (Article 15) Cigarettes – prohibited (Article 15)	Not fulfilled- Article 8.2 – Smoking in closed work and public space for HTP
Ban on advertising, promotion, and sponsorship	HTP – prohibited (Article 6) Marketing of heating devices is not covered by Law Cigarettes – prohibited (Article 6)	Partially fulfilled: Article 13.1: Recognize that a comprehensive ban on advertising, promotion, and sponsorship would reduce the consumption of tobacco products.
Disclosure of ingredients	HTPs – regulated by Article 30 Cigarettes – regulated by Article 30	Fulfilled - Articles 9 and 10 of the WHO FCTC- Ensure the regulation of the ingredients and the disclosure of such ingredients in HTPs in line with the guidelines.
Law bans on advertising at point of sale	HTPs – No Cigarettes – No	Not fulfilled - Article 16 - banning the sale of tobacco products in any manner by which they are directly accessible, such as store shelves

<p>Minimum age at which a person may purchase tobacco products</p>	<p>HTPs – 18 years (Article 10) Cigarettes – 18 years (Article 10)</p>	<p>Fulfilled - Article 16 - prohibit the sales of tobacco products to persons under the age set by domestic law, national law or eighteen.</p>
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