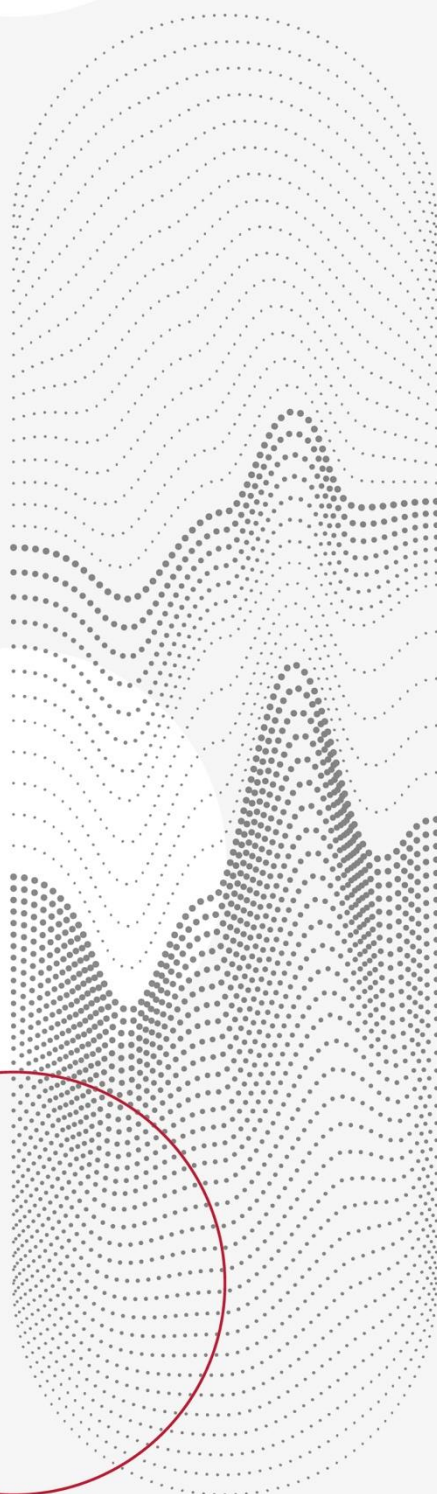
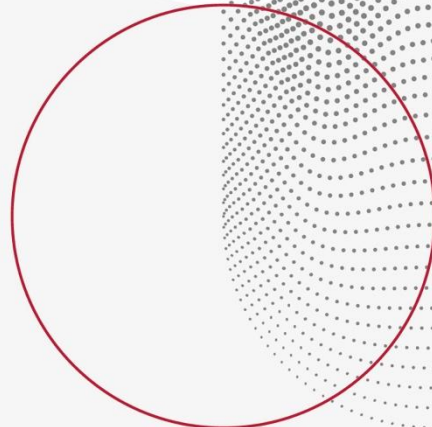


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Patterns of nicotine use in Poland and potential policy responses

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Executive summary

This report investigates the consumption patterns of nicotine products in Poland and assesses the potential effects of policy responses. In recent years, the landscape of nicotine consumption has become much more complex, with some new products gaining popularity rapidly. However, there has been a shortage of evidence on the popularity of specific products, consumer characteristics, and their sensitivity to price changes. To fill this gap, in June 2025 we conducted a large-scale (over 4,500 participants) web-based survey among Poles aged 18–64 who had used at least one of main nicotine products in the 30 days preceding the survey. To assess the potential effects of policy interventions, we utilised a discrete choice experiment (DCE).

Traditional cigarettes remain the dominant nicotine product in Poland, with nearly 75% of users reporting their consumption. Their prevalence increases with age, especially among older men, while younger users show different patterns. Women aged 18–34 are more likely to use e-cigarettes than cigarettes, and the popularity of e-cigarettes decreases sharply with age. Younger users also tend to consume nicotine products less intensively and more occasionally, in contrast to older users who are more often intensive users. Heated tobacco products are less popular than e-cigarettes. The former are more likely to be consumed by tertiary-educated people, parents with young children and employed persons.

Nicotine products are not always perceived by consumers as very harmful. Only 70% of respondents consider cigarettes to be very or extremely harmful. Among daily users of alternative products, the figures are even lower: just 38% for e-cigarettes and 30% for heated tobacco. These findings underline that health research and communication are vital to ensure consumers receive accurate information about product risks.

The estimation results derived from the DCE confirm that demand for all nicotine products is price responsive. We document heterogeneous responses to price changes across nine consumer groups, defined by their main product, exclusivity or combination with other products, and frequency of use. Multiproduct users react more strongly to price increases than exclusive users, but they are also less likely to quit nicotine altogether. Daily smokers of traditional cigarettes—who account for over half of nicotine consumers in Poland—are more likely to switch towards heated tobacco than e-cigarettes. In contrast, heated tobacco users appear least price sensitive and are unlikely to switch to traditional cigarettes.

We use our econometric estimates to quantify the effects of potential price changes on the product-use structure. In September 2025, disposable e-cigarette prices in Poland increased by about 200%, and the prices of devices used to heat tobacco increased by about 100%. Our simulation suggests that this policy may reduce the number of consumers aged 18–64 who primarily use e-cigarettes by 62% (659 thousand), of whom 178 thousand would likely quit nicotine entirely. Considering other policy scenarios, a higher excise on traditional cigarettes could substantially affect the consumer structure by both reducing overall nicotine use and encouraging a shift from traditional cigarettes to heated tobacco. However, this substitution effect weakens when heated tobacco prices also rise, highlighting trade-offs for policymakers.

We also find that flavour is a key driver of e-cigarette consumption but has minimal impact on demand for heated tobacco. Daily e-cigarette consumers who do not use other products are willing to pay around 33 PLN more for fruity e-cigarettes (7.7 euros). By contrast, heated tobacco users show little or no additional willingness to pay for flavours.

1. Background

1.1. The use of nicotine products in Poland

There is a lack of recent nationally representative surveys that would accurately capture the popularity of different nicotine products in Poland. The most recent large-scale European Health Interview Survey (EHIS) was conducted in 2019, when 24.3% of adult Poles smoked cigarettes and 4% used e-cigarettes or similar electronic devices. A smaller-scale Eurobarometer survey from 2023 reported that 27% of Poles smoked cigarettes, 4% used e-cigarettes, and 1% used heated tobacco products (HTP). A web-based study from 2024 (Jankowski et al., 2024) found a higher prevalence of daily HTP use (4.9%) and daily e-cigarette use (5.9%).

Despite uncertainty about the exact prevalence, there are clear signs of rapid growth in the popularity of alternative nicotine products in recent years. Ministry of Health data show that e-cigarette sales rose from 114,000 in 2019 to 14.7 million in 2022. Other sources estimate that sales reached 32 million units in 2022 and almost 100 million in 2023 (IPAG, 2024). A comparison of surveys conducted by Jankowski et al. in 2022 and 2024 shows an increase in the prevalence of daily use of HTP and e-cigarettes by 1 percentage point each.

The Polish Household Budget Survey (HBS) makes it possible to track consumption trends using a consistent methodology. This dataset allows us to calculate the share of households reporting expenditures on nicotine products, rather than identifying individual users. In 2023, the share of households purchasing nicotine products other than cigarettes increased noticeably, from 6.3% to 8.2% (Figure 1). The rise was driven mainly by households with a head younger than 60 (Figure 2).

Figure 1 Smoking and vaping prevalence, all households

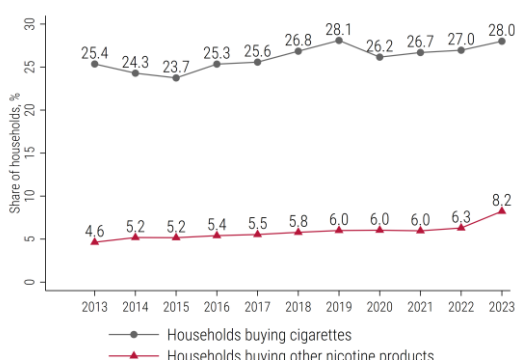
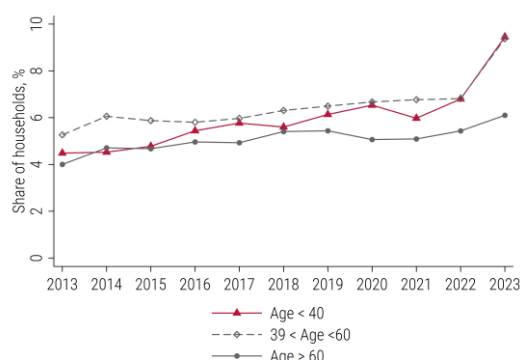


Figure 2 Vaping by the head of household's age



Note: Vaping prevalence refers to all nicotine products other than cigarettes and cigars. Source: own figure based on the household budget survey, Statistics Poland

The HBS dataset does not capture consumption among young people. Parents are unlikely to report their children's use, and many adult students live in dormitories not covered by the survey. Data from the Global Youth Tobacco Survey indicate that vaping in Poland is widespread among teenagers. In 2022, 22% of students aged 13–15 reported using e-cigarettes and 10% reported using heated tobacco products within the last 30 days.

Previous research highlighted important educational differences in cigarette smoking patterns in Poland (Albinowski et al., 2025). Among people with tertiary education, smoking prevalence systematically declined due to non-economic factors, whereas this was not observed among those with lower education. Moreover, individuals without tertiary education were found to be more sensitive to cigarette affordability. HBS data indicate that in 2023, vaping prevalence rose more sharply among households with tertiary-educated members (to 6.7%, up from 4.2% in 2022) than among households without tertiary-educated members (to 9.4%, up from 7.7% in 2022).

1.2. Excise on different nicotine products in Poland

Excise taxes on all nicotine products in Poland are set within a single legal act¹, but the calculation method and overall tax burden differ significantly between product categories. In October 2024, the act was amended to include a new roadmap of excise rates through 2027, with higher rates applied across all products. In March 2025, another amendment introduced a prohibitively high excise on e-cigarettes. This was effectively enforced in September 2025, when shops were no longer allowed to sell e-cigarettes with old excise stamps.

In the first half of 2025, disposable e-cigarettes were subject to a very low excise of 1.9 PLN per unit (Table 1). Nevertheless, their retail price was already higher than that of a pack of traditional cigarettes or heated tobacco sticks. From September 2025, an additional excise of 40 PLN per unit became mandatory. Importantly, value-added tax (23%) is applied on top of the excise, further increasing the overall tax burden. As a result, retail prices tripled compared to their initial level.

Following these changes, HTPs appear to receive preferential tax treatment. The excise is calculated based on tobacco weight, which is relatively low in HTPs. Assuming 6 grams per pack of 20 sticks, the excise amounts to 4.7 PLN per pack—64% less than the 12.8 PLN applied to a pack of cigarettes, presumably due to a belief that HTPs are less harmful. However, the excise on raw tobacco sufficient to make 20 roll-your-own cigarettes (around 15 g) is higher than the excise applied to HTPs.

Table 1 Excise for alternative nicotine products

Product	Cigarettes	Heated tobacco	Disposable e-cigarette (2ml)	Raw tobacco (per 15 g)
Excise per pack, June 2025	12.8 PLN	4.7 PLN	1.9 PLN	6.3 PLN
Typical retail price, June 2025	22.0 PLN	18.5 PLN	30 PLN	
Excise, from July 2025	as above	Additional 40 PLN per heating device	41.9 PLN	as above
Typical retail price, September 2025	as above	as above	90 PLN	

Source: Own elaboration based on the legislative acts

In our analysis, we do not include reusable e-cigarettes as a separate category. Prior to 2025 excise hikes, reusable e-cigarettes represented only a small segment of the Polish nicotine market. After these excise hikes, reusable e-cigarettes have become a more affordable option than disposable e-cigarettes. Importantly, their cost consists of three components:

- A reusable device, with prices starting from 130 PLN. However, typical devices sold in vape shops cost around 200 PLN, including an excise of 40 PLN.
- E-liquids, which can be bought in larger quantities and are relatively inexpensive - for example 35 PLN per 10 ml, that is 7 PLN per the amount of liquid that used to be contained in a disposable e-cigarette. This includes an excise of 0.96 PLN per millilitre, with gradual increases scheduled up to 1.80 PLN in 2027.
- Replacement cartridges, which are sold for approximately 100 PLN per three-pack. For a daily smoker, one cartridge typically lasts about a week.

¹ "Ustawa z dnia 6 grudnia 2008 r. o podatku akcyzowym".

Moreover, using reusable e-cigarettes requires more effort and knowledge than disposable ones. While ready-to-use e-liquids are available, they still require manual refilling, and more advanced users often mix their own liquids from concentrated aromas, glycerol, and nicotine base—a process that demands practice and precision. In addition, the availability of reusable devices and related supplies remains limited compared to traditional cigarettes, and heated tobacco, which are sold in most retail outlets. Reusable systems are mainly available in specialised vape shops or online, making access more difficult, especially in smaller towns and rural areas. Using such devices also requires planning ahead to ensure sufficient stocks of cartridges and liquids. Consequently, it is unlikely that reusable e-cigarettes will become a perfect substitute for disposable models, particularly given the differences in taste, convenience, and availability.

1.3. Related studies

Survey experiments have become a popular method in tobacco control research, allowing researchers to analyse how smokers and vapers respond to hypothetical regulatory changes. These experiments present participants with sets of product options that vary by price, flavour, nicotine level, or other attributes, and then estimate demand elasticities and willingness to pay.

Existing research confirms the crucial role of prices in tobacco control. Price remains one of the most powerful policy levers. Chalak et al. (2023) used a volumetric experiment to assess price elasticity (accounting for both the extensive and intensive margins) in three Middle Eastern countries. They found that the demand for premium cigarettes in Lebanon, Jordan, and Palestine was price elastic (-1.0 to -1.2), while the demand for discount cigarettes was less elastic in Lebanon and Jordan (-0.6 to -0.7). The results for alternative product (waterpipe) varied substantially across countries. For the US, Pesko et al. (2016) found that demand for e-cigarettes is highly responsive to prices. However, there is a shortage of experimental evidence on own-price and cross-price elasticities of nicotine products in Europe.

Survey experiments also provide evidence on the role of health perceptions and the availability of flavours. Marti et al. (2019) and Shang et al. (2020) showed that smokers are more likely to choose e-cigarettes viewed as less harmful and more effective in aiding cessation, with significant willingness to pay for these attributes. Product design also matters. Yang et al. (2023) reported that adult e-cigarette users prefer non-tobacco and non-menthol flavours, highlighting significant preference differences across user groups.

2. Empirical strategy

In this section, we present the methodology of our report. First, we describe the data collection, sample characteristics and experimental framework. Second, we outline the econometric strategy used to estimate consumers' responses to price changes and their willingness to pay for non-tobacco flavours. Third, we explain the approach used to simulate nicotine product consumption under alternative policy scenarios.

2.1. Data collection, sample characteristics and experimental framework

We conducted the online survey (Computer-Assisted Web Interviewing technique, CAWI) between June 2 and June 27, 2025, to implement the discrete choice experiment.² The survey was administered by a survey research

² We conducted a pilot study to evaluate the quality of the survey software and the clarity of the questions before the main study. A total of 108 participants completed the pilot. Since we slightly modified the questionnaire after the pilot study, we present data only for participants in the main study.

company, which recruited participants from its nationwide panel of respondents.³ We invited individuals aged 18 to 64 who had used one of the following products within the 30 days preceding the survey: traditional cigarettes, HTP, or nicotine-containing e-cigarettes. Quotas were applied to ensure that the sample was representative of nicotine users in Poland with respect to gender, age, and education.

We recruited 4542 participants (Table 2). Most participants in our sample are men (60.6%) and have an education below the tertiary level (80.4%). The age group distribution is fairly balanced, with a slight predominance of older participants (aged 50–64, 36.5%). Overall, the sample structure corresponds to the population of nicotine-product users, as implied by the 2019 EHIS data. Most participants use traditional cigarettes (74.5%), followed by e-cigarette users (41.5%) and HTP users (33.8%).

Table 2. Sample characteristics

	Sample structure		Population structure of nicotine users
	N	%	%
Women	1790	39.4	40
Men	2752	60.6	60
Age: 18-34	1348	29.7	30
Age: 35-49	1536	33.8	34
Age: 50-64	1658	36.5	36
Education: non-tertiary (ISCED 1-5)	3652	80.4	85
Education: tertiary (ISCED 6-8)	890	19.6	15
Product use: traditional cigarettes	3383	74.5	x
Product use: heated tobacco product	1537	33.8	x
Product use: e-cigarette with nicotine	1885	41.5	x

Source: own calculations based on the experimental data and the 2019 European Health Interview Survey

In the first part of the survey, we collected basic socio-demographic and labour market information about participants, their nicotine use habits (frequency and quantity of products consumed), their opinions on the harmfulness of various nicotine products, and information about the nicotine use habits of their significant others (parents, friends, partner, and adult children). In the second part of the survey, we introduced the discrete choice experiment (DCE).

In the DCE section, we showed participant five screens, each containing a vignette with three nicotine-containing products: traditional cigarettes, e-cigarettes, and HTP, along with an opt-out option. We asked participants to choose one option. The price of each product was randomly assigned in each vignette in the range of {0, 10%, 20%, ..., 100%} deviations from the base price. Base prices reflected real-market values: EUR

³ The panel has over 300 000 registered users. Their socio-demographic structure corresponds with the structure of Polish Internet users. They are verified by a postal address, ensuring unique users and real persons in the panel. By taking surveys, users collect points they can exchange for non-cash gifts delivered to their home addresses. An annual audit by an independent auditor (Polish Association of Public Opinion and Marketing Research Firms) assesses the quality of the research services. The panel is certified with a valid Interviewer Quality Control Program certificate. The company follows the international Code of Marketing and Social Research Practice (the International Chamber of Commerce/ESOMAR).

5.2 for a pack of traditional cigarettes, EUR 7.0 for an e-cigarette, and EUR 4.3 for a HTP⁴. The flavour of traditional cigarettes was always tobacco, while for e-cigarettes and HTP, it was randomly assigned from tobacco, fruit, or menthol. Additionally, the HTP included the requirement to purchase a heating device for either €11 or €22 (randomly assigned). The order of the three products and the opt-out option (left, middle, or right position) was randomised on each vignette. All randomisations were performed independently for each vignette with equal probabilities. Each respondent viewed five vignettes and made five product choices. Table 3 presents the attributes and values of the vignettes. Figure A1 in Appendix A shows an example of a vignette.

Table 3. Vignette attributes and values

Product	Traditional tobacco	E-cigarette	Heated tobacco product	
				
Price	~EUR 5.2 or EUR 5.2 + {10%, 20%, ..., 90%, 100%}	~EUR 7.0 or EUR 7.0 + {10%, 20%, ..., 90%, 100%}	~EUR 4.3 or EUR 4.3 + {10%, 20%, ..., 90%, 100%}	I do not buy any of these products. I refrain from consuming nicotine products.
Tobacco heating device price	-	-	A one-time purchase of a tobacco heating device for: EUR 11/EUR 22	
Flavour	Tobacco	Tobacco/Menthol/Fruit	Tobacco/Menthol/Fruit	

Source: own elaboration

Before conducting the survey, we received approval from the Research Ethics Committee of IBS and CenEA (Decision 2/2025) and registered the study with the AEA RCT (AEARCTR-0016042).

2.2. Econometric specification

To assess the responses of consumers to price changes and the availability of flavours, we estimate the McFadden (1974) multinomial choice model. This model captures the idea that while individuals deterministically select the option with the highest overall utility, the researcher does not observe all factors that influence individual utility. In other words, utility for an individual i from choosing product j , U_{ij} , is not observable due to the presence of an unobserved error term, ϵ_{ij} . However, the model aims to estimate the systematic utility component, V_{ij} , where:

$$U_{ij} = V_{ij} + \epsilon_{ij}$$

⁴ In the experiment, we showed prices in Polish zloty (PLN). In this report, we converted prices from PLN to EUR based on the official exchange rate of the National Bank of Poland, which on July 14, 2025, was 1 EUR = 4.2614 PLN

The McFadden model assumes that an individual chooses a product j with a probability proportional to the exponential of its systematic utility component, relative to the set of available alternatives, k . Formally, the probability of choosing product j is given by:

$$P_{ij} = \frac{\exp(V_{ij})}{\sum_k \exp(V_{ik})}$$

We estimate the observable component of utility, V_{ij} , that individual i receives from alternative j ($j = 1, 2, 3, 4$) as:

$$V_{ij} = \alpha_j + \beta_j \log(\text{price}_{ij}) + \gamma X_i + \phi T_j \quad (1)$$

where X is a vector of individuals' characteristics (gender, education level, age, income, the size of the city of residence, voivodeship), and T represents the nicotine product specifics (flavour, price of the device).

To approximate the own price elasticity and cross price elasticities for each nicotine product, we calculate the marginal effects with respect to each product's price.⁵ The marginal effect is given by formula:

$$\frac{\partial P_{ij}}{\partial \text{price}_{ik}} = P_{ij}(\delta_{ij} - P_{kj})\beta_k$$

Where $\delta_{ij} = 1$ if $j = k$, and 0 otherwise.

We estimate the willingness to pay for flavoured nicotine products among alternative product users as the ratio of point estimates of parameters:

$$WTP(F_{tj}) = -\left(\frac{\phi_{jt}}{\beta_j}\right)$$

where ϕ_t is the point estimate for the flavour t of nicotine product j , and β_j is a point estimate for price of nicotine product j . We calculate the confidence intervals using Stata *ncom* command with the default delta method (Hole, 2007).

2.3. Methodology of simulations

We use findings from our econometric analysis to illustrate potential effects of changes in excise rates on the consumption of the main categories of nicotine products. We consider four policy scenarios, representing different retail prices of traditional cigarettes and HTPs. In each scenario, we incorporate a large excise hike on e-cigarettes that took place in 2025, after the completion of our survey. The four scenarios are as follows:

1. An increase in retail prices of e-cigarettes by 200% (60 PLN) + an increase in retail prices of devices for heating tobacco by 102% (50 PLN).
2. Scenario 1 + an increase in retail prices of HTPs by 50% (9.25 PLN).
3. Scenario 1 + an increase in retail prices of traditional cigarettes by 50% (11 PLN).
4. Scenario 1 + 50% increases in retail prices of both HTPs and traditional cigarettes.

We simulate the effects of price changes separately for six groups of daily consumers, defined by their main product and use of other products. Characteristics of these groups are presented later in Table 4. For each group, we apply consumption responses to price changes estimated on the corresponding sub-sample. Since we simulate a very large increase in e-cigarette prices, we estimate econometric models using price levels rather than logarithms. The log-price specification is convenient for deriving elasticities that are appropriate for

⁵ In regressions we use the natural logarithm of price.

small price changes. However, applying it to our simulations would imply that an absolute price increase has a smaller impact on consumer choices at higher price levels. For instance, a rise from 60 PLN to 90 PLN would be treated as equivalent to an increase from 30 PLN to 45 PLN. Previous research also suggests that the absolute value of elasticity increases with the price level (Tauras et al., 2016)

We conduct post-estimation predictions of the probabilities of choosing three different products or opting out. First, we calculate the baseline probabilities with prices set at their market values in June 2025. Then, we conduct predictions for each price set defined by alternative scenarios. In the baseline, all consumers within a group use the same primary product. A switch to other products or to non-consumption occurs when the average probability of choosing an alternative option is higher than in the baseline prediction associated with June 2025 prices. Specifically:

$$\Delta_{j,k}^{g,s} = \begin{cases} \frac{(p_k^{g,s} - p_k^{g,0})}{p_j^{g,0}} & \text{if } p_k^{g,s} > p_k^{g,0} \\ 0 & \text{otherwise} \end{cases}$$

where $\Delta_{j,k}^{g,s}$ is the share of consumers in group g who, in scenario s , switch from the product j (primary product for group g) to an alternative option k ; $p_k^{g,s}$ is the average probability of choosing alternative k in scenario s by consumers in group g , whereas $p_k^{g,0}$ denotes this probability under the baseline scenario ($s=0$). Such shifts are only calculated for cases where the probability of choosing an alternative k is increased and when the prices of primary product j increase in a given scenario.

We do not simulate prevalence rates of specific products as some consumers use multiple products. Rather, we project the shares of daily consumers that use primarily a given product as well as the share of consumers that decide to abstain from consumption due to price changes.

To convert consumer shares into easier to interpret consumer numbers, we make the following assumptions. First, we assume that the population aged 18-64 in 2025 amounts to 22.2 million. This is based on the data for 2024 from Eurostat (22.4 million) and the projected change between 2025 and 2024 according to 2023 projections (-1.01%). Second, we assume that the share of nicotine consumers in the population aged 18-64 is the same as in the EHIS data for 2019 (26.8%). Third, we base the assumptions on the consumers' structure (e.g., daily vs occasional) on our survey.

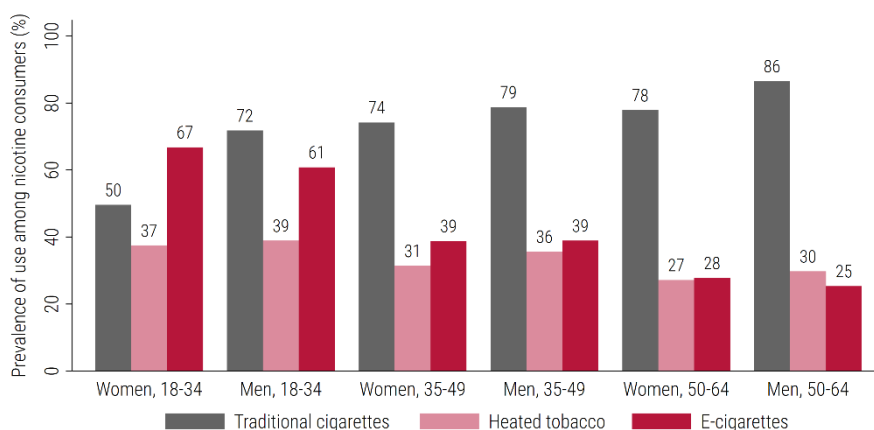
3. Descriptive evidence

In this section, we use data from our survey to analyse patterns of nicotine consumption among Poles aged 18–64. We examine the relative popularity of alternative nicotine products across socio-demographic groups, their intensity of use, and patterns of joint use. We also summarise perceptions of the health harmfulness of individual products and the self-reported role of alternative products in quitting traditional cigarettes.

3.1. Differences across demographic groups

The popularity of nicotine products varies significantly by age and gender (Figure 3). Traditional cigarettes are the most commonly used product in most demographic groups, particularly among older men. Their prevalence increases with age – from 72% among men aged 18–34 to 86% among men aged 50–64. However, among young women (18–34), e-cigarettes are more popular than traditional cigarettes: 67% reported using e-cigarettes, compared to 50% for traditional cigarettes and 37% for HTP. Overall, younger nicotine users – particularly women – are more likely to adopt non-traditional products, while older users rely most heavily on traditional cigarettes.

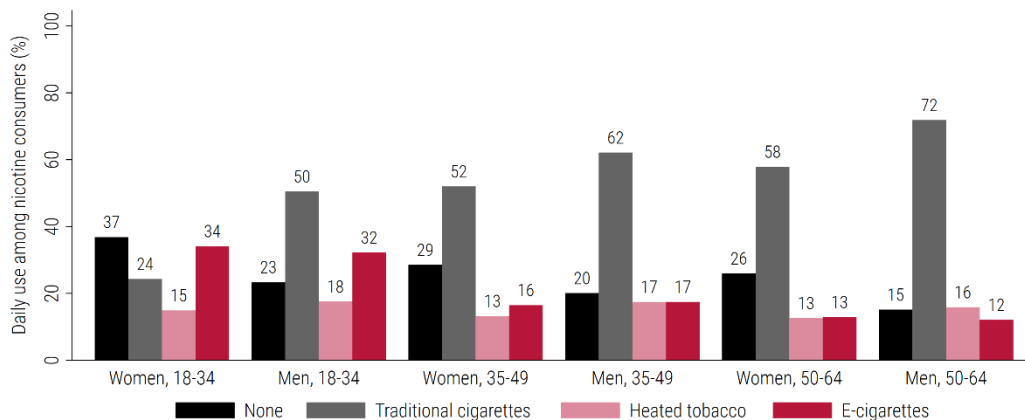
Figure 3 Percentage of nicotine consumers who used each product in the last 30 days



Source: Authors' calculations based on the survey data.

A significant share of younger users—37% of women and 23% of men aged 18–34—report no daily nicotine use, indicating more occasional consumption in this group (Figure 4). Daily nicotine use increases with age, with traditional cigarettes remaining the dominant daily product among older users. Across all age groups, men consume traditional cigarettes daily at notably higher rates than women. In contrast, daily use of alternative nicotine products is less common and is mostly found among younger consumers. Among women aged 18–34, e-cigarettes lead daily use at 34%, surpassing traditional cigarettes (24%) and HTP (15%).

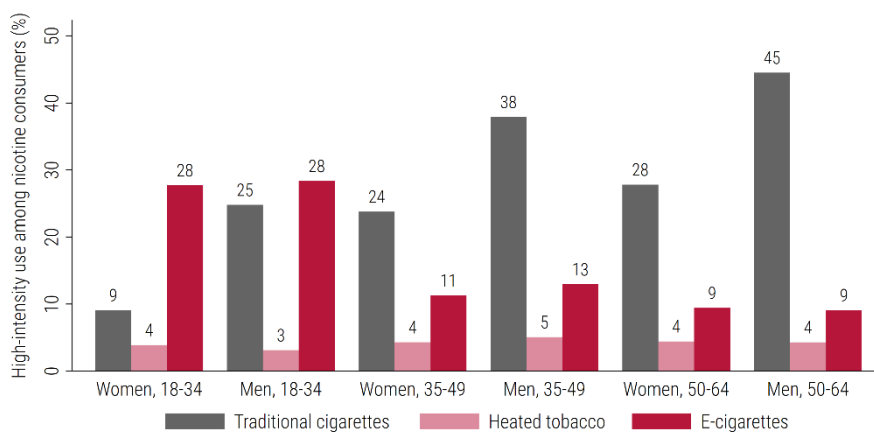
Figure 4 Percentage of nicotine consumers who were daily users of each product in the last 30 days



Source: Authors' calculations based on the survey data.

Now, we turn to the analysis of high-intensity use, which we define as smoking more than 10 cigarettes or HTP sticks daily or using an e-cigarette every hour or more. The gender gap in high-intensity cigarette smoking is strong across all age groups (Figure 5). In particular, only 9% of young female nicotine users are high-intensity traditional cigarette smokers, compared to 25% of young male users. Comparing Figures 3 and 5, fewer than one in five women aged 18–34 who smoke traditional cigarettes do so intensively. In stark contrast, over half of male smokers aged 50–64 are high-intensity users. Intensive e-cigarette use is common among young consumers, while HTP users rarely exceed 10 sticks per day, with little difference across demographic groups.

Figure 5 Percentage of nicotine consumers who were high-intensity users of each product in the last 30 days



Source: Authors' calculations based on the survey data.

We observe substantial differences in consumption patterns across education levels. In every age group, nicotine users with tertiary education are less likely to be daily users (Figures 6 and 7). The largest gap appears in the 18–34 age group, where 43% of tertiary-educated users consume nicotine occasionally, compared to only 27% of those without tertiary education. Additionally, tertiary-educated consumers are significantly less likely to smoke traditional cigarettes daily but are more often daily users of HTP.

Figure 6 Daily users of individual products among non-tertiary-educated nicotine consumers

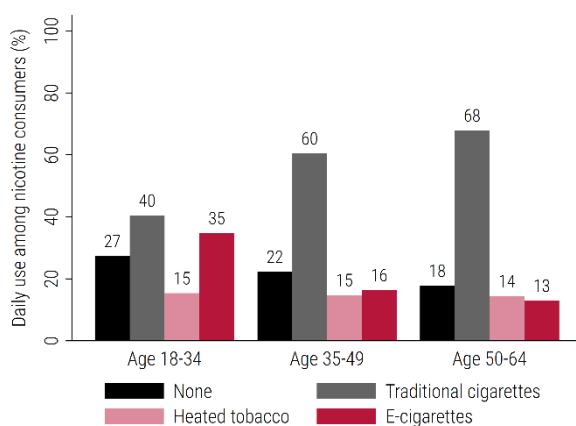
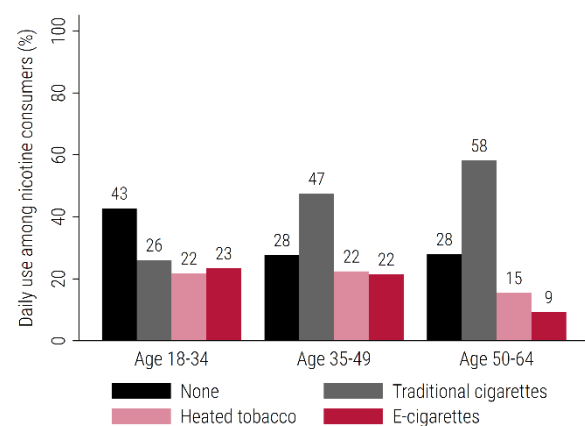


Figure 7 Daily users of individual products among tertiary-educated nicotine consumers



Note: the category “None” represents consumers that do not consume any nicotine products daily. We refer to them as occasional consumers. Source: Authors' calculations based on the survey data.

3.2. Patterns of joint use of multiple products

Nicotine consumers frequently combine multiple products. While 54% of daily traditional cigarette smokers report exclusive use, the remaining 46% also use other nicotine products (Figure 8). 30% of daily cigarette smokers have also used e-cigarettes and 27% have used HTP in the past 30 days. Even greater variety is found among daily users of alternative products: 55% of daily HTP users and 49% of daily e-cigarette users also smoke traditional cigarettes (Figures 9 and 10). Both groups also use other alternatives, such as nicotine-free e-cigarettes (12% and 15%, respectively) and nicotine pouches (14% in each group).

Figure 8 Use of other products among daily smokers of traditional cigarettes

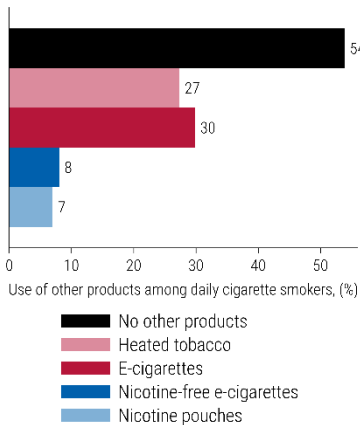


Figure 9 Use of other products among daily consumers of heated tobacco

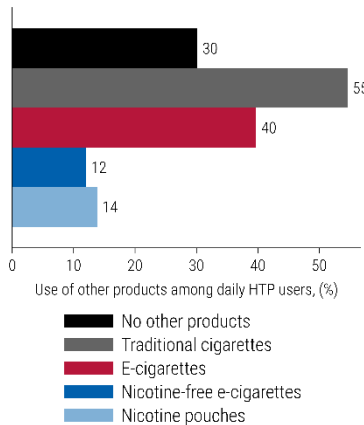
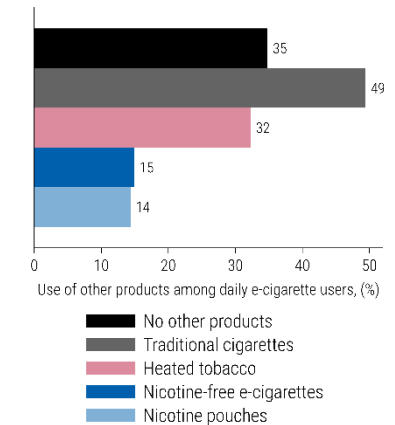


Figure 10 Use of other products among daily consumers of e-cigarettes



Source: Authors' calculations based on the survey data.

Based on observed patterns of product use, we identify nine categories of consumers. The classification focuses on three product types included in the econometric analysis, for which detailed frequency-of-use data were collected. Each consumer is assigned a main product—defined as the one with the highest frequency score on a 0–7 scale.⁶ We further distinguish between daily and occasional use of the main product. Finally, we account for whether the consumer also uses another product, as such individuals may be more prone to switching in response to price changes. Table 4 summarises the classification of consumer types and their characteristics.

The largest group comprises daily smokers of traditional cigarettes who do not use other products, accounting for 31.4% of the sample. They are followed by daily smokers of traditional cigarettes who also use other products (18.6%). The third-largest group consists of daily e-cigarette users who also use other products (9.7%). The next two groups are occasional users: Group 4 excludes traditional cigarette use, while Group 5 includes only occasional smokers of traditional cigarettes. Each of them represents about 9% of the sample. Group 6, which consists of daily e-cigarette users who do not use other products, comprises 8.1% of all consumers. The final three groups are significantly smaller, each representing less than 5.5% of the sample. Group 7 includes occasional users of both traditional cigarettes and other products, while Groups 8 and 9 are daily users whose main product is HTP.

There are visible differences in socio-demographic characteristics among the nine consumer groups. Daily exclusive cigarette users (Group 1) are the oldest group, with an average age of 49. This group is also characterized by a low share of tertiary-educated individuals (12%). In contrast, the youngest groups are those who use e-cigarettes, with an average age between 36 and 37. Groups with higher shares of tertiary-educated individuals include occasional consumers and daily HTP users.

⁶ The scale is based on two questions regarding the use of each product. The first question asks whether a product is used i) daily, ii) at least once a week but not every day, or iii) less often than once a week. Among consumers using it daily, the second question provides five levels of frequency of use. In the case of a tie in frequency scores between the products, traditional cigarettes are assigned as the main product. If the tie is between HTP and e-cigarettes, HTP is selected.

Table 4 Sample composition by consumer type

Group no	Main product used	Daily vs occasional user	Use other products?	Share of total sample (%)	Women in the consumer group (%)	Average age	Tertiary-educated in the consumer group (%)
1	Traditional cigarettes	Daily	No	31.4	35	49	12
2	Traditional cigarettes	Daily	Yes	18.6	28	43	13
3	E-cigarettes	Daily	Yes	9.7	37	36	12
4	E-cigarettes or HTPs	Occasionally	No traditional cigarettes	9.2	59	36	21
5	Traditional cigarettes	Occasionally	No	9.0	47	44	19
6	E-cigarettes	Daily	No	8.1	54	37	14
7	Vary	Occasionally	Yes	5.4	47	39	23
8	HTPs	Daily	No	5.0	43	43	20
9	HTPs	Daily	Yes	3.6	39	40	21

Source: Authors' calculations based on the survey data.

3.3. Socio-demographic determinants of product choice

To better understand the relationship between consumers' observable characteristics and their choice of nicotine products, we estimate a series of logit regressions, where the dependent variable is the use of a specific product. In addition to the previously used socio-demographic variables, we also examine:

- Degree of urbanization (rural areas, towns with fewer than 100,000 residents, and larger cities)
- Employment status
- Self-declared monthly household net income per adult (below 4,000 PLN, between 4,000 and 10,000 PLN, and above 10,000 PLN). At the time of the survey, the net minimum wage was around 3,500 PLN.
- Presence of a child under the age of 18

Controlling for all these variables in a single regression allows us to assess the role of individual factors in product choice. Table 5 reports average marginal effects, which can be interpreted as percentage point changes in the probability of using a given product due to a specific characteristic. The first five columns present results for any use in the past 30 days, while the last three refer to daily use.

We find that tertiary education is associated with a 4.1 percentage point lower probability of smoking traditional cigarettes and a 6.2 percentage point higher probability of using HTP. It is also linked to a 9.5 percentage point lower likelihood of daily traditional cigarette use and a 4.1 percentage point lower likelihood of daily e-cigarette use. A higher probability of HTP use is also observed among employed individuals, with marginal effects of around 7 percentage points for both any use and daily use. Employed consumers are also 1.9 percentage points more likely to use nicotine pouches. The effects of the employment status may reflect a preference to avoid the smell of cigarettes, which could be undesirable in the workplace. Another group with a significantly higher probability of using HTP –by 11.5 percentage points–are consumers with young children, possibly due to a desire to reduce children's exposure to tobacco smoke. This is a large effect as an overall share of HTP users (both daily and occasional) in our sample amounts to 33.4%.

Living in a rural area (compared to small towns) and having a low income (compared to medium income) are both associated with a lower probability of using all alternative nicotine products. In contrast, the differences between small and large cities, as well as between medium and high income levels, do not appear to significantly influence product choice. The lower uptake of alternative products among rural residents is not offset by a higher prevalence of traditional cigarette use. This suggests that consumers in rural areas are less likely to use multiple products. Overall, these patterns may reflect both differing social norms and more limited product availability in rural areas.

As already suggested by Figures 3–9, product choice is strongly linked to demographic characteristics. For example, controlling for other factors, young women are 29.5 percentage points less likely to use traditional cigarettes than men aged 35–49, while men aged 50–64 have an 11-percentage-point higher probability of using traditional cigarettes daily than men aged 35–49.

Table 5 Predictors of product choice among nicotine consumers

Dep. variable	Any use over the last 30 days					Daily use		
	Cigarettes	Heated tobacco	E-cig	Nicotine-free e-cig	Nicotine pouches	Cigarettes	Heated tobacco	E-cig
Tertiary educated	-0.041** (0.016)	0.062*** (0.017)	-0.031 (0.018)	0.017 (0.011)	0.013 (0.010)	-0.095*** (0.018)	0.031* (0.013)	-0.041* (0.016)
Employed	-0.004 (0.014)	0.071*** (0.015)	0.019 (0.015)	0.016 (0.010)	0.019* (0.009)	0.003 (0.016)	0.069*** (0.013)	0.022 (0.013)
Rural area	0.016 (0.017)	-0.071*** (0.019)	-0.042* (0.019)	-0.019 (0.013)	-0.023* (0.012)	0.023 (0.019)	-0.053*** (0.016)	-0.015 (0.016)
Large city	-0.006 (0.014)	0.015 (0.015)	-0.008 (0.016)	0.004 (0.010)	-0.008 (0.009)	-0.005 (0.016)	0.007 (0.012)	0.016 (0.013)
Low income	0.038** (0.014)	-0.090*** (0.016)	-0.066*** (0.016)	-0.012 (0.010)	-0.016 (0.009)	0.048** (0.016)	-0.044*** (0.013)	-0.021 (0.013)
High income	0.022 (0.021)	0.021 (0.022)	-0.026 (0.023)	-0.011 (0.015)	0.007 (0.013)	0.017 (0.023)	0.021 (0.016)	-0.01 (0.020)
Children age <18	-0.005 (0.014)	0.115*** (0.015)	0.03 (0.016)	0.019* (0.010)	0.008 (0.009)	0.038* (0.016)	0.066*** (0.011)	0.006 (0.013)
Women, 18-34	-0.295*** (0.024)	0.067** (0.024)	0.297*** (0.025)	0.065*** (0.018)	0.024 (0.016)	-0.370*** (0.024)	0.006 (0.019)	0.179*** (0.023)
Men, 18-34	-0.070*** (0.021)	0.062** (0.023)	0.223*** (0.024)	0.062*** (0.016)	0.054*** (0.016)	-0.109*** (0.024)	0.022 (0.018)	0.147*** (0.021)
Women, 35-49	-0.048* (0.023)	-0.028 (0.024)	0.007 (0.026)	0.002 (0.015)	-0.027* (0.013)	-0.101*** (0.027)	-0.031 (0.017)	-0.006 (0.020)
Women, 50-64	-0.012 (0.022)	-0.034 (0.024)	-0.092*** (0.024)	-0.007 (0.015)	-0.044*** (0.012)	-0.030 (0.026)	-0.016 (0.018)	-0.039* (0.018)
Men, 50-64	0.075*** (0.017)	-0.010 (0.021)	-0.121*** (0.021)	-0.029* (0.012)	-0.036** (0.012)	0.110*** (0.021)	0.016 (0.017)	-0.050** (0.016)

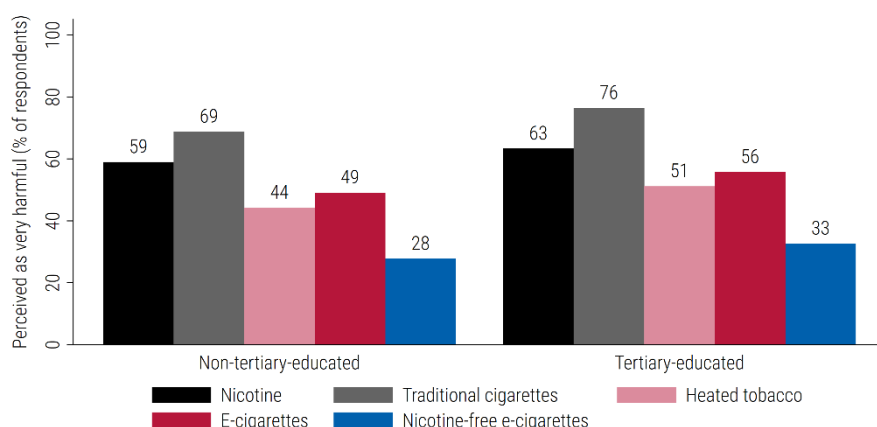
Note: The dependent variable is a binary indicator of the use of the product specified in the column header. Reported values are average marginal effects from logit regressions. The reference category for place of residence is towns with fewer than 100,000 inhabitants; for income, the reference is a monthly household income per adult between 4,000 and 10,000 PLN; for demographic groups, the reference is men aged 35-49. Robust standard errors are shown in parentheses. Number of observations: 4,542. *** p < 0.001, ** p < 0.01, * p < 0.05. Source: Authors' calculations based on own survey.

3.4. Perceptions of health effects

Respondents were also asked to assess the health harmfulness of nicotine and four specific products. For each item, they could choose from six response options: (i) not harmful at all, (ii) slightly harmful, (iii) moderately harmful, (iv) very harmful, (v) extremely harmful, and (vi) don't know. In the following analysis, we focus on the combined share of respondents who perceive each product as very or extremely harmful – a group likely to prefer avoiding the health risks associated with its use.

Overall, 60% of respondents consider nicotine to be very or extremely harmful, and 70% say the same about traditional cigarettes. The latter figure may seem low, given the public health policies in Poland aimed at raising awareness of the risks associated with cigarette smoking. Specifically, 22% of respondents view cigarettes as moderately harmful, and 4% as only slightly harmful. While we do not observe significant differences across age groups, there are noticeable, though not large, differences by educational attainment. Among tertiary-educated consumers, 76% perceive cigarettes as very or extremely harmful, compared to 69% among those without tertiary education (Figure 11). Alternative nicotine products are less frequently seen as very or extremely harmful, with HTP more often considered a safer choice than e-cigarettes.

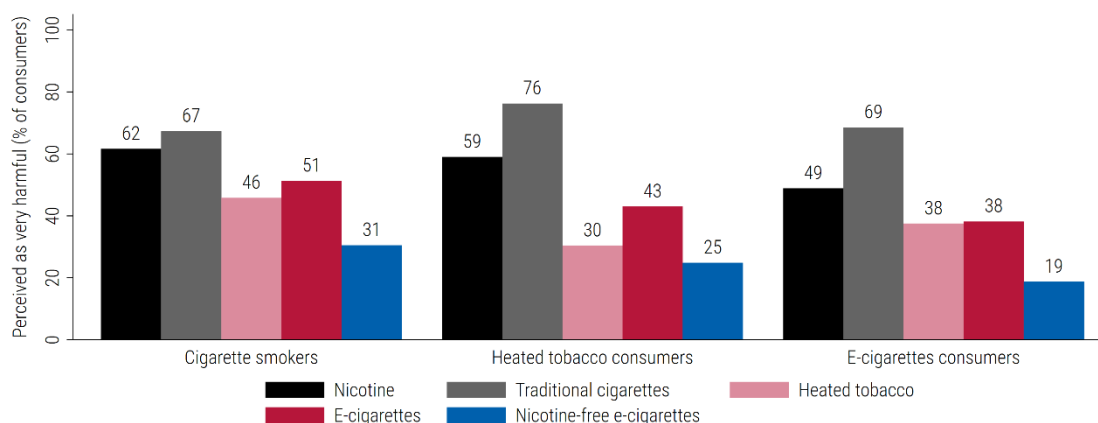
Figure 11 Percentage of nicotine consumers who perceive each product as very or extremely harmful, by educational attainment



Source: Authors' calculations based on the survey data.

Health perceptions differ notably between daily users of specific products (Figure 12). Traditional cigarettes are most often viewed as very or extremely harmful by daily users of HTP (76%), yet only 30% of them perceive HTP itself as very or extremely harmful. Similarly, only 38% of daily e-cigarette users consider e-cigarettes to be very or extremely harmful – a lower share than among daily users of traditional cigarettes (51%). These differences may reflect both pre-existing health beliefs influencing product choice and ex-post rationalisations of one's current behaviour.

Figure 12 Percentage of nicotine consumers who perceive each product as very or extremely harmful, daily users of traditional cigarettes, heated tobacco or e-cigarettes



Source: Authors' calculations based on the survey data.

According to respondents' recollections, alternative nicotine products most often led to a reduction in traditional cigarette use. Among HTP users, 63% declared that its use helped them either quit smoking or reduce its intensity. However, 11% reported starting to smoke traditional cigarettes after initiating heated tobacco, and for 15% the use of HTP had no impact on their cigarette consumption. The age breakdown (Figure 13) shows that older users were more likely to reduce their consumption of traditional cigarettes compared to younger users.

In the case of e-cigarettes, 58% of users reported a reduction in traditional cigarette use, while 12% stated they began smoking cigarettes after using e-cigarettes. Age differences in the reduction of traditional cigarette use are even more pronounced for e-cigarettes than for heated tobacco. Only 53% of nicotine users aged 18–34 reported reducing their cigarette use due to e-cigarettes (Figure 14). Importantly, the analysis excludes adolescents, for whom e-cigarettes often represent the first nicotine product used (WHO, 2023).

Figure 13 Self-reported changes in traditional cigarette smoking due to heated tobacco use

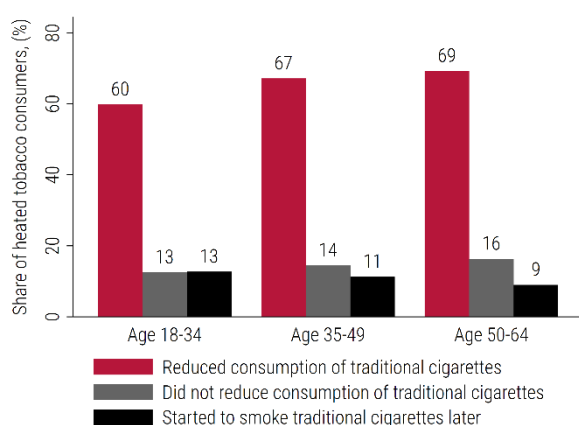
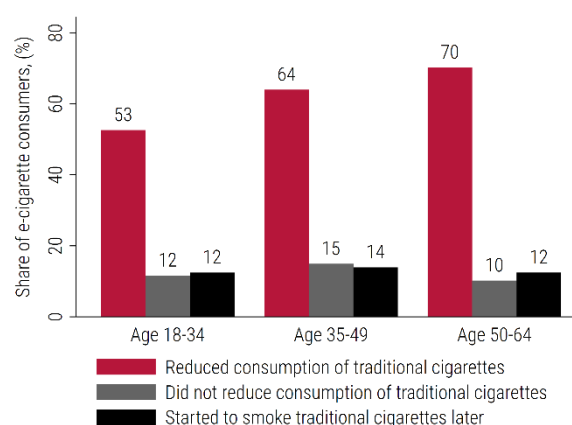


Figure 14 Self-reported changes in traditional cigarette smoking due to e-cigarette use



Note: Consumer categories do not sum to 100%, as we do not include consumers who had not smoked traditional cigarettes before using alternative products and did not start smoking afterwards. Source: Authors' calculations based on the survey data.

4. Estimation results

In this section, we report the estimation results derived from the vignette experiment. First, we report price effects estimated for the whole sample. Second, we zoom in on the price effects within nine consumer groups. Third, we report estimates of the willingness to pay (WTP) for the flavoured taste of alternative nicotine products.

4.1. Main results

We report the marginal effects of changes in the log prices of the considered nicotine products—traditional cigarettes, HTP, and e-cigarettes—on the probability of choosing a particular product for the entire study sample (Table 6). Importantly, these results cannot be interpreted as elasticities. Under the baseline prices, the probability of choosing individual products is different, with cigarettes having the highest probability. Nevertheless, these results provide a useful approximation of population-wide changes in product choice resulting from small increases in product prices.

Table 6 Estimated price effects, total sample

Total sample	(1) Pr(cig)	(2) Pr(HTP)	(3) Pr(e-cig)	(4) Pr(opt out)
log(cigarettes price)	-0.273*** (0.015)	0.113*** (0.007)	0.081*** (0.005)	0.080*** (0.005)
log(HTP price)	0.062*** (0.007)	-0.116*** (0.013)	0.029*** (0.003)	0.025*** (0.003)
log(e-cigarettes price)	0.060*** (0.006)	0.039*** (0.004)	-0.125*** (0.012)	0.026*** (0.003)

Note: The table presents the marginal effects of a one-unit change in price on the probability of choosing traditional cigarettes (Column 1), HTPs (Column 2), e-cigarettes (Column 3), and opting out (Column 4). We control for gender, education level, age, income, the size of the city of residence, voivodeship, the flavours of HTP and e-cigarette, and for the price of the heating device. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: Authors' calculations based on the survey data.

Own-price effects are consistently negative and highly significant, indicating that higher prices reduce the probability of choosing the respective product. For example, a 10% increase in cigarette prices lowers the probability of cigarette choice by 2.7 percentage points, with substitution distributed across HTPs (1.1 pp), e-cigarettes (0.8 pp), and opting out (0.8 pp). Similarly, a 10% increase in HTP prices decreases HTP use by 1.2 percentage points, with consumers shifting partly towards cigarettes (0.6 pp), e-cigarettes (0.3 pp), and opting out (0.3 pp). For e-cigarettes, a 10% price increase reduces their use by 1.3 percentage points, while substitution occurs towards cigarettes (0.6 pp), HTPs (0.4 pp), and opting out (0.3 pp).

Overall, these results confirm that demand for all three nicotine products is price responsive, though the patterns of response differ: in the case of cigarettes, 29% of discouraged consumers decide to opt out, whereas for alternative nicotine products this share is around 21%. For both HTPs and e-cigarettes, discouraged consumers are more likely to switch to traditional cigarettes rather than to the other alternative product.

4.2. Heterogeneity of responses by consumer types

In this subsection, we report the marginal effects of the change in log prices of the nicotine products considered within nine consumer groups (see Table 4). In this case, the magnitudes of the estimated coefficients can be compared across groups, as in the real-life choices used as the baseline, 100% of consumers in each group choose the same product (except for Groups 4 and 7). Across all groups, own-price effects are negative and mostly highly significant, confirming that higher prices reduce the probability of choosing a given product (Table 7). However, the magnitude of the responses and the substitution patterns differ considerably across consumer types.

Table 7 Estimated price effects by consumer type

	(1)	(2)	(3)	(4)
1: Daily traditional cigarette consumers (without other products)	Pr(cig)	Pr(HTP)	Pr(e-cig)	Pr(opt out)
log(cigarettes price)	-0.371*** (0.027)	0.114*** (0.01)	0.062*** (0.005)	0.195*** (0.017)
log(HTP price)	0.070*** (0.012)	-0.091*** (0.016)	0.006*** (0.001)	0.016*** (0.003)
log(e-cigarettes price)	0.024*** (0.009)	0.004** (0.001)	-0.033*** (0.013)	0.006*** (0.002)
2: Daily traditional cigarette consumers (combining with other products)				
log(cigarettes price)	-0.438*** (0.037)	0.234*** (0.021)	0.122*** (0.011)	0.082*** (0.010)
log(HTP price)	0.162*** (0.021)	-0.246*** (0.032)	0.052*** (0.007)	0.032*** (0.005)
log(e-cigarettes price)	0.061*** (0.014)	0.037*** (0.009)	-0.110*** (0.025)	0.012*** (0.003)
3: Daily e-cigarette consumers (combining with other products)				
log(cigarettes price)	-0.287*** (0.044)	0.121*** (0.019)	0.127*** (0.019)	0.038*** (0.007)
log(HTP price)	0.046*** (0.018)	-0.126*** (0.048)	0.063*** (0.024)	0.017*** (0.007)
log(e-cigarettes price)	0.086*** (0.018)	0.114*** (0.023)	-0.232*** (0.047)	0.032*** (0.007)
4: Occasional alternative product consumers (without traditional cigarettes)				
log(cigarettes price)	-0.069** (0.027)	0.028** (0.011)	0.024** (0.009)	0.017** (0.007)
log(HTP price)	0.004 (0.007)	-0.025 (0.046)	0.012 (0.023)	0.008 (0.015)
log(e-cigarettes price)	0.026*** (0.007)	0.094*** (0.026)	-0.189*** (0.051)	0.069*** (0.019)
5: Occasional traditional cigarette consumers (without other products)				
log(cigarettes price)	-0.322*** (0.054)	0.089*** (0.016)	0.055*** (0.010)	0.178*** (0.032)
log(HTP price)	0.047** (0.020)	-0.089** (0.037)	0.011** (0.005)	0.031** (0.013)
log(e-cigarettes price)	0.032** (0.014)	0.011** (0.005)	-0.065** (0.028)	0.021** (0.009)
6: Daily e-cigarette consumers (without other products)				
log(cigarettes price)	-0.079*** (0.029)	0.020*** (0.007)	0.041*** (0.015)	0.018*** (0.007)
log(HTP price)	0.008 (0.006)	-0.062 (0.041)	0.037 (0.024)	0.017 (0.011)
log(e-cigarettes price)	0.049*** (0.011)	0.102*** (0.022)	-0.259*** (0.054)	0.108*** (0.023)
7: Occasional consumers of various products				
log(cigarettes price)	-0.153*** (0.057)	0.063*** (0.024)	0.054*** (0.020)	0.036*** (0.014)
log(HTP price)	0.031 (0.024)	-0.079 (0.060)	0.028 (0.021)	0.020 (0.015)
log(e-cigarettes price)	0.106*** (0.022)	0.112*** (0.023)	-0.283*** (0.057)	0.066*** (0.015)

Table 8 Estimated price effects by consumer type, continued

8: Daily HTP consumers (without other products)				
log(cigarettes price)	-0.030 (0.035)	0.020 (0.023)	0.005 (0.006)	0.005 (0.005)
log(HTP price)	0.041** (0.017)	-0.181*** (0.068)	0.069*** (0.025)	0.071*** (0.027)
log(e-cigarettes price)	0.006 (0.005)	0.037 (0.033)	-0.052 (0.045)	0.009 (0.008)
9: Daily HTP consumers (combining with other products)				
log(cigarettes price)	-0.152*** (0.054)	0.096*** (0.035)	0.028*** (0.01)	0.027*** (0.01)
log(HTP price)	0.043 (0.031)	-0.111 (0.083)	0.039 (0.029)	0.029 (0.022)
log(e-cigarettes price)	0.040*** (0.012)	0.126*** (0.036)	-0.201*** (0.056)	0.034*** (0.011)

Note: The table presents the marginal effects of a one-unit change in price on the probability of choosing traditional cigarettes (Column 1), HTPs (Column 2), e-cigarettes (Column 3), and opting out (Column 4). We control for gender, education level, age, income, the size of the city of residence, voivodeship, the flavours of HTP and e-cigarette, and for the price of the heating device. Consumer groups are ordered by size (see Table 4). Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' calculations based on the survey data.

Among daily consumers who use exclusively traditional cigarettes (Group 1), higher cigarette prices substantially reduce the probability of cigarette choice, with substitution mainly towards opting out and, to a lesser extent, HTPs. For example, a 10% increase in traditional cigarette prices reduces the probability of choosing traditional cigarettes by 3.7 percentage points, with 2 points shifting towards opting out and 1.1 points towards HTPs. The substitution towards e-cigarettes (0.6 percentage points) is significantly lower than towards HTPs.

For daily cigarette consumers that also use alternative products (Group 2), substitution following higher cigarette prices occurs mainly towards HTPs and, to a smaller extent, e-cigarettes. For example, a 10% increase in traditional cigarettes prices corresponds to a decrease in the probability of choosing traditional cigarettes by 4.4 percentage points, with 2.3 points shifting towards HTP, 1.2 points towards e-cigarettes, and only 0.8 points towards opting out. Thus, the excise hikes on traditional cigarettes are expected to have significantly different effects on the first and second consumer groups, with more consumers quitting nicotine consumption in the first group.

For daily e-cigarette consumers that also use alternative products (Group 3), a 10% increase in e-cigarette prices corresponds to a 2.3 percentage points decrease in the probability of choosing these products, with 1.1 percentage points shifting towards HTP, 0.9 percentage points towards traditional cigarettes, and only a 0.3 percentage point higher probability of quitting nicotine consumption. In contrast, daily consumers who use exclusively e-cigarettes (Group 6) are much more likely to quit nicotine consumption in response to an e-cigarette price increase. For example, a 10% increase in e-cigarette prices corresponds to a 2.6 percentage points decrease in the probability of choosing e-cigarettes, with a 1.1 point shift towards opting out and a 1 point shift towards HTP.

Daily HTP consumers who do not use other products (Group 8) are relatively unlikely to switch to traditional cigarettes after an increase in HTP price. For example, a 10% increase in HTP prices corresponds to a 1.8 percentage point decrease in the probability of choosing HTP, with a 0.7 point shift towards opting out, a 0.7 point shift towards e-cigarettes, and only a 0.4 point shift towards traditional cigarettes. For daily HTP

consumers who also consume other products (Group 9), our estimates of responses to increases in HTP prices are not statistically significant, which may be partly related to the small sample size for that consumer group.

Now, we turn to occasional nicotine consumers. Those who do not smoke traditional cigarettes (Group 4) respond strongly to e-cigarette prices, substituting towards HTPs and opting out, while HTP prices do not affect their choices significantly. For example, a 10% increase in e-cigarette prices corresponds to a 1.9 percentage point decrease in the probability of choosing e-cigarettes, with a 0.9 point shift towards HTP and 0.7 towards opting out. Among occasional cigarette consumers who do not use alternative products (Group 5), higher cigarette prices strongly reduce cigarette use, with substitution mainly towards opting out. For example, a 10% increase in traditional cigarettes prices corresponds to a 3.2 percentage point decrease in the probability of choosing traditional cigarettes, with a 1.8 points shift towards opting out, 0.9 points towards HTP, and 0.6 points towards e-cigarettes. The group that mixes various products (Group 7) exhibits the most pronounced own-price effects with regard to e-cigarette prices. However, in the case of each product price increase, the probability of quitting nicotine consumption is low.

Taken together, several patterns emerge. Own-price elasticities are consistently negative and significant, confirming downward-sloping demand. Substitution patterns are asymmetric: cigarette smokers tend to shift more to HTPs than to e-cigarettes, while HTP smokers substitute only weakly when HTP prices rise. E-cigarette smokers display broader substitution, shifting both to HTPs and cigarettes. Multiproduct users are more price responsive than exclusive users, with strong substitution across categories. In contrast, exclusive users are more likely to quit nicotine consumption after a price increase of their preferred product.

From a policy perspective, consumers who use multiple tobacco or nicotine products tend to be more resistant to excise tax increases. For these groups, meaningful health gains require simultaneous tax hikes across different product categories to prevent substitution. Another potential regulatory approach is limiting product variety—for example, by requiring prior approval before introducing any new nicotine product to the market.

4.3. Willingness to pay for flavoured nicotine products

In this section, we estimate the willingness to pay (WTP) for flavoured nicotine products. Specifically, we assess the WTP for menthol and fruity variants of heated tobacco products and e-cigarettes across consumer types. Flavoured traditional cigarettes are not available in Poland due to legal restrictions and are therefore excluded from the analysis.

Overall, the results indicate apparent differences in flavour valuation across consumer types. Flavour plays a central role for e-cigarette users, particularly daily users, who display consistently high and significant WTP for flavoured variants. For instance, daily e-cigarette consumers who do not use other products (Group 6) are willing to pay around 33 PLN more for fruity e-cigarettes than for the tobacco flavour (equivalent to about 7.7 EUR), and daily users with alternatives (Group 3) value fruity e-cigarettes at about 21 PLN (equivalent to 4.9 EUR). By contrast, HTP users show little or no additional willingness to pay for flavours, suggesting that flavour is not a major driver of HTP demand. Occasional users reveal mixed patterns: while their WTP estimates for flavoured HTPs are highly uncertain, they demonstrate significant willingness to pay for flavoured e-cigarettes. Taken together, these findings suggest that flavours are an important determinant of demand for e-cigarettes but not for HTPs, with the strongest effects observed among regular e-cigarette users.

The incoming ban on flavoured heated tobacco products (effective from January 2026) is expected to have limited impact on daily HTP users, as our estimates show no statistically significant behavioural response within this group. However, some response may occur among daily e-cigarette users who also use other nicotine products. Their estimated willingness to pay for flavoured HTP variants is around 20-22 PLN, although this result should be interpreted with caution due to limited statistical power. Overall, the ban may reduce the

likelihood of e-cigarette users substituting toward HTPs, as flavour variety remains an important factor driving their preferences and product choices.

Table 9 Willingness to pay for flavoured nicotine products, by consumer types

Consumer group:	HTP		e-cigarettes	
	(1) Menthol	(2) Fruity	(3) Menthol	(4) Fruity
2: Daily traditional cigarette consumers (combining with other products)	5.49** (2.18)	2.22 (2.12)	-6.36 (5.18)	-0.68 (4.97)
3: Daily e-cigarette consumers (combining with other products)	22.16* (12.30)	20.35* (11.91)	7.62 (5.79)	20.85*** (7.08)
4: Occasional alternative product consumers (without traditional cigarettes)	127.66 (226.02)	159.21 (282.72)	20.2** (8.10)	31.44*** (11.02)
6: Daily e-cigarette consumers (without other products)	- -	- -	18.04*** (5.94)	32.66*** (8.33)
7: Occasional consumers of various products	37.37 (29.98)	30.56 (25.99)	1.34 (4.50)	0.75 (4.61)
8: Daily HTP consumers (without other products)	-5.52 (5.61)	0.98 (5.36)	- -	- -
9: Daily HTP consumers (combining with other products)	7.32 (13.64)	-33.95 (28.99)	12.93 (9.10)	42.55*** (15.77)

Note: The table presents the willingness to pay for flavoured HTP (columns 1-2) and e-cigarettes (columns 3-4) in Polish PLN. Consumer groups are ordered by size (see Table 4). Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Source: Authors' calculations based on the survey data.

5. Simulated effects of excise hikes

In this section, we present the results of the simulation exercise. Scenario 1 evaluates the policy change implemented after our survey. Our estimates suggest that a 200% increase in e-cigarette prices (by 60 PLN) and a 102% increase in the heating device (by 50 PLN) would reduce the number of consumers aged 18–64 who primarily use e-cigarettes by 62% (659 thousand; Table 9). Among these discouraged users, 178 thousand are likely to abstain from nicotine consumption, 319 thousand to switch to traditional cigarettes, and 162 thousand to heated tobacco.

To address an increased number of traditional cigarette consumers, we consider a hypothetical Scenario 2. It combines policies of Scenario 1 with a 50% increase in traditional cigarette prices (by 11 PLN). Under this scenario, the number of cigarette smokers falls to 2.5 million, or 778 thousand fewer than in Scenario 1. A substantial share of these consumers (466 thousand comparing with Scenario 1) switch to HTP, while 257 thousand quit nicotine use entirely. Compared with the June 2025 baseline, Scenario 2 results in an overall decline of daily nicotine users by 435 thousand (9.6%).

The comparison of Scenarios 3 and 2 reveals trade-offs associated with the taxation of alternative products. Scenario 3, in addition to the price hikes considered in Scenario 2, also includes an increase in the price of HTP by 50% (by 9.25 PLN). While the overall number of nicotine consumers drops by 84 thousand, the product

structure is different. In Scenario 3, there are 286 thousand more traditional cigarette smokers than in Scenario 2. This is mostly because higher HTP prices discourage cigarette smokers from switching to HTP.

We also consider Scenario 4, in which the rise in prices of heated tobacco sticks is not accompanied by a simultaneous increase in the prices of traditional cigarettes. Relative to Scenario 1, it reduces the number of HTP users by 130 thousand, of whom just 37 thousand quit nicotine altogether. 54% of the discouraged HTP users switch to traditional cigarettes. Overall, this intervention brings much lower health benefits than Scenarios 2 and 3, which also include increases in traditional cigarette prices.

Table 10 Simulation results: differences with respect to the baseline, thousands of consumers aged 18–64

Main product used daily	Number of daily consumers before the policy change	Scenario 1 (200% price increase of e-cigarettes, 102% price increase of HTP device)	Scenario 2 (S1 + 50% price increase of cigarettes)	Scenario 3 (S1 + 50% price increases of HTPs and cigarettes)	Scenario 4 (S1 + 50% price increase of HTPs)
Traditional cigarettes	2,975	3,294 (+319)	2,515 (-459)	2,802 (-173)	3,364 (+389)
Heated tobacco	511	673 (+162)	1,139 (+629)	738 (+228)	543 (+32)
E-cigarettes	1,058	399 (-659)	454 (-605)	484 (-574)	422 (-636)
Total daily consumers of nicotine products	4,544	4,366 (-178)	4,109 (-435)	4,025 (-519)	4,329 (-215)

Source: Authors' calculations based on the European Health Interview Survey, Eurostat, and own survey data.

While our simulations demonstrate certain patterns and provide a useful quantitative benchmark, they should be treated with caution. First, consumers' decisions in real-life situations may differ from the choices revealed in the experiment. In particular, the large price shock may lead to unexpected reactions on both the demand and supply sides of the market. Second, the number of options in the experiment had to be limited and could not fully reflect the complex landscape of nicotine products. Relatedly, we do not model the potential switch to roll-your-own cigarettes or nicotine pouches. We also treat e-cigarettes as one product category. Although the prices of reusable e-cigarettes increased less sharply than those of disposables, there are significant barriers for consumers to switch from disposable e-cigarettes to reusable ones. Therefore, there remains some degree of uncertainty regarding the effects of price increases on e-cigarettes.

Importantly, our analysis focuses only on adjustments at the extensive margin – that is, on the number of consumers. A discrete choice experiment does not allow us to assess the effects of price changes at the intensive margin, i.e., on the amount of product consumed by the average user. Substantial price hikes are likely to reduce the frequency of use among continuing consumers, but this effect is not captured in our simulations.

6. Concluding remarks

This report outlines the landscape of nicotine consumption among Poles aged 18–64. While traditional cigarettes remain the predominant product, younger cohorts are increasingly drawn to e-cigarettes. The use of heated tobacco, in turn, is linked not only to age but also to socio-economic characteristics such as tertiary education, parenthood, employment, and place of living outside rural areas.

Our discrete choice experiment uncovers the nuanced effects of taxation policies on consumption patterns. Higher prices consistently discourage use, yet the direction of substitution depends on the product. Traditional cigarette smokers are more likely to switch towards heated tobacco than e-cigarettes, while exclusive users of

alternatives are more prone to quitting altogether. Heated tobacco users, however, show limited price responsiveness, suggesting that higher taxes on these products may not meaningfully reduce their consumption. Importantly, the interplay of tax rates across products creates trade-offs: raising taxes on one product can reduce its use but also drive consumers back towards other harmful options.

To choose between different excise structures, health research needs to provide credible evidence on the relative harmfulness of various nicotine products. Currently, there is considerable uncertainty regarding the health risks of alternative products (Braznell et al., 2025). Such evidence should not only inform policymakers but also be effectively communicated to consumers, as health perceptions may influence their behaviour. Our survey finds that most users of heated tobacco and e-cigarettes do not consider these products to be very harmful, which raises concerns about misperceptions and potential underestimation of health risks.

Our report did not examine nicotine consumption among adolescents, yet this group is critically important for public health and must be considered when setting excise rates. Youth are particularly responsive to price increases (Stoklosa et al., 2022), and the recent excise hike on e-cigarettes is likely to yield tangible benefits. Therefore, maintaining lower excise rates for certain products, such as heated tobacco, may not only encourage adult smokers to switch from traditional cigarettes but also facilitate the initiation of nicotine use among young people. Careful attention to all product categories and all consumer groups is essential to maximise public health outcomes.

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Appendix A: Survey details

Figure A1. Sample vignette

Proszę wybrać jedną z poniższych opcji.

	Podgrzewacz tytoniu	Papierosy tradycyjne	E-papieros jednorazowy	
Typ produktu				Nie kupuję nic, powstrzymuję się od konsumpcji wyrobów nikotynowych
Cena paczki / jednego produktu	18,50 zł	43,98 zł	29,99 zł	
Cena urządzenia	Jednorazowy zakup podgrzewacza do tytoniu za 99 zł			
Smak	Owocowy	Tytoń	Owocowy	
Wybieram	☐	☐	☐	☐

Source: screenshot from the survey experiment



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