Patterns of Heated Tobacco Product Use Among Czech Adult Tobacco Users in 2020: An Online Survey

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BACKGROUND: Heated tobacco products represent a new phenomenon, called novel tobacco products, and one that is not unique to the Czech market. These are electronic tobacco heating and aerosol-producing devices. Although studies on the prevalence of heated tobacco use are already available, patterns of use have not yet been sufficiently mapped. **AIM:** The aim of this article is to map and describe the patterns of heated tobacco use among adult tobacco users in the Czech Republic. **METHODS:** The study was conducted in the form of an online survey. Respondents were recruited through selected online channels dealing with tobacco product use and then included in the study on the basis of previously defined criteria. The research sample comprised 198 people (68% female, average age 31.4 years). The data was analysed in R 4.02 and MS Excel with descriptive statistics and control analyses. **RESULTS:** Heated tobacco users are predominantly former smokers of combustible cigarettes in the young adult age group. Only 3% of them have had no previous experience with smoking tobacco products. For 25% of the respondents, the smoking of cigarettes has decreased after switching to heated tobacco, one-fifth of the respondents smoke the same number of cigarettes as before, and for 4% the consumption has increased. The main motives for using heated tobacco products included the absence of the smell of cigarette smoke (80%) and the subjective perception of lower harmfulness (65.7%), as well as the fact that heated tobacco is allowed to be used in restaurants (52.5%). The largest proportion of the respondents consume half to one pack of tobacco sticks per day (average 12.77 tobacco sticks). The respondents use heated tobacco most frequently at home, when drinking coffee or alcohol, and when with their friends. **CONCLUSION:** The use of heated tobacco products is linked to the lifestyle of users. Further studies on heated tobacco use patterns may help to map this phenomenon and to set up suitable tobacco control measures.

Keywords | Heated Tobacco – Nicotine – HTP – IQOS – Addiction – Patterns of Use

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1 THEORETICAL BACKGROUND

Heated tobacco products (HTP) are a new way of delivering nicotine to the human body. The tobacco industry is struggling to find ways to stay in business as the smoking of combustible cigarettes has become increasingly regulated, leading to a global decline in the number of users of combustible cigarettes. The tobacco industry is thus coming up with novel technologies that heat tobacco instead of burning it. HTPs use battery-based heating systems to heat up tobacco sticks to 350 °C and then produce an aerosol (Simonavicius et al., 2019). In addition to the addictive substance nicotine, they further contain non-tobacco additives and are often flavoured (WHO, 2020b; 2021). There is a strong link between the use of HTPs and the lifestyle of their users, a fact which is exploited by the tobacco industry in its marketing communications (Hejlová et al., 2019).

Up till now, several HTP device models have been launched globally. Philip Morris International (PMI) first launched IQOS *("I Quit Ordinary Smoking")* in 2014. British American Tobacco (BAT) first launched iFuse in Romania in 2015, followed by "glo". There are also the Japanese Ploom and PAX products, as well as the Korean lil, which are not available on the Czech market. Currently, HTPs are sold in more than 40 countries and IQOS is present in most of them (WHO, 2021).

IQOS devices have been available in the Czech Republic since 2017 (PMI, 2021), followed by glo since 2018 (Česká Tisková Kancelář, 2018). They include a rechargeable base, a holder, and tobacco sticks. The tobacco sticks are inserted into a holder, where they are heated by an electronically controlled heating coil (Simonavicius et al., 2019). Since 2021, the product PULZE by Imperial Brands has been newly available on the Czech market (Křešnička, 2021).

1.1 Overview of the prevalence of HTP use

Although there is currently no reliable, publicly available data that encompasses the global trend in the prevalence of HTP use, national and regional trends have been reported (WHO, 2021).

In Japan, 0.3% of the population aged between 15 and 69 reported using IQOS in the past 30 days in 2015; two years later this number equalled 3.6%, and 1.7% used HTP products on a daily basis. Nearly all the HTP users surveyed were also current or former cigarette smokers (WHO, 2021). In Italy, 1.4% of the population aged ≥ 15 years tried IQOS in 2017. In Germany, 0.3% of current smokers and recent ex-smokers aged 14 years and older were using HTPs in 2017. In the UK, 1.7% of adults tried or used HTPs in 2017, but only 13% of them used them on a daily basis. Three months after the introduction of IQOS in the Republic of Korea in 2017, 3.5% of young adults aged between 19 and 24 were already HTP users, although all of them also smoked combustible cigarettes or used electronic cigarettes (WHO, 2020a). In 2017, only 0.7% of U.S. adults reported ever having used an HTP; however, this percentage increased significantly within just one year to 2.4% of adults in 2018 (WHO, 2021).

In the Czech Republic, data on the prevalence of HTP use was examined and published by the National Survey on the Use of Tobacco and Alcohol (NAUTA). The data was collected from a representative sample of 1,769 respondents. Heated tobacco products are currently used by 4.1% of the respondents (3.2% in 2019), with 2.1% using these products on a daily basis (2.2% in 2019). There is no gender difference in the representation of users. Most users of these products fall into the age group between 25 and 44, while in 2019, the highest representation was in the youngest age group, between 15 and 24 years. Neither education nor place of residence has a significant impact on the use of these products (Csémy et al., 2021).

Given that HTPs are a new phenomenon, there are still very few studies available on the long-term effects or on the patterns and characteristics of use. In our paper, we have therefore focused on mapping the patterns of HTP use among adult tobacco users in the Czech Republic.

2 MATERIALS AND METHODS

The research was conducted in the form of an online questionnaire survey. The main aim was to map and describe the patterns of HTP use among adult tobacco users for the two most widely used products on the Czech market (IQOS and glo).

Five research questions were set:

1. What motivated users to switch to or use IQOS and/or glo?
2. How has the consumption of combustible cigarettes among tobacco users changed after switching to IQOS and glo products?
3. What is the nature (duration of use, number of tobacco sticks per day, type of device and tobacco sticks, places of purchase of devices and sticks, appearance of device) of the use of IQOS and glo?
4. According to HTP users, how is the maintenance of heated tobacco devices performed (frequency of cleaning)?
5. In which situations are IQOS and glo products most used?

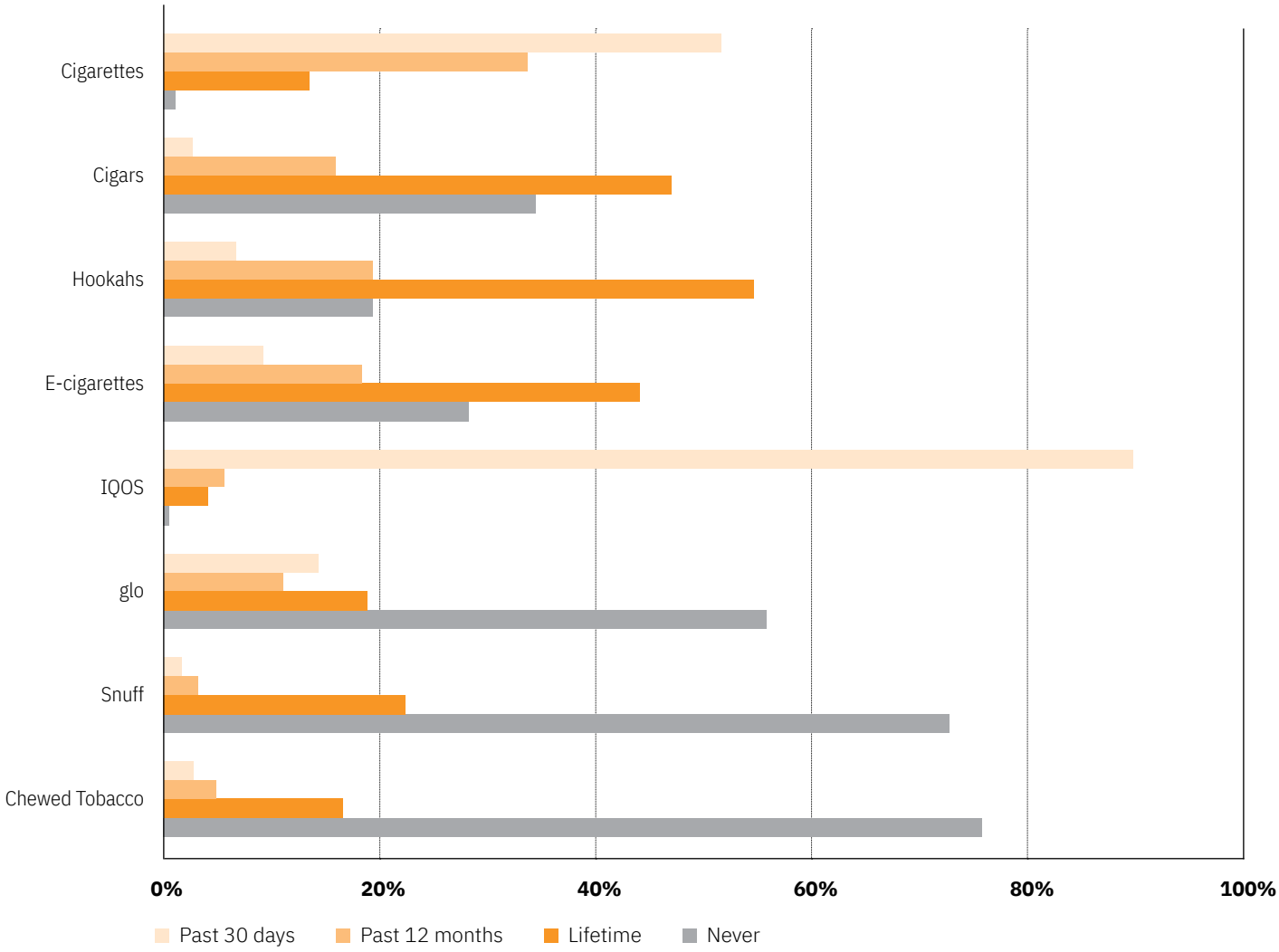
2.1 Recruitment of the research sample

A non-probability sampling method—self-selection—was used to obtain the research sample. An online questionnaire was developed and distributed through selected online channels between 12 February and 30 June 2020. At the beginning of the questionnaire, participants were informed about the criteria for participation in the study. The following criteria were established for the inclusion of respondents in the research: 1) regular or occasional user of IQOS and/or glo products, 2) Czech citizenship, 3) over 18 years of age, 4) consent to participation in the study.

2.2 Data collection methods

The online questionnaire was created in the Google Forms web-based interface. The recruitment channels for dissemina-

Figure 1 | Prevalence of tobacco and nicotine product use in the research sample (%)



tion of the questionnaire included the Czech Smoking Quitline, the National Smoking Quitting Website (www.koureni-zabiji.cz), the e-Cigarette Fans forum, and the HTP Facebook user group called "IQOS – advice and discussion", as well as other channels. The questionnaire contained a total of 18 questions. The introduction to the questionnaire included basic information about the participation and instructions for completion, followed by confirmation of the respondent's consent. The first part of the questionnaire covered the socio-demographic data and smoking history of the respondents. The second part consisted of questions exploring the patterns of use of heated tobacco products.

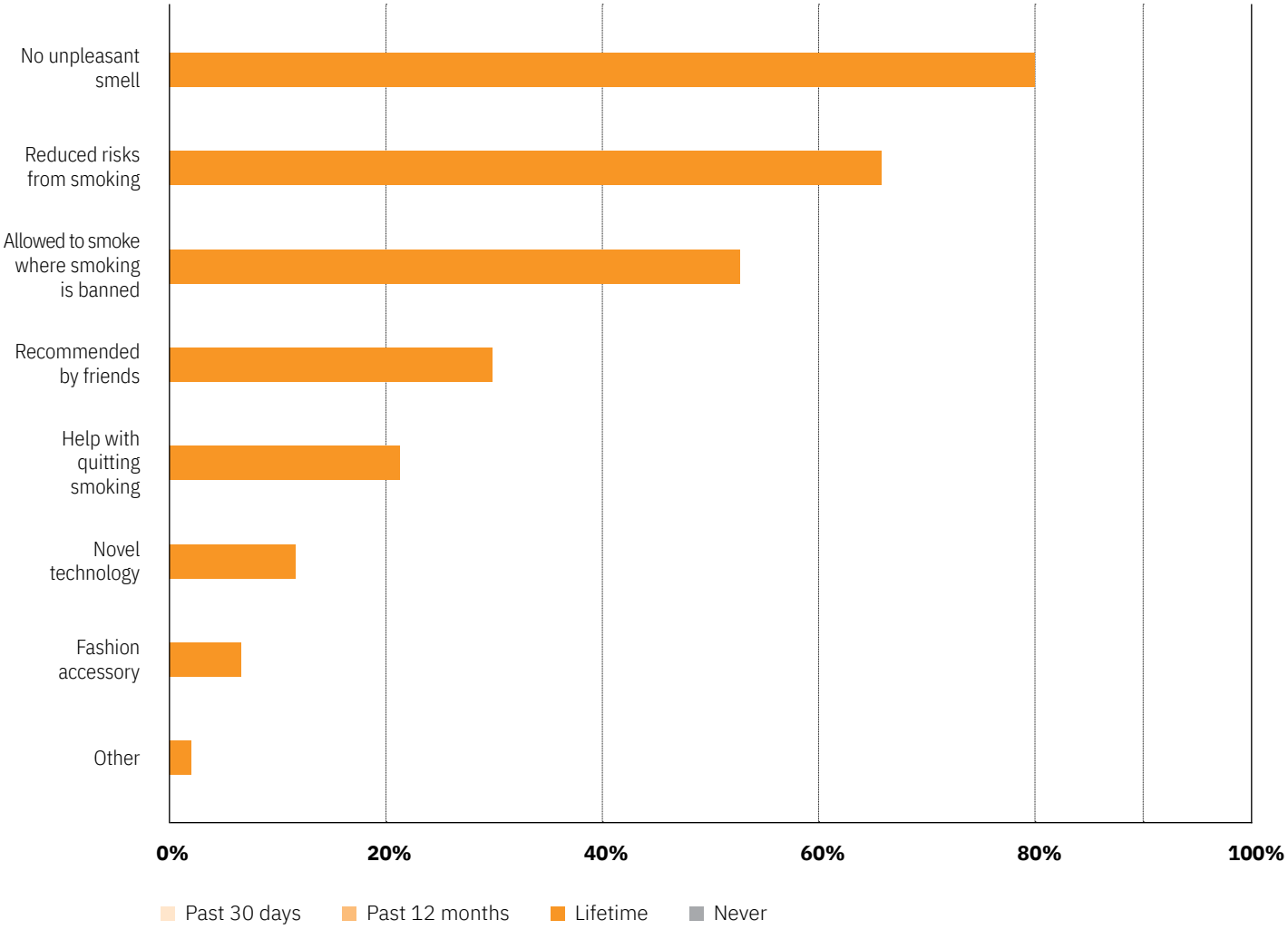
2.3 Research sample

A total of 213 respondents completed the questionnaire, 198 of whom met the criteria for inclusion in the survey. Women predominated in the study population (135 women vs. 63 men). Half of the respondents fell into the 25–39 age group. In terms of education, the largest group of respondents had secondary education with a high school diploma (41%). The socio-demographic data of the research sample is further described in *Table 1*.

Table 1 | Demographic data of the research sample (n = 198)

	Number (n = 198)	Percentages
Gender		
Male	63	31.8 %
Female	135	68.2 %
Age (average 31.4)		
18–24	57	28.8 %
25–39	99	50.0 %
40–54	36	18.2 %
55+	6	3.0 %
Education		
Primary	19	9.6 %
Secondary school w/o diploma	43	21.7 %
Secondary school with diploma	82	41.4 %
University	54	27.3 %

Figure 2 | Reasons for using heated tobacco products (%)



2.4 Data analysis methods

The total of 198 questionnaires was subjected to statistical analysis. The data was analysed in R 4.02 and MS Excel. To answer the research questions, we used frequency analysis of individual indicators. For numerical variables, summary statistics (median, mode, average, extremes) were used. Next, a series of control analyses was performed: t-test, Z-test, chi-square goodness of fit test, and Cochran-Armitage test.

2.5 Ethical aspects of research

The participation in the research was voluntary and anonymous. Each respondent was initially informed about the nature of the study and then confirmed their consent to participation in the online interface of the questionnaire. No personal data was requested from the respondents. The respondents could withdraw from the study at any time without providing any reason.

3 RESULTS

This section presents the results of the study chronologically, under five thematic headings corresponding to the research questions.

3.1 Respondents' experiences with heated tobacco products and electronic cigarettes

The prevalence of heated tobacco products and e-cigarette use in the study population is shown in *Figure 1*. In the last month, the most commonly used products among the respondents were IQOS heated tobacco products (90%) and combustible cigarettes (52%). These were followed by the second heated tobacco product, glo (14%), electronic cigarettes (9%), and a hookah (6%). The lowest 30-day prevalence rates were recorded for cigars, chewing tobacco, and snuff. More than half of the respondents had never used chewing tobacco, snuff, or glo heated tobacco products. In the case of chewing tobacco and snuff use, the predominant experience among the respondents was a single experience.

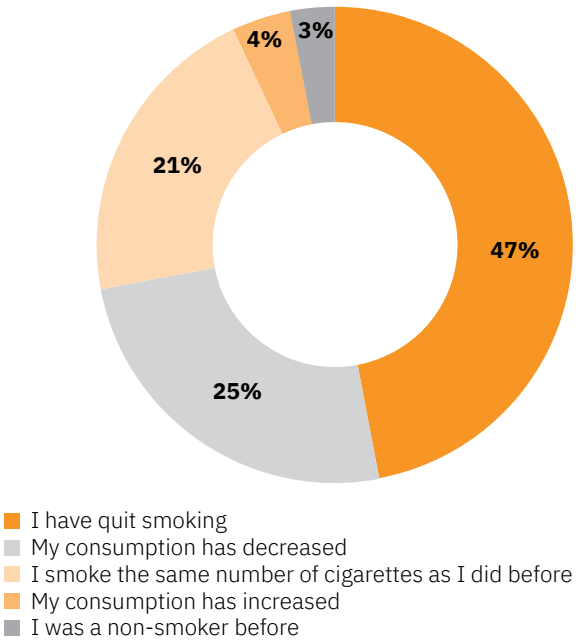
3.2 Motivation of tobacco users to switch to heated tobacco products

As illustrated in *Figure 2,* the predominant motive for using heated tobacco products was the absence of an unpleasant smell for almost 80% of the respondents. The second most frequent response was the subjective perception of risk reduction of smoking, reported by 65.7% of the respondents. More than half of the respondents stated the possibility of using heated tobacco products in restaurants as a reason why they preferred heated tobacco. More than a quarter (29.8%) of the respondents reported that the influence of friends who use HTPs encouraged them to use these products. One-fifth of the research sample had purchased a heated tobacco product for the purpose of quitting smoking. Less common reasons included lifestyle aspects, e.g. the perception of HTPs as a technologically novel product (11.6%) or fashion accessory (6.6%).

3.2 Development of tobacco consumption after switching to heated tobacco products

In this section, we verified the extent to which the respondents' consumption of tobacco products changed after they had switched to HTPs. Half of the respondents answered that they no longer smoked combustible cigarettes at all in parallel with using HTPs. Among the HTP users, 47% were ex-smokers. Only 3% of the respondents had never smoked before they started using HTPs. The other half of the respondents show a pattern of dual use (combination of HTP and other forms of combustible tobacco). For 25% of the respondents, consumption of combustible cigarettes has decreased, and 21% of the respondents still smoke the same number of combustible cigarettes as they did before they started using HTPs. 4% of the respondents had increased their cigarette consumption as a result of switching to HTPs *(Figure 3).*

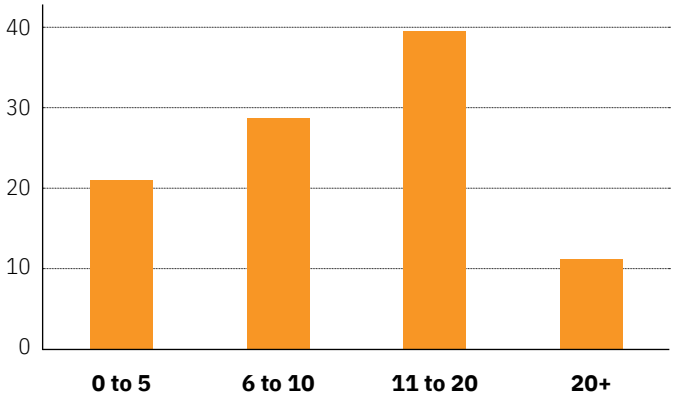
Figure 3 | Consumption of combustible cigarettes after starting to use HTPs (%)



3.4 Selected characteristics of heated tobacco product users

We also mapped the respondents' characteristics in relation to daily use of HTPs, purchases of product and tobacco sticks, and equipment maintenance. The largest proportion of the respondents (39.3%) consume between 11 and 20 tobacco sticks per day. One-third of the respondents (28.6%) use between six and ten tobacco sticks every day and a fifth of the respondents use no more than five tobacco sticks per day. The use of one pack of tobacco sticks (20 sticks) was confirmed by 11.2% of the respondents. The average daily consumption of tobacco sticks amounted to 12.77 sticks *(Figure 4).*

Figure 4 | Daily use of heated tobacco products (number of tobacco sticks per day)



Most users (93.4%) use points of sale (newsagents, petrol stations, retail shops) to buy tobacco sticks. In total, 16.8% of the respondents order their tobacco sticks online. A similar proportion of the respondents (16.2%) use specialist outlets (such as IQOS stores, lounges, or pop-ups).

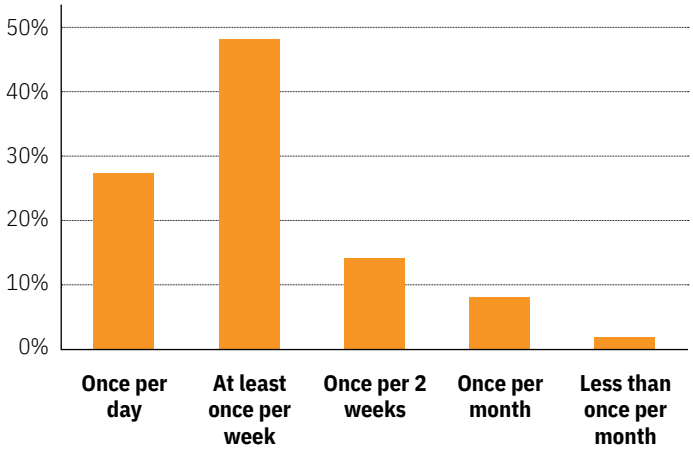
Three-quarters of the HTP users take a responsible approach to device maintenance. Just under one-third (27.4%) of the respondents clean the device on a daily basis. Out of the total number of respondents, less than half (48.2%) perform device maintenance at least once a week. A total of 10% of the HTP users in the survey clean the device once a month or less frequently.

In terms of visual appearance, almost 70% of the users keep the original look of their HTP device. 18.9% of the respondents use an HTP sleeve or similar protection. 13.8% of the respondents reported having replaced the cover of their IQOS device *(Figure 5).*

3.5 Preferred situations for the use of heated tobacco products

As part of mapping the patterns of use, we were also interested in the respondents' preferences as regards the places and situations in which they use HTPs.

Figure 5 | Frequency of cleaning of tobacco heating device (%)



Almost 62% of the respondents use HTPs at home or when drinking coffee or tea. The use of HTPs also plays a significant role in socializing with friends (59.4%) and drinking alcoholic beverages (58.9%). More than half of the respondents reported the outdoor environment as a typical situation in which they use HTPs. For nearly half of the respondents, the possibility of using HTPs in restaurants (49.2%), which would be banned by law for combustible cigarettes, is a crucial factor. The respondents reported taking a break between activities (48.7%) or using at work (47.2%) as another typical situation. More than a third of the respondents (35%) use HTPs when taking a walk. Most respondents identified driving a car as another typical situation in which they use HTPs *(Figure 6)*.

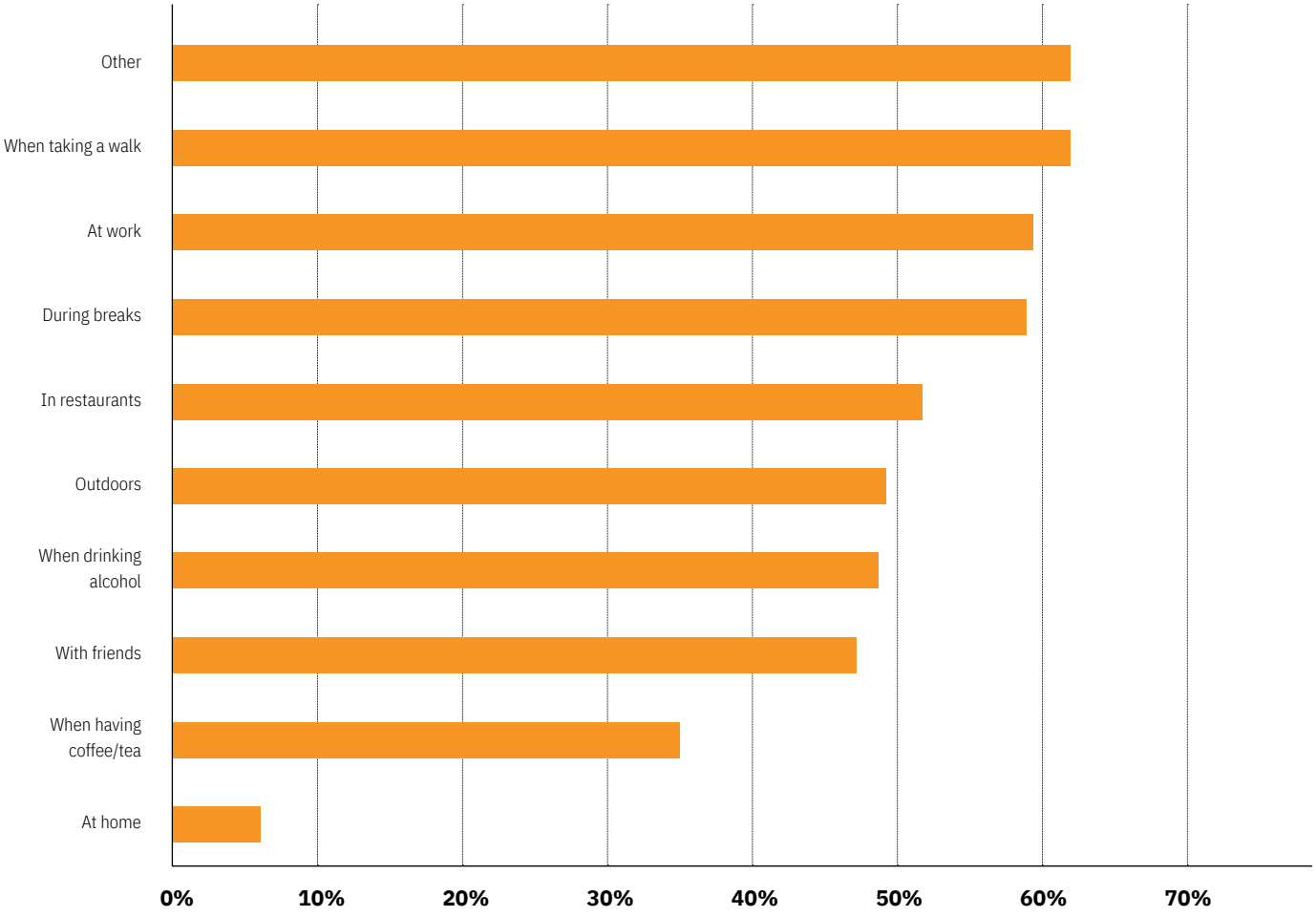
4 DISCUSSION

As the results of our study show, HTP users are mainly current or former smokers of combustible cigarettes in the age group of young adults. Only 3% of them had no previous experience with smoking tobacco products. Less than half of these users have switched to HTPs completely, while the remainder continue to smoke combustible cigarettes. For 25% of the respondents, the consumption of combustible cigarettes has decreased, one-fifth of the respondents smoke the same number of cigarettes as before, and for 4% the consumption has increased. The lead motives for using HTP among most respondents were the absence of cigarette smoke and the reduction of impacts on their health. Another strong motive is the possibility of using HTPs in restaurants, where combustible cigarettes are not allowed to be smoked. In contrast, only one-fifth of the respondents had obtained HTPs for the purpose of quitting smoking. The largest proportion of the respondents use half to one pack of tobacco sticks per day, which amounts to 12.77 tobacco sticks on average. In terms of preferred places and situations, the respondents mostly used HTPs at home, when drinking coffee or alcoholic beverages, and in the company of their friends.

As also confirmed by the results of the National Survey on the Use of Tobacco and Alcohol conducted in the Czech Republic (Csémy et al., 2021), the highest proportion of HTP users is among the younger age group (between 25 and 44). However, the respondents in our study reported a significantly higher average daily consumption rate of tobacco sticks (12.77 vs. 4.8 sticks; Csémy et al., 2021). The predominant use of HTPs in the cohort of younger users and former or current tobacco smokers is also confirmed by other studies from Europe (Tattan-Birch et al., 2021) and Asia (Tabuchi et al., 2016; Yi et al., 2021). On the evidence of findings from the study of Hwang et al. (2019), triple use (a combination of HTP, ENDS, and combustible cigarettes) is another pattern of HTP users. In our study, so-called triple users were not identified. The use of heated tobacco products is closely linked to the lifestyle of HTP users. The patterns of HTP use in our study were characterized by users' friends, a less bad smell, perceived lower risk, and greater freedom of use. Sutanto et al. (2019) described these specific generational characteristics among the Japanese population, where peer influence, design, taste, or the perception of lower health risks ranked among the most frequent arguments in favour of starting to use HTPs. These characteristics are also reflected by the tobacco industry, which builds its HTP marketing communication on values such as lifestyle, fashion, hi-tech, exclusivity, freedom, etc. The targeting of HTP advertising and promotion to young users by the tobacco industry has been demonstrated in previous studies conducted not only in the Czech Republic but elsewhere too (Campaign for Tobacco-Free Kids, 2019; Hejlová et al., 2019, 2021; Kreitzberg et al., 2019). These findings should be considered when setting up tobacco control strategies and regulating the sale, advertising, and promotion of HTPs. The monitoring of HTP use prevalence and users' characteristics should be further priorities for policy makers, as stated by Gallus et al. (2022) in their very recent study on the use and awareness of HTPs in 11 European countries.

This study has several strengths, but also a few weaknesses. One of the strengths of this study is that it is one of the first studies aimed specifically at identifying patterns of HTP use in the Czech Republic. We have sought to respond in a flexible manner to the rapidly changing characteristics of tobacco and nicotine use in the Czech Republic. Thus, our study provides completely new data beyond the research on national prevalence indicators. The limitations of this study include the unbalanced research sample, in which women dominated significantly. Since the respondents were recruited using a non-probability sampling method and the size of the research sample is rather small, the findings cannot be generalized to the entire population. Given the very dynamic development of HTP on the Czech market, we were unable to capture the impact of the most recently launched products on the market (e.g. newer brands and models of HTPs or the newest flavours of tobacco sticks).

Figure 6 | Preferred situations in which HTPs are used (%)



5 CONCLUSION

The use of heated tobacco products is closely linked to the lifestyle of HTP users. Our study described the characteristics of HTP use patterns among adult tobacco users in the Czech Republic, such as the social nature of use, preference for the reason of a less bad smell, and greater freedom to use tobacco. The results also show that among regular HTP users, the most numerous group includes current or former tobacco smokers in the young adult age group.

HTPs represent a public health challenge in regulating the use of novel tobacco products. Further studies on HTP use patterns may help to map this phenomenon and to set up suitable tobacco control measures.

Authors' contributions: KD and AK developed the questionnaire and research methodology. KD coordinated the data collection. KD and AK participated in the evaluation and presentation of the results. BO conducted a review of sources, prepared the theoretical background, and performed formal editing of the text. The final form of the manuscript was approved by all authors

Declaration of interest: No conflict of interest.

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