

Heated Tobacco Products: Awareness and Ever Use
Among U.S. Adults

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Introduction: Heated tobacco products, also referred to as heat-not-burn tobacco, are among the latest products introduced to the market by the tobacco industry. However, data on heated tobacco product awareness and use from population-based probability surveys are limited. This study examines heated tobacco product awareness and ever use among U.S. adults.

Methods: This study used data (n=42,477) from the 2019 Tobacco Use Supplement to the Current Population Survey, analyzed in 2020. Descriptive statistics, including a weighted prevalence of heated tobacco product awareness and ever use, were estimated. The awareness and ever use of heated tobacco products were also estimated by age, sex, cigarette smoking status, E-cigarette use status, and other tobacco product use status. Multivariable logistic regression examined the individual characteristics associated with the awareness and ever use of heated tobacco products.

Results: Overall, approximately 8.6% of U.S. adults were aware of heated tobacco products. Awareness was higher among participants who were younger, male, cigarette smokers, E-cigarette users, and other tobacco product users. Ever use of heated tobacco products was uncommon among U.S. adults (0.51%) but more prevalent among E-cigarette users and cigarette smokers. In the general adult populations, the odds of ever use of heated tobacco products were significantly higher among cigarette smokers (AOR=2.19, 95% CI=1.63, 2.94), E-cigarette smokers (AOR=2.70, 95% CI=1.71, 4.25), and other tobacco product users (AOR=1.69, 95% CI=1.30, 2.20).

Conclusions: Although the ever use of heated tobacco products is uncommon among U.S. adults, recent regulatory approval of the marketing of IQOS as modified risk tobacco products may increase use. Therefore, ongoing monitoring of heated tobacco products use and their long-term health consequences are important for informing future decision making.

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INTRODUCTION

In the last few decades, there has been a significant progress in reducing smoking prevalence after the landmark 1964 Surgeon General's report on the health consequences of tobacco use.^{1,2} However, the landscape of tobacco products and patterns of use have also witnessed recent changes, with the evolution of polytobacco use and the emergence of new classes of tobacco products. Heated tobacco products (HTPs), also referred to as heat-not-burn tobacco, are among the latest products in the market. HTPs heat tobacco through battery-powered heating systems to produce aerosols containing nicotine for users to inhale.^{3–5} There is already a number of HTPs (e.g., IQOS from Philip

Morris International, New York, NY) available in the market in >40 countries, with substantial growth observed in countries in which the products were first introduced (e.g., Japan and Korea).^{3,6–8}

Although the long-term health impact of HTPs is unknown, they have been heralded as a breakthrough innovation that heats tobacco without burning (i.e.,

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heats tobacco up to 350°C, a temperature below combustion levels).⁹ Preliminary evidence suggests that HTPs may have a lower level of harmful constituents than a conventional tobacco cigarette.^{5,10–12} At the same time, studies have shown that HTPs contain similar levels of some harmful components of combustible cigarettes^{5,11–13} and that users of IQOS may be exposed to unexpected organ toxicity that has not been associated with cigarettes.¹⁴ As of January 8, 2020, the U.S. Food and Drug Administration (FDA) has approved 2 HTPs (IQOS and Eclipse) for sale⁴; in addition, the FDA approved the marketing of IQOS as modified risk tobacco products on July 8, 2020.¹⁵

There is only a handful of studies on the awareness and ever use of HTPs in the U.S.^{16–18} In an Internet survey of U.S. adults aged ≥18 years in 2017, Marynak et al.¹⁶ found that approximately 1 in 20 U.S. adults were aware of HTPs, with <1% U.S. adults reporting the use of HTPs. One study using data drawn from GfK's Knowledge Panel found an increase in both HTP awareness and ever use from 2016 to 2017.¹⁷ Elsewhere, Dunbar and colleagues,¹⁸ in a study examining the correlates of awareness and use of HTPs among a sample of U.S. young adults from Southern California, found that about 12% of the respondents were aware of HTPs and that 5% reported a lifetime HTP use in 2018–2019. In the extant literature, some characteristics have been significantly associated with HTP awareness and use, including age, sex, cigarette smoking, and the use of other tobacco-related products.^{6,16–20} Much of the existing U.S. studies come from a regional sample¹⁸ and nonpopulation-based probability survey,¹⁶ which limits generalizability, and most have a limited sample size for certain demographic subgroups. In addition, an updated report on the awareness and use of HTPs is of public health importance given the recent FDA approvals and their newness in the U.S. market. This study examines HTP awareness and ever use among U.S. adults using a nationally representative data set. The factors associated with HTP awareness and use are also reported.

METHODS

Study Sample

The Tobacco Use Supplement to the Current Population Survey (TUS-CPS) is a large household survey among the civilian non-institutionalized population aged ≥16 years in the U.S. TUS-CPS is administered by the Census Bureau and sponsored by the National Cancer Institute. The Current Population Survey (CPS) is a monthly labor force survey interviewing >50,000 households across the country. Since 1992, the TUS-CPS has been conducted every 3–4 years as a supplement to the CPS to assist in monitoring adult tobacco-related behaviors. In 2019, the TUS-CPS asked additional questions about HTPs. For the May 2019 basic CPS,

the household-level response rate was 82.0%. The person-level response rates for the TUS-CPS were 75.7% for the total response (allowing all self-response and proxy responses) and 56.2% for self-response only (counting proxy responses as nonresponses). Survey participants included 43,657 adults aged ≥18 years. In addition, the final 42,477 analytic sample excluded 1,180 respondents who did not respond ($n=504$), refused ($n=562$) to answer, or reported *don't know* ($n=122$) to the questions on awareness and ever use of HTPs.

Measures

The main outcome variables were awareness and ever use of HTPs. The respondents were provided a short description before answering questions about HTPs: *The last few questions are about heated tobacco products. Some people refer to these as "Heat-not-burn" tobacco products. These heat TOBACCO STICKS or CAPSULES to produce a vapor. They are different from e-cigarettes, which heat a LIQUID to produce a vapor. Some brands of heated tobacco products include IQOS and Eclipse.* Survey participants were then asked the following 2 questions: *Before today, have you heard of heated tobacco products?* and *Have you ever tried a heated tobacco product, even just one time?* Awareness of HTP was defined as responses with *yes* to the former question, and *ever use* was defined as response with *yes* to the latter question.

Independent variables included measures of cigarette, E-cigarette, and other tobacco product use and several demographic characteristics. *Cigarette users* were defined as respondents who had used 100 cigarettes in their lifetime and smoked cigarettes some days or every day during the time of the survey. *E-cigarette users* were defined as respondents who had ever used E-cigarettes and then used E-cigarettes some days or every day during the time of the survey. *Other tobacco users* were defined as respondents who had ever used other tobacco products even 1 time (i.e., filtered cigars, cigarillos, traditional cigars, hookah or water pipe, pipes, and smokeless tobacco such as moist snuff, dip, spit, chew tobacco, or snus).

Demographic characteristics included age (18–24, 25–34, 35–44, 45–54, or ≥55 years), sex (male or female), race (non-Hispanic White, non-Hispanic Black, Hispanic, or non-Hispanic other), employment status (full time, part time, unemployed, not in the labor force), educational attainment (some high school or less, high school graduate or GED, some college [no degree] or associate degree, at least bachelor's degree), income (<\$25,000, \$25,000–\$50,000, or >\$50,000), metropolitan status (metropolitan, nonmetropolitan, or not identified), and residential region.

Statistical Analysis

Descriptive statistics, including weighted frequencies and 95% CIs, were calculated for the dependent and independent variables. The prevalence of HTP awareness and use status were reported for the full sample and by subgroups (age, sex, cigarette smoking status, E-cigarette use status, and other tobacco use status). In addition, the proportion of ever use among respondents who were aware of HTPs was reported for the full sample as well as for the subgroups. Multivariable logistic regressions were used to examine the factors associated with HTP awareness and ever use. Analyses adjusted for cigarette, E-cigarette, and other tobacco product use and sociodemographic characteristics (age, sex, race, employment status, income, educational attainment, metropolitan status,

and residential region). AORs and 95% CIs were reported for logistic regression. Sampling weights were used in all analyses to account for the differential probability of sample selection, non-responses, and noncoverage. Detailed survey design methodology can be found on the CPS technical paper.²¹ All tests were 2-sided, and $p < 0.05$ was considered significant. Investigators performed all data analyses using SAS, version 9.4.

RESULTS

Among the 42,477 adults included in the study, 215 were aware of and had tried using HTPs at the time of the survey, 3,453 were aware of but had never tried using HTPs, and the remaining 38,809 were unaware of HTPs. About 46% of the study sample were male, 67% were non-Hispanic White, and approximately 1.8% were aged 18–20 years. In terms of socioeconomic characteristics, more than half of the sample were employed full time and had more than \$50,000 in family income during the previous 12 months. Almost 36% of the sample had at least a bachelor's degree, about 85% lived in metropolitan areas, and 23% were from the West. In addition, approximately 11.2% currently smoked cigarettes, and 2.2% currently used E-cigarettes, whereas 20% had used other tobacco products other than cigarettes, E-cigarettes, and HTPs.

In 2019, approximately 8.6% (95% CI=8.3, 8.9) of U.S. adults were aware of HTPs (Table 2). By age, awareness was lowest among adults aged ≥ 55 years (7.2%, 95% CI=6.8, 7.6) and highest among young adults aged 18–20 years (13.3%, 95% CI=10.4, 16.1) and 21–24 years (12.9%, 95% CI=10.5, 15.3). The prevalence of HTPs awareness was higher for male participants (10.6%, 95% CI=10.1, 11.1) than for female participants (6.9%, 95% CI=6.5, 7.3). HTP awareness was more prevalent among everyday (10%) and some days (8.4%) smokers than among former and never smokers. Likewise, by E-cigarette use status, HTP awareness ranged from 8.4% among never users to 14.6% among everyday users. Results from logistic regressions examining the correlates of HTP awareness are shown in Table 3. The adjusted odds of HTP awareness were significantly higher among participants who were male (AOR=1.54, 95% CI=1.41, 1.68), younger and current cigarette smokers (AOR=1.21, 95% CI=1.07, 1.38), and E-cigarette users (AOR=1.50, 95% CI=1.19, 1.88) than among their reference categories.

Overall, approximately 0.5% (95% CI= 0.4, 0.6) of U.S. adults reported ever use of HTPs (Table 2). The prevalence of ever use of HTPs ranged from 0.3% (95% CI=0.2, 0.4) among adults aged ≥ 55 years to 1.2% (95% CI=0.5, 2.0) among adults aged 18–20 years. Among everyday and some days smokers, ever use of HTPs was 1.6% and 1.5%, respectively. Similarly, ever use of HTPs

Table 1. Study Sample Characteristics From May 2019 TUS-CPS (n=42,477)

Characteristics	Full sample
<i>n</i>	42,477
Age, years	
18–20	1.86 (1.71, 2.02)
21–24	3.11 (2.90, 3.31)
25–34	18.78 (4.33, 19.22)
35–44	16.86 (5.45, 17.27)
45–54	15.24 (6.85, 15.63)
≥ 55	44.16 (7.63, 44.69)
Sex	
Male	46.01 (1.47, 46.55)
Female	53.99 (2.45, 54.53)
Race	
Non-Hispanic White	66.99 (1.46, 67.52)
Non-Hispanic Black	11.76 (2.38, 12.14)
Hispanic	14.06 (3.66, 14.47)
Non-Hispanic other	7.18 (4.89, 7.48)
Employment status	
Full time	50.49 (1.95, 51.04)
Part time	10.20 (2.87, 10.53)
Unemployed	2.04 (3.88, 2.19)
Not in the labor force	37.27 (4.76, 37.79)
Income, \$	
<25,000	19.26 (1.83, 19.69)
25,000–50,000	23.56 (2.10, 24.02)
>50,000	57.18 (3.64, 57.72)
Education attainment	
Some high school or less	9.25 (1.93, 9.57)
High school graduate or GED	26.47 (2.99, 26.95)
Some college or Associate degree	28.89 (3.39, 29.39)
At least a bachelor's degree	35.39 (4.87, 35.92)
Cigarette use ^a	
Yes	11.15 (1.81, 11.49)
No	88.85 (2.51, 89.19)
E-cigarette use ^b	
Yes	2.20 (1.04, 2.36)
No	97.80 (2.64, 97.96)
Other tobacco use ^c	
Yes	20.08 (1.65, 20.51)
No	79.92 (2.49, 80.35)
Awareness and ever use of HTP ^d	
Aware and ever used	0.51 (0.43, 0.59)
Aware but never used	8.28 (7.98, 8.58)
Unaware	91.21 (90.90, 91.52)
Region	
Northeast	16.51 (1.10, 16.91)
Midwest	21.90 (2.45, 22.35)
South	38.45 (3.92, 38.97)
West	23.15 (4.70, 23.59)

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Table 1. Study Sample Characteristics From May 2019 TUS-CPS (n=42,477) (continued)

Characteristics	Full sample
Metropolitan status	
Metropolitan	85.19 (1.84, 85.54)
Nonmetropolitan	13.91 (2.57, 14.25)
Not identified	0.90 (3.81, 0.99)

Note: The weighted frequency and its 95% CI were reported for all categorical variables.

^aCigarette users were defined as respondents who had used 100 cigarettes in their lifetime and smoked cigarettes some days or every day during the time of the survey.

^bE-cigarette users were defined as respondents who had ever used E-cigarettes and now used E-cigarettes some days or every day during the time of the survey.

^cOther tobacco users were defined as respondents who had ever used other tobacco even 1 time (i.e., filtered cigars, cigarillos, traditional cigars, hookah or water pipe, pipes, and smokeless tobacco such as moist snuff, dip, spit, chew tobacco, or snus).

^dEver user was defined as respondents who had heard and ever tried a HTP. Aware but never used was defined as respondents who had heard but never tried a HTPs. Unaware was defined as respondents who had never heard of HTPs.

HTP, heated tobacco product; TUS-CPS, Tobacco Use Supplement to the Current Population Survey.

was higher among E-cigarette users (everyday and smoke days users) and former users than among never E-cigarette users.

Among those who were aware of HTPs, approximately 6% (95% CI=5.0%, 7.0%) reported ever use (Table 2). In terms of demographic characteristics, ever use was more prevalent among those who were aged 21–24 years, male, cigarette smokers, E-cigarette users, and former E-cigarette users. The results of the correlates of ever use of HTPs among the general adult population (Model 1) and among those who were aware of HTPs (Model 2) are reported in Table 4. The odds of ever use were significantly higher for those who were younger, cigarette smokers, E-cigarette users, other tobacco products users, and living in metropolitan areas than for their reference categories.

DISCUSSION

Worldwide, HTPs continue to gain more popularity; they are currently sold in more than 40 countries,^{3,6–8}

Table 2. Awareness and Ever Use of HTPs

Characteristics	Awareness, prevalence (95% CI)	Ever use, prevalence (95% CI)	Ever use, proportion ^a (95% CI)
Overall	8.60 (8.29, 8.91)	0.51 (0.43, 0.59)	5.78 (4.92, 6.64)
Age, years			
18–20	13.28 (10.43, 16.13)	0.96 (0.19, 1.74)	6.97 (1.51, 12.43)
21–24	12.88 (10.51, 15.25)	1.23 (0.46, 2.00)	9.25 (3.66, 14.84)
25–34	9.42 (8.65, 10.20)	0.73 (0.52, 0.95)	7.63 (5.43, 9.83)
35–44	9.28 (8.50, 10.06)	0.60 (0.39, 0.81)	6.33 (4.18, 8.48)
45–54	9.49 (8.66, 10.32)	0.58 (0.37, 0.80)	6.10 (3.95, 8.25)
≥55	7.19 (6.78, 7.59)	0.28 (0.20, 0.36)	3.80 (2.72, 4.88)
Sex			
Male	10.62 (10.12, 11.12)	0.68 (0.54, 0.81)	6.29 (5.07, 7.51)
Female	6.88 (6.51, 7.25)	0.36 (0.28, 0.45)	5.11 (3.92, 6.30)
Cigarette smoking status			
Everyday smoker	10.14 (9.04, 11.24)	1.60 (1.14, 2.06)	15.64 (11.48, 19.80)
Some days smoker	10.13 (7.95, 12.32)	1.45 (0.53, 2.36)	14.27 (5.90, 22.64)
Former smoker	8.38 (8.01, 8.75)	0.27 (0.20, 0.34)	3.18 (2.38, 3.98)
Never smoker	8.49 (7.83, 9.16)	0.71 (0.51, 0.91)	8.37 (6.11, 10.64)
E-cigarette use status			
Everyday user	14.62 (10.93, 18.30)	4.49 (2.27, 6.70)	30.69 (17.92, 43.46)
Some days user	14.39 (10.67, 18.12)	3.49 (1.56, 5.43)	23.40 (11.84, 34.96)
Former user	10.41 (9.01, 11.81)	2.58 (1.83, 3.33)	24.81 (18.52, 31.10)
Never user	8.35 (8.03, 8.66)	0.29 (0.23, 0.35)	3.44 (2.74, 4.13)
Other tobacco use status			
Yes	10.37 (9.63, 11.11)	1.22 (0.95, 1.50)	11.72 (9.23, 14.21)
No	8.15 (7.82, 8.49)	0.33 (0.26, 0.40)	3.92 (3.12, 4.72)

^aProportion was defined as the percentage of respondents who were aware of HTPs and reported ever use of HTP.

HTP, heated tobacco product.

Table 3. Logistic Regression of Factors Associated With Awareness of Heated Tobacco Products

Characteristics	AOR (95% CI)
Age, years	
18–20	1.85 (1.42, 2.41)
21–24	1.75 (1.39, 2.20)
25–34	1.18 (1.05, 1.33)
35–44	1.16 (1.03, 1.31)
45–54	1.14 (1.00, 1.29)
≥55	ref
Sex	
Male	1.54 (1.41, 1.68)
Female	ref
Race	
Non-Hispanic White	ref
Non-Hispanic Black	1.14 (1.00, 1.31)
Hispanic	0.91 (0.79, 1.04)
Non-Hispanic other	0.83 (0.70, 1.99)
Employment status	
Full time	0.81 (0.63, 1.05)
Part time	0.82 (0.62, 1.09)
Unemployed	ref
Not in labor force	0.66 (0.51, 1.86)
Income, \$	
<25,000	ref
25,000–50,000	0.91 (0.79, 1.03)
>50,000	1.03 (0.91, 1.16)
Education attainment	
Some high school or less	ref
High school graduate or GED	0.95 (0.80, 1.12)
Some college or associate degree	1.16 (0.98, 1.37)
At least bachelor's degree	1.15 (0.97, 1.36)
Cigarette smoking status	
Yes	1.21 (1.07, 1.38)
No	ref
E-cigarette use	
Yes	1.50 (1.19, 1.88)
No	ref
Other tobacco use	
Yes	1.04 (0.94, 1.15)
No	ref
Region	
Northeast	0.81 (0.71, 1.92)
Midwest	0.87 (0.77, 1.98)
South	0.94 (0.84, 1.04)
West	ref
Metropolitan status	
Nonmetropolitan	ref
Metropolitan	1.05 (0.94, 1.17)
Not identified	0.50 (0.31, 1.81)

Note: Boldface indicates statistical significance ($p < 0.05$).

The AORs and its 95% CIs were estimated using logistic regression adjusting for all listed respondents' characteristics.

with more sales growth projected.²² HTPs recently entered the U.S. market, and this study examined the awareness and ever use of HTPs among adults. In addition, this paper reports on the sociodemographic correlates of awareness and ever use of HTPs. Awareness of HTPs was about 8.6% among adults, with rates higher for young adults (aged 18–24 years). This finding showed a higher rate of awareness than reported in a previous study from 2017¹⁶; this potentially indicates an increase in awareness between 2017 and 2019. Similarly, an earlier study using online survey data found that from 2016 to 2017, the awareness of HTPs increased from 9.3% to 12.4% among U.S. adults.¹⁷ The higher awareness rate reported by Nyman et al.¹⁷ than in this study may be due to their oversampling of smokers in GfK's Knowledge Panel. Among the countries where HTPs were first introduced, previous studies have reported an increase in awareness.^{6–8} For example, 1 year after the introduction of IQOS (Philip Morris International's brand of HTPs) in the Japanese market, nearly half of the survey respondents were aware of IQOS, and the prevalence of current use increased almost 3-fold between 2 and 3 years after the introduction.^{7,8} Another study among adult cigarette and E-cigarette smokers in Mexico found that 23% of those aged 30–39 years were more likely to be aware of HTPs.²³ In a 2017 web-based cohort survey of people aged 16–19 years from Canada, England, and the U.S., Czoli and colleagues²⁰ found that youth in the U.S. reported the greatest levels of awareness of IQOS among the 3 countries. In keeping with previous research, male participants were more likely to be aware of HTPs than female participants. Awareness of HTPs was markedly higher among E-cigarette users and cigarette smokers, which is consistent with the findings of previous studies.^{16,17,20} One study reported 21.5% HTP awareness among E-cigarette users and 15.9% among cigarette smokers.¹⁷

Ever use of HTPs was uncommon among the general adult population, with about <1 in 100 reporting ever use. Cigarette smokers and E-cigarette users were more likely to have used HTPs, with similar findings reported elsewhere.^{17,20} The higher use of HTPs among E-cigarette users, in part, may be explained by 2 reasons. First, although both products are different (HTPs heat actual tobacco and E-cigarettes heat liquids, including those containing nicotine), they also share the similarity of belonging to a class of battery-powered heating systems that produce an inhaled aerosol.^{3–5} Second, E-cigarette users may be using HTPs to generate higher levels of nicotine because previous studies have observed more nicotine in HTPs than in E-cigarettes.¹¹ It is unknown to what extent the users of HTPs use these products to switch from E-cigarettes and cigarette smoking. A

Table 4. Logistic Regressions of Factors Associated With Ever Use of Heated Tobacco Products

Characteristics	AOR (95% CI)	
	Model 1 ^a	Model 2 ^b
Age, years		
18–20	1.68 (0.78, 3.61)	1.50 (0.48, 4.75)
21–24	1.99 (1.10, 3.61)	2.25 (1.04, 4.90)
25–34	1.37 (0.97, 1.94)	1.87 (1.12, 3.14)
35–44	1.03 (0.70, 1.51)	1.46 (0.85, 2.53)
45–54	1.46 (1.03, 2.08)	1.75 (1.04, 2.94)
≥55	ref	ref
Sex		
Male	1.10 (0.86, 1.40)	0.87 (0.61, 1.25)
Female	ref	ref
Race		
Non-Hispanic White	ref	ref
Non-Hispanic Black	0.77 (0.50, 1.20)	0.63 (0.35, 1.17)
Hispanic	0.97 (0.66, 1.41)	1.15 (0.65, 2.05)
Non-Hispanic other	0.61 (0.34, 1.11)	0.39 (0.16, 0.94)
Employment status		
Full time	0.93 (0.47, 1.83)	1.02 (0.41, 2.50)
Part time	0.92 (0.44, 1.94)	0.96 (0.35, 2.67)
Unemployed	ref	ref
Not in labor force	0.70 (0.34, 1.41)	0.87 (0.34, 2.19)
Income, \$		
<25,000	ref	ref
25,000–50,000	0.96 (0.67, 1.39)	0.87 (0.52, 1.46)
>50,000	0.77 (0.53, 1.11)	0.56 (0.34, 0.92)
Education attainment		
Some high school or less	ref	ref
High school graduate or GED	1.00 (0.62, 1.61)	0.89 (0.46, 1.74)
Some college or associate degree	1.11 (0.68, 1.80)	0.89 (0.46, 1.73)
At least bachelor's degree	1.04 (0.63, 1.70)	0.83 (0.42, 1.65)
Cigarette use		
Yes	2.19 (1.63, 2.94)	2.76 (1.86, 4.11)
No	ref	ref
E-cigarette use		
Yes	2.70 (1.71, 4.25)	3.79 (2.13, 6.75)
No	ref	ref
Other tobacco use		
Yes	1.69 (1.30, 2.20)	2.45 (1.70, 3.53)
No	ref	ref
Region		
Northeast	0.89 (0.62, 1.28)	0.96 (0.54, 1.70)
Midwest	0.72 (0.50, 1.03)	1.04 (0.62, 1.73)
South	0.86 (0.64, 1.16)	0.97 (0.63, 1.49)
West	ref	ref
Metropolitan status		
Nonmetropolitan	ref	ref
Metropolitan	1.50 (1.05, 2.14)	1.73 (1.02, 2.92)
Not identified	1.21 (0.47, 3.11)	2.97 (0.81, 10.81)

Note: Boldface indicates statistical significance ($p < 0.05$).

The AORs and its 95% CIs were estimated using logistic regression adjusting for all listed respondents' characteristics.

^aModel 1 was estimated among all the 42,477 respondents.

^bModel 2 was estimated among 3,668 respondents who were aware of heated tobacco products.

previous study found that the introduction of IQOS in Japan coincided with a reduction in cigarette sales in Japan,²⁴ which indicates that HTPs may have led to a decrease in combustible cigarette sales. Conversely, another study among Korean adults suggests that HTPs are not a substitute for cigarettes but rather complements.²⁵ More research is needed to determine the relationships between HTPs and cigarette use patterns, including possible heterogeneous relationships because HTPs may be a substitute or complement depending on smokers' characteristics.

The FDA's recent approval of the marketing of IQOS as modified risk tobacco products¹⁵ will likely make HTPs more popular as the products permeate retail outlets. Although the long-term health effects are mainly unknown, from a harm reduction perspective, HTPs may offer reduced risk to the extent that people permanently switch from combustible products.²⁴ It also remains unknown whether these products will lead to an uptake in smoking, including an appeal to nonsmokers.^{6,19,26} Similar to some evidence in the E-cigarette literature,^{27–30} HTPs could contribute to the evolution of dual or polytobacco products users.^{25,31,32} Another area of potential concern is the availability of the products to underage youth.²⁷ A strict regulatory environment, including limiting product marketing targeted at youth coupled with an effective enforcement strategy, will be needed to prevent uptake of HTPs among underage teens.^{30–32}

Limitations

There are several limitations to this study that are worth noting. First, the survey is based on self-reported data, which may be subject to reporting bias. Second, causal inference cannot be determined on the basis of the analytical design. Future studies should examine the relationship between HTPs and cigarette or E-cigarette use behaviors using longitudinal data. Third, this study did not examine additional characteristics that may influence purchasing or use, including flavors and price. In addition, the authors were unable to assess the frequency of HTP use because this information is not available in TUS-CPS. Analyzing the frequency of HTP use would provide additional insights to inform policy and prevention efforts. Finally, although the survey question clearly states that HTPs are different from E-cigarettes, there is still potential misclassification of HTPs given the limited availability of HTPs in the U.S. market.³³

CONCLUSIONS

Data on HTP awareness and use from population-based probability surveys are limited in the extant literature.

Using data from a population-based probability survey, TUS-CPS, this study reports important baseline estimates of HTP awareness and use among U.S. adults before the FDA's approval of the marketing of IQOS as modified risk tobacco products. As the landscape of tobacco products continues to evolve in a changing regulatory environment, ongoing monitoring of HTP patterns of use and associated long-term health consequences will be of critical public health importance for informing future decision making.

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