

HEATED TOBACCO PRODUCTS: Evidence



Heated tobacco products (HTPs) are tobacco products that require the use of an electronic device to heat a stick or plug of compressed tobacco. The stick (by definition, a cigarette) or tobacco pod is heated to a temperature high enough to produce an inhalable aerosol. HTP systems are fully integrated so that the heating device and heated cigarettes or pods for each system must be used together.



HTP Use

HTPs are relatively new to the consumer market, so data on use are limited.

YOUTH

- In Romania in 2017, 3.1% of youth, 3.8% of boys and 2.3% of girls, (age 13-15) were currently using HTPs.¹
- In Taiwan, a survey conducted in 2018 found that 2.33% of adolescents (age 12-18) were using IQOS, the HTP produced by Philip Morris International.²

ADULTS

- In the Republic of Korea, a survey conducted in 2018, one year after HTPs were first introduced to the market, found that 4.4% of adults were current HTP users, 7.8% of men and 0.9% of women.³

- In Japan, where HTPs were introduced in phases between 2014 and 2016, current use of the products has risen considerably from 0.2% of adults (age 15-69) in 2015 to 11.3% in 2019. Current use in 2019 was highest among men (17.2%) and young adults (17.0% of adults in their twenties, 15.2% of adults in their thirties).⁴
- HTPs were introduced in Kazakhstan with the launch of IQOS in late 2016. In 2019, 1.0% of adults (age 15 and over,) 1.4% of men and 0.6% of women, were current heated tobacco product users.⁵

Dual Use of HTPs and Conventional Cigarettes

Dual use of HTPs and conventional cigarettes has been documented in several countries. Dual use is concerning because HTP users who also smoke increase their exposure to the harmful chemicals contained in tobacco products.

- In the Republic of Korea, where HTPs were first introduced in early 2017 and quickly became popular, several surveys conducted in 2018 documented high rates of dual use:
 - A survey of 21,100 adults (age 19 and older) in one province of the Republic of Korea found that 96.25% of current HTP users were also current smokers of conventional cigarettes.⁶
 - A national survey of 6,182 adults (age 19 and older) found that 90% of current HTP users were also currently smoking, using e-cigarettes, or both.³
- In Japan, a 2018 survey of 4,684 adults (age 15- 69) also found high rates of dual use – 67.8% of HTP users were also current smokers of conventional cigarettes.⁷



HTPs and Potential Reductions in Cigarette Use

Evidence is still emerging as to whether HTP use leads to a reduction in smoking.

- IQOS was introduced in Japan in regional phases over two years (2014-2016). A sales-based study found that cigarette sales declined substantially as IQOS was introduced across the 11 regions of the country.⁸
- However, other researchers have investigated patterns in dual use and intention to quit to conclude that HTPs are complements, rather than substitutes for cigarette use.
 - In Japan in 2018, 93.9% of all concurrent users of cigarettes and HTPs smoked every day, about half of whom (48.4% of the sample) both smoked and used HTPs daily. This suggests that HTP use is not connected with reduced cigarette smoking among dual users.⁹
 - Several studies report that dual users of HTPs and conventional cigarettes in Japan were not any more likely to intend to quit or to attempt to quit smoking than exclusive smokers.^{3, 4, 6, 9, 10}

HTP Emissions and Potential Health Risks

The short and long term-health effects of HTP use and exposure are still unknown. However, there is large body of evidence about the health risks associated with the chemicals found in cigarette smoke. Many of these chemicals are also found in HTP emissions, and their effects in cigarette smoke can be used to predict the potential health impacts of HTPs (see table).¹¹⁻¹⁹ So far, all independent research has been conducted using Philip Morris International’s IQOS and British American Tobacco’s glo.

- Exposure to various carbonyl compounds has a range of adverse health effects; many, like formaldehyde and acetaldehyde, are carcinogenic and can render the lungs more susceptible to infection.²¹ Other carbonyls like acrolein contribute to plaque build-up in blood vessels as well as blood clot formation, increasing the risk of heart disease and stroke. Acrolein exposure also damages the lungs’ ability to fight infections.²¹
- Volatile organic compounds like benzene, toluene, and isoprene are also harmful when inhaled; many cause cancer, some also effect the respiratory, cardiovascular, and reproductive systems.²⁰
- Exposure to tobacco-specific nitrosamines is linked to cancers of the lung, nose, esophagus, liver, pancreas, and cervix.²⁰
- Exposure to carbon monoxide reduces oxygen delivery to the heart and other tissues, which over time increases the risk of blood clots, heart disease and stroke. These cardiovascular effects can negatively affect fetal development during pregnancy.²¹
- Nicotine is a highly addictive chemical and exposure to nicotine may also increase risk of cardiovascular disease. During pregnancy, nicotine exposure negatively affects maternal and fetal health, contributing to preterm delivery and stillbirth. Nicotine exposure during fetal development and adolescence has lasting negative consequences for brain development.²¹

Chemicals Present in HTP Emissions	Examples	Potential Health Effects ²⁰
Carbonyls ^{11, 14, 16, 17, 18, 19}	Acetaldehyde	Cancer, respiratory disease
	Formaldehyde	Cancer, respiratory disease
	Acrolein	Respiratory disease, cardiovascular disease
Other Volatile Organic Compounds ^{11, 14, 17}	Benzene	Cancer, cardiovascular disease, adverse reproductive and developmental outcomes
	Isoprene	Cancer
	Toluene	Respiratory disease, adverse reproductive and developmental outcomes
Tobacco-Specific Nitrosamines (TSNAs) ^{12, 13, 14, 15, 17}	NNN, NNK, NAB, NAT	Cancer
Carbon Monoxide ^{11, 12, 17}		Adverse reproductive and developmental outcomes, cardiovascular disease ²¹
Nicotine ^{11, 12, 14, 17, 18}		Addiction, adverse reproductive and developmental outcomes, cardiovascular disease ²¹

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Preliminary Clinical Evidence

- Laboratory studies examining the effects of exposure to IQOS emissions found evidence of cell poisoning and inflammation in lung cells which could lead to lung damage.²²
 - At least two reported cases of acute eosinophilic pneumonia have been attributed to use of HTPs.^{23,24}
- Another laboratory study found that exposure to IQOS emissions impaired cardiovascular function.²⁵
- Still others suggest that HTP use may compromise the immune system function²⁶ and increase susceptibility to bacterial infection.²⁷
- One study examining the effects of IQOS found evidence of liver poisoning; a health impact not previously associated with conventional cigarette use.²⁸

PMI markets IQOS as a non-combustible tobacco product; however, there is evidence of pyrolysis, a critical step in combustion, during its use.^{11,16,29} Regardless of the technical term used to describe what happens during the use of IQOS, it is clear that IQOS emissions contain nicotine, carcinogens, and many other dangerous chemicals.



Key Messages

- Heated tobacco products carry serious health risks.
- More research is needed to understand better the specific health harms caused by heated tobacco products.
- Governments should consider banning heated tobacco products or applying tobacco control provisions to both the heated cigarettes and the heating devices that are fully compliant with WHO Framework Convention on Tobacco Control.

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