



## KEYNOTES AND RESOURCES

### Episode 101 – Tobacco Use and Cessation

January 26, 2024

#### Introduction

Tobacco use is a major preventable cause of premature death and disease globally. It is estimated more than 8 million individuals die each year due to tobacco-related illnesses, costing the global economy USD \$1.4 trillion annually in health expenditures and productivity losses. More than 7 million of those deaths are the result of direct tobacco use, while approximately 1.3 million are the result of nonsmokers exposed to secondhand smoke. About 80% of the world's tobacco users live in low- and middle-income countries, where the burden of tobacco-related illness and death is heaviest. Tobacco use contributes to poverty by diverting household spending from basic needs such as food and shelter to tobacco. This spending behaviour is challenging to curb because nicotine in tobacco is highly addictive. [1] [2] [3]

Tobacco use is a major risk factor for cardiovascular and respiratory diseases and over 20 different types or subtypes of cancer, including lung, bladder, kidney, cervix, pancreas, esophagus, stomach, pharynx, larynx, and oral cancer, as well as many other debilitating health conditions. [4] [5]

According to the latest global estimates by the World Health Organization (WHO), 1.25 billion individuals aged  $\geq 15$  years used tobacco in 2022 versus 1.36 billion in 2000. This steady decline in tobacco use rates occurred despite tobacco industry efforts to jeopardize progress in reducing tobacco use [6]. [6] [7]

Furthermore, 150 countries successfully reduced tobacco use. However, in some countries, the prevalence of tobacco use changed little since 2010, while other countries are still seeing tobacco use rising. Country surveys consistently show children aged 13-15 years in most countries are using tobacco and nicotine products. [6]

#### Tobacco plants

Nicotine is naturally present in the tobacco plant. It is a toxin that evolved as the tobacco plant's natural defense against insects and animals. Thus, any product containing tobacco will contain nicotine. Laboratories can also produce nicotine synthetically.

The tobacco plant also contains harmful chemicals such as cadmium and lead. Cadmium, lead, and other chemicals are often found in the soil where tobacco plants grow. These chemicals accumulate in the plant. Other toxic chemicals form in tobacco leaves during the curing process (e.g., tobacco-specific nitrosamines) or are added

during manufacturing (e.g., ammonia to increase nicotine absorption). Sugar and flavourings may be added to mask the harshness of the smoke. These additives form cancer-causing chemicals when they are burned. Altogether, tobacco and tobacco smoke contain more than 7,000 chemicals. This mix of chemicals can cause serious disease, disability, and death in tobacco users. [8] [9] [10]

### **Types of tobacco products**

All forms of tobacco are harmful, and there is no safe level of exposure. Cigarette smoking is the most common form of tobacco use worldwide. Other tobacco products include waterpipe tobacco, cigars, roll-your-own tobacco, pipe tobacco, bidis, kreteks, heated tobacco, and smokeless tobacco products. [3]

#### Waterpipe

Water pipes or hookahs are used to smoke specially made tobacco that comes in different flavours (e.g., apple, mint, cherry, chocolate, coconut, licorice, cappuccino, watermelon). Waterpipes vary in size, shape, and style. Other names for waterpipes include narghile, argileh, shisha, hubble-bubble, and goza.

Waterpipes usually work by passing charcoal-heated air through the tobacco mixture and ultimately through a water-filled chamber. The user then inhales the smoke from the heated tobacco through a tube and mouthpiece. The water in the waterpipe cools the smoke. However, it does not filter out the toxins in the smoke. Waterpipe smoking is typically done in groups, with the same mouthpiece passed from person to person, increasing the risk of infectious disease transmission (e.g., tuberculosis, herpes, hepatitis, influenza, COVID-19).

Waterpipe users often perceive it to be less harmful than smoking cigarettes. However, studies show waterpipe smoke contains many of the same toxic components found in cigarette smoke (e.g., nicotine, tar, heavy metals). Heat sources used to burn the tobacco release other dangerous substances (e.g., carbon monoxide). Waterpipes are not a safe alternative to cigarette smoking. Waterpipe smokers may breathe in more tobacco smoke than cigarette smokers do because one waterpipe smoking session can last an hour or longer.

Newer electronic hookahs, called e-hookahs, are vaping devices that use a battery to heat a liquid into a vapour, which users breathe in. The liquid can come with or without nicotine and flavours. Research into the health effects of e-hookahs is still early. But the use of vaping devices, including e-hookahs, is not safe for most people. [11] [12] [13]

#### Cigars

Cigars are tobacco products consisting of tobacco wrapped in leaf tobacco or in a paper wrapper that contains tobacco. Cigars differ from cigarettes, which are wrapped in paper that does not contain tobacco. Three major types of cigars are large cigars, cigarillos, and little cigars. All three are sold in many flavours (e.g., fruit flavours, chocolate, menthol, alcohol). The addictive, toxic, and carcinogenic constituents of cigar tobacco and cigar smoke are the same as those found in cigarette smoke.

- Traditional large cigars contain at least 14 grams of aged, fermented tobacco (as much as an entire pack of cigarettes) and take about one to two hours to smoke.
- Cigarillos are short (7.5-10cm) and narrow cigars, typically containing about three grams of tobacco. They may come with wood or plastic tip filters or without filters.
- Little cigars are typically the same size and shape as cigarettes, often include a filter, and are packaged similarly to cigarettes. [14] [15] [16]

#### Bidis and kreteks

- Bidis are small, thin, hand-rolled cigarettes comprised of tobacco wrapped in a tendu or temburni leaf (plants native to Asia). They may be secured with a colourful string at one or both ends. Bidis can be flavoured (e.g., chocolate, cherry, mango) or unflavoured.
- Kreteks (or clove cigarettes) contain a mixture of tobacco, cloves, and other additives.
- Bidis and kreteks have higher concentrations of nicotine, tar, and carbon monoxide than conventional cigarettes. Neither are safe alternatives to conventional cigarettes. [17]

#### Smokeless tobacco

Smokeless tobacco products include tobacco that is chewed, sucked, or sniffed rather than smoked. They can be spit or swallowed depending on the product. Smokeless tobacco, although not combustible, contains a mix of 4,000 chemicals, including as many as 30 or more that are linked to cancer (e.g., heavy metals: cadmium, lead, nickel, arsenic). Like all tobacco products, smokeless tobacco contains nicotine, which can lead to addiction.

Many types of smokeless tobacco products exist, including chewing tobacco, snuff, snus, dissolvable tobacco, betel quid with tobacco, gutkha, khaini, and zarda.

- Chewing tobacco (also called chew, spitting tobacco, or spit) is sold as loose leaves, braided leaves (also called a twist), or compressed leaves (also called a plug) and may be flavoured. Users place it between the buccal mucosa and gingiva. The buildup of saliva is either spit out or swallowed.
- Snuff is finely ground tobacco that may be moist or dry. It is packaged in tins or pouches and may be flavoured. Users place a pinch or “dip” of snuff between the buccal mucosa and gingiva. Using snuff is also called dipping. Dry snuff can be inhaled through the nose.
- Snus is a type of moist snuff sold loose or in pouches resembling small tea bags. The pouch is held between the buccal mucosa and gingiva. It is marketed as spitless and is available in flavours (e.g., menthol, spice, alcohol, fruit, candy).
- Dissolvable tobacco products are powdered tobacco pressed into shapes, such as tablets, sticks, or strips. Some contain sweeteners or flavouring and may resemble candy or mints, toothpicks, or breath strips. It is chewed or held in the mouth until it dissolves. It is marketed as spitless.

- Betel quid with tobacco, commonly known as paan or pan, consists of four main ingredients: betel leaf, areca (betel) nut,<sup>1</sup> slaked lime, and tobacco. The product is chewed.
- Gutkha consists of sun-dried, roasted, finely chopped tobacco, areca nut, slaked lime, and catechu (extract of acacia trees) mixed with several other ingredients such as flavourings and sweeteners. The product is sold in small packets or sachets. It is held in the mouth, sucked, and chewed.
- Khaini is made from sun-dried or fermented coarsely cut tobacco leaves mixed with slaked lime. It is held in the mouth and sucked or chewed. Areca nut may sometimes be added to khaini by the user.
- Zarda consists of tobacco, lime, spices, and vegetable dyes. It is generally chewed mixed with finely chopped areca nuts and spices.

The flavours (e.g., berry, vanilla, apple) and the candy-like appearance of some smokeless tobacco products make them attractive to children and youth. Eating these products can cause nicotine poisoning. Nicotine poisoning in children can cause nausea, vomiting, weakness, shaking, coma, trouble breathing, and even death. [9] [10] [18] [19] [20]

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<sup>1</sup> Areca (betel) nut chewing is a significant risk factor for oral cancer, with risk increasing in a dose-response manner. Oral leukoplakia and oral submucous fibrosis are the main potentially malignant disorders caused by areca nut chewing that can progress to oral cancer with continued use. [60] Refer to Episode 76 for more information on oral potentially malignant disorders.

## Types of smokeless tobacco [19] [20]

Type	Ingredients	Mode of use	Mainly used in	Prevalence
Betel quid with tobacco (paan, pan)	Tobacco, betel leaf, areca (betel) nut, slaked lime, catechu (extract of acacia trees), other flavouring agents (e.g., menthol, camphor, sugar, rosewater, aniseed, cardamom, clove, mint, spices)	Chewed	Central, East, South, and South-East Asia, western pacific and migrant communities from these regions.	More common in rural areas; older females
<b>Chewing tobacco</b>				
Braided chewing tobacco (twist, chew, chaw)	Tobacco, tobacco leaf extract, sometimes sweetener or flavourings	Chewed or held between buccal mucosa and gingiva	United States	More common in males
Loose leaf chewing tobacco	Small strips of shredded tobacco, flavoured with licorice and sugar	Chewed or held between buccal mucosa and gingiva	Europe, United States	More common in males.
Loose leaf (sada pata, chadha, tobacco leaf)	Air cured loose tobacco leaf mixed with slaked lime	Chewed, held in the mouth Added to betel quid	India, Bangladesh, Bhutan, Myanmar	More common in people with lower socioeconomic status
Plug chewing tobacco (spit tobacco, chew, chaw)	Compressed tobacco leaves, often licorice and sugar added	Chewed or held between buccal mucosa and gingiva	United States	More common in males
Chimó	Tobacco leaf, sodium bicarbonate, brown sugar, mamon tree ashes, vanilla and anisette flavouring	Placed between buccal mucosa and gingiva; left for usually 30 minutes	Venezuela, Colombia	More common in males
Dissolvable tobacco	Powdered tobacco, humectants, preservatives, flavours, pressed into tablets, sticks, or strips	Chewed or held in mouth until dissolved	United States	New to the market
Dhora	Wet mixture of tobacco, slaked lime, areca nut, other ingredients (e.g., catechu, peppermint, cardamom)	Chewed, sucked	India	More common in males
Gudhaku	Paste made of powdered tobacco, molasses (sheera), lime, gerumati (red soil)	Rubbed over teeth and gingiva with fingertip for 10-15 minutes Some swallow the product, others spit it out	India	More common in females in rural areas

Type	Ingredients	Mode of use	Mainly used in	Prevalence
Gul	Powdered tobacco, molasses, other ingredients	Applied on teeth and gingiva as dentifrice	India, Bangladesh	More common in females
Guthka	Sun-dried, roasted, finely chopped tobacco, areca nut, slaked lime, catechu, flavourings, sweeteners	Sucked, chewed	India, people from India living in Canada, United Kingdom, United States	More common in males
Iq'mik (Iqmik, black bull, dediguss)	Tobacco, tree fungus ash (punk ash) or other ash from burning driftwood, alder bush or willow bush	Users may prechew iq'mik and place in a small box for later use or to share with others, including children and teething infants	United States (Alaska)	Used by all ages, including youth and pregnant individuals. Believed to relieve infant teething pain
Khaini	Sun-dried or fermented coarsely cut tobacco leaves, slaked lime. Areca nut sometimes added by user	Held in mouth between buccal mucosa and gingiva; sucked slowly for 10-15 minutes, or chewed. Sometimes left overnight	India, Nepal, Bangladesh	Most popular smokeless tobacco product in India; more common in males
Kharra	Tobacco, areca nut, lime, catechu, other ingredients	Held in mouth, sucked, chewed	India	More common in adolescent males
Khiwam (kiwam, qimam)	Thick paste of tobacco leaf extract, spices (e.g., saffron, cardamom, aniseed), additives (e.g., musk)	Chewed or added to betel quid	South Asia, mainly India, Pakistan, Bangladesh	More common in people with higher socioeconomic status
Mainpuri (kapoori)	Finely cut betel nut, small pieces of tobacco leaves treated in slaked lime, flavourings (e.g., powdered cloves, cardamom, Kewara [extract from a fragrant flower], sandalwood powder). Sometimes catechu used	Held in mouth, chewed, sucked	India, Pakistan	More common in people aged ≥35 years
Mawa	Thin areca nut shavings, tobacco flakes, slaked lime	Chewed for 10-20 minutes	India	Common in young males
Mishri	Roasted and powdered tobacco	Applied to teeth and gingiva using a finger; used as a dentifrice	India	More common in females and people with lower socioeconomic status

Type	Ingredients	Mode of use	Mainly used in	Prevalence
Naswar (nass, niswar, nasvay)	Sun-dried tobacco, ash, cotton or sesame oil, water flavouring (e.g. cardamom, menthol), colouring (e.g., indigo) and, in some areas, slaked lime	Rolled into a ball and placed under tongue or in buccal vestibule. Sucked for 10-15 minutes	Afghanistan, Pakistan, Iran, United Arab Emirates, South Africa, Turkmenistan, Kyrgyzstan, Uzbekistan	More common in males aged 15-60 years
Rapé	Dried tobacco leaf, flavourings (e.g., tonka bean, clove, cinnamon powder, camphor, ashes of select trees)	Inhaled nasally	Brazil	Used in rural areas and small towns. Has cultural significance
Red tooth powder (red tooth paste, lal dantamanjan)	Fine red tobacco powder, herbs, flavourings. Ginger, pepper, camphor may be added	Used as a dentifrice to clean teeth	India	Used by males and females of all age groups
Shammah (el-shama, chemma, al-shammah)	Powdered tobacco, slaked lime, ash, black pepper, oil, flavourings, bombosa (sodium carbonate)	Held in the mouth, chewed	Saudi Arabia, Yemen, Algeria	Used by males and females Use increases with age
<b>Snuff</b>				
Creamy snuff	Commercially manufactured paste consisting of finely grounded tobacco, clove oil, glycerin, spearmint, menthol, camphor, salts, water, other hydrating agents	Rubbed on gingiva and teeth with finger or toothbrush for 3-4 minutes Marketed as a dentifrice	India	More common in children aged 13-15 years and adult females
Dry snuff (tapkeer, tapkir, bazaar)	Dry powdered tobacco available plain, menthol, and scented	Held between buccal mucosa and gingiva, or inhaled nasally	United States, Europe, India	More common in adolescent males and older females in rural areas in India
Ghana traditional snuff (tawa)	Dried tobacco leaf, chemicals (e.g., potassium nitrate) ground into a fine powder	Held in the mouth or inhaled nasally	Africa (Ghana)	More common in the youth
Moist snuff	Finely ground or strips of tobacco, flavourings, inorganic salts, humectants. Sold loose or prepackaged in small sachets.	Pinch (dip) or sachet held between buccal mucosa and gingiva for about 30 minutes	United States, Canada, Mexico, South Africa, Europe	More common in males

Type	Ingredients	Mode of use	Mainly used in	Prevalence
Neffa (tenfeha, nufha, naffa)	Type of dry snuff	Held in the mouth or inhaled nasally	Northern Africa (Tunisia, Libya, Algeria, Morocco)	More common in males
Snus	Small packages of tobacco, moisturizers, sodium carbonate, salt, sweeteners, flavouring	Held in the mouth for about 30 minutes	Sweden, Norway, Iceland, Finland, Denmark, United States, Canada, Brazil, South Africa	More common in males and adolescents
Taaba	Dry fermented tobacco, natron (atron), a naturally occurring mixture of sodium bicarbonate and sodium chloride	Held in the mouth or inhaled nasally	West Africa (Northern Nigeria, Cameroon, Senegal, Uganda, Chad)	More common in males
Tambakoo	Finely or coarsely shredded tobacco leaves	Chewed or sucked	India	Used by both males and females
Tobacco chewing gum	Chewing gum that contains tobacco	Chewed	Japan	Not available
Tombol	Tobacco, areca nut, noura, slaked lime, catechu, tombol leaf, powdered khat, other flavourings	Held in the mouth	Yemen	Not available
Toombak (saute, sute, ammari, saood)	Tobacco, sodium bicarbonate, water	Rolled into a ball and held between buccal mucosa and gingiva or under the tongue	Sudan, Chad	More common in males
Tuibur (tobacco water, hidakphu)	Tobacco smoke-infused water	Sipped, gargled or kept in mouth for 5-10 minutes, then spit out	India	More common in females Integrated with social and cultural rituals
Zarda (vizappatta, ZafraniZarda when flavoured with saffron)	Flavoured chewing tobacco flakes, aromatic spices, menthol, herbs, fragrances, saffron, raw kiwam, silver flakes, sandalwood oil. Lime provided separately by the manufacture	Used in betel quid, chewed alone or mixed with lime or areca nut	India, Bangladesh, Pakistan, Nepal, Myanmar	More common in males and females with higher socioeconomic status

Heated tobacco products (HTP) contain tobacco and produce aerosols containing nicotine and toxic chemicals upon heating the tobacco or by activating a device containing the tobacco. They contain nicotine and nontobacco additives and are often flavoured.

Despite claims of “risk reduction”, there is no evidence HTP are less harmful than conventional tobacco products. Many toxicants found in tobacco smoke are at significantly lower levels in HTP aerosol. However, HTP aerosol contains other toxicants, sometimes at higher levels than tobacco smoke (e.g., glycidol, pyridine, dimethyl trisulfide, acetoin, methylglyoxal).

Further, some toxicants found in HTP aerosols are not found in conventional cigarette smoke and may have detrimental health effects. Additionally, these products are highly variable, and some of the toxicants found in the emissions of these products are carcinogens. The long-term impact of HTP is currently not known. [3]

E-cigarettes do not contain tobacco and may or may not contain nicotine, and pose safety and health concerns. However, it is too early to know the long-term impact of e-cigarette use.<sup>2</sup> [4]

Nicotine pouches do not contain tobacco. They are pre-portioned pouches containing white nicotine powder and are placed between the buccal mucosa and gingiva to provide a source of nicotine. The pouches also generally contain plant fibres, flavourings, and sweeteners and do not require refrigeration. Users dissolve in the mouth without spitting. They are promoted as “tobacco-free” and often referred to as “white pouches.”

Nicotine pouches may appeal to youth and nonsmokers, as they are often sold in a variety of fruit flavours, in attractive packaging, and can be used discreetly (more so than e-cigarettes). For example, in 2023, about one of every 100 US high school students reported using nicotine pouches in the past 30 days. [21]

Nicotine pouches are a relatively new product that began to predominately be sold in Europe, the US, and Japan from around 2019. They are becoming increasingly popular as the tobacco industry continues to invest in, develop, and market nicotine products to secure their profits.

In the US, these products are classified as tobacco products. Some countries regulate them as a form of nicotine replacement therapy (NRT), some have no specific regulations, and others have banned the sale of the product. Health Canada approved the sale of the flavoured nicotine pouch Zonnic by Imperial Tobacco in October 2023. It is licensed as a Natural Health Product and is authorized by Health Canada for use as a form of NRT.<sup>3</sup>

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<sup>2</sup> Refer to Episode 19 for discussion on e-cigarettes and vaping.

<sup>3</sup> The introduction of nicotine pouches to the Canadian market has raised concerns among health experts, who are urging prompt regulation due to the legal availability of these products to children. Because these products are classified as a natural health product, they do not have a minimum advertising age, so there

Nicotine pouches are likely to be a substantially 'lower-risk product' relative to tobacco smoking due to their lack of combustion and absence of tobacco. However, there is currently a lack of evidence to evaluate the health effects of these products. The oral health effects of nicotine pouches are not yet known. However, the oral effects may be similar to other orally administered nicotine products (e.g., mouth irritation and sores). [3] [22] [23] [24] [25] [26] [27]

### **Secondhand smoke**

Secondhand smoke is the smoke that fills enclosed spaces when people burn tobacco products (e.g., cigarettes, bidis, waterpipes, etc.). Research has clearly shown secondhand smoke causes many health problems, including cancer, cardiovascular and respiratory diseases, and premature death. Nearly half of all children breathe air polluted by tobacco smoke, and 65,000 children die each year due to illnesses related to secondhand smoke. Among newborns exposed either in utero or after birth, there is an increased risk of premature birth and low birth weight and a doubling of the risk for sudden infant death syndrome. There is no safe level of exposure to secondhand tobacco smoke. Only a quarter of the world's population living in 74 countries is protected by comprehensive national smoke-free laws. Creating smoke-free indoor public places through smoke-free legislation is popular wherever enacted, and these laws do not harm business. [3] [4] [28]

### **Thirdhand smoke**

Thirdhand smoke is the chemical residue left on surfaces where tobacco smoking has occurred. These chemicals include nicotine and cancer-causing substances (e.g., formaldehyde, naphthalene). Thirdhand smoke can persist long after the smoke is cleared from the environment. It can become embedded in most soft surfaces (e.g., clothing, furniture, drapes, bedding, carpets, toys). It also settles as dust-like particles on hard surfaces (e.g., walls, floors, vehicles). Thirdhand smoke can remain for many months, even after smoking has stopped. Thirdhand smoke cannot be eliminated by airing out rooms, opening windows, using fans or air conditioners, or confining smoking to only certain areas of a home. Traditional household cleaning often cannot effectively remove thirdhand smoke from many surfaces.

Individuals are exposed to the chemicals in thirdhand smoke when they touch contaminated surfaces or breathe in the gases released by thirdhand smoke. Infants and young children are at greater risk for exposure to thirdhand smoke due to activities such as crawling and putting non-food items in their mouths. They also tend to spend more time indoors. More research is needed on the risks posed by thirdhand smoke since the effects from long-term exposure to the toxins in thirdhand smoke are not as well studied as secondhand smoke. [29] [30] [31]

### **Tobacco industry**

The tobacco industry invests enormous amounts of money in lobbying against tobacco control policies and funds organizations that promote its interests. The tobacco industry tries to interfere with countries' right to protect people's health by taking governments to

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is no legal restriction on where and to whom these products can be sold (only Quebec restricts sales to pharmacies). [61]

court or offering financial and in-kind incentives to be able to influence tobacco control policies.

The tobacco industry also relentlessly markets its products to vulnerable groups, especially young people. With half of all tobacco users dying prematurely, the maintenance of the tobacco and nicotine market relies heavily on recruiting new, young users, and tobacco companies employ multiple tactics to gain the trust and interest of young people at an early age.

Menthol and flavoured cigarettes and candy-flavored e-cigarettes with eye-catching designs have further contributed to the popularization of these products among the young generation, all while leaving many consumers largely unaware of the detrimental effects on their health. [32]

The tobacco industry has been found to have misrepresented the risk of tobacco to the public for decades, even insisting smoking does not cause lung cancer. In the 1950s, extensive studies from the UK and the US linked smoking as a likely cause of lung cancer. The tobacco industry responded to reassure existing and potential customers. In 1954, US tobacco companies released the “Frank Statement to Cigarette Smokers” that denied the link to cancer and sought to cast doubt on the independent studies’ findings, stating there was no proof cigarette smoking was one of the causes. However, research suggests tobacco companies knew by the mid-1950s that their products were addictive and linked to cancer. [33]

Today, it is known tobacco causes 25% of all cancers and kills millions of individuals each year. Nevertheless the tobacco industry persists in marketing what they call ‘new’ and ‘safer’ products (e.g., heated tobacco products) that are known to be harmful to health while still producing trillions of cigarettes each year.

The tobacco industry’s ongoing tactics to influence and interfere with health policies and lie to the public include:

- Supporting corporate social responsibility initiatives and saying they are ‘sustainable’ while their products pollute the environment.
- Funding scientists or third parties to produce biased research.
- Financing front groups to lobby against tobacco control policies.
- Paying for social media influencers and event sponsorships.
- Hiring legal teams to litigate, challenge, and delay tobacco regulations.
- Financially supporting activist groups to rally against tobacco policies. [32] [34]

These tobacco tactics inflict immeasurable harm on public health. Moreover, the production and use of tobacco and nicotine products have a cascading damaging effect on other critical issues, such as child labour, mental health, and the environment, mental health. The WHO urges countries to continue to put in place tobacco control policies and to fight against tobacco industry interference. [6]

## General health risks of tobacco use

Individuals who smoke are at an increased risk of:

- Cardiovascular disease, including coronary artery disease, stroke, atherosclerosis, and hypertension.
- Respiratory infections (e.g., pneumonia) and chronic obstructive pulmonary disease (COPD), such as chronic bronchitis and emphysema.
- Eye disease (e.g., age-related macular degeneration), diabetes, and rheumatoid arthritis.
- Preterm birth, stillbirth, birth defects, and infertility. Smoking can also be associated with erectile dysfunction.
- Certain types of cancer, including lung, liver, colon, and oral cancer.
- Premature death. [35] [36]

## Tobacco and oral health

- Tobacco smoking can lead to a variety of adverse oral effects, including gingival recession, impaired healing following periodontal therapy, oral cancer, oral leukoplakia, nicotine stomatitis<sup>4</sup> (smokers palate), smoker's melanosis,<sup>5</sup> periodontal disease, tooth staining, halitosis, tooth loss, and implant failure. A recent systematic review and meta-analysis by Mustapha et al. (2022) found a 140% increased risk of implant failure in smokers than in nonsmokers. [37]
- Smokeless tobacco use is associated with increased risks of oral cancer, oral leukoplakia, gingival keratosis, tooth staining, halitosis; dental erosion, attrition, and abrasion; gingival recession, alveolar bone damage, periodontal disease, coronal or root surface dental caries due to sugars added to the product, and tooth loss.
- Exposure to secondhand smoke is associated with periodontal disease, tooth loss, early childhood dental caries, and gingival pigmentation in children.
- Sugar and irritants in smokeless tobacco products can cause dental caries, dental abrasion, and attrition. [10] [18] [38]

Leite et al. (2022) investigated the influence of different levels of smoking on periodontal healing for 12 months after nonsurgical periodontal therapy and supportive periodontal care every three months. The study revealed heavy smokers with severe periodontitis obtained no benefit from periodontal therapy. Heavy smokers with moderate periodontitis only had a 50% effect from therapy, compared to smokers who consumed less tobacco. Also, heavy smokers experienced progressive clinical attachment loss (CAL) of 0.5mm despite this group receiving the most extensive, individually designed periodontal treatment.

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<sup>4</sup> Nicotine stomatitis is the inflammation of the minor salivary glands present in the hard palate due to chronic smoking. It is usually symptomless and presents as multiple red discrete papules in the hard palate surrounded by grayish white areas. Smoking cessation usually treats the condition within 2-4 weeks. [62]

<sup>5</sup> Smoker's melanosis is increased tissue pigmentation, or darkening, due to irritation from tobacco smoke. Typically, this pigmentation occurs on the gingiva of anterior teeth. The amount of pigmentation increases with greater tobacco use. Tissues usually return to normal colour in 6-36 months after quitting smoking. [65]

The study highlights the importance for smokers to understand smoking cessation is vital to effectively treat periodontitis. The authors concluded smoking cessation should be part of periodontal therapy to facilitate periodontal therapy and allow heavy smokers to receive benefits. [39]

### **Tobacco and oral cancer**

The use of tobacco products is a major cause of oral cancer.

- If someone smokes, their risk of oral cancer is about 5 to 10 times greater than someone who has never smoked. This risk increases if alcohol is also consumed.
- Individuals who smoke have a higher risk of mortality from oral cancer than those who have never smoked. This risk increases with the amount smoked per day.
- Chewing tobacco and other smokeless tobacco products increase the risk of oral and throat cancer and can cause oral leukoplakia, which may lead to cancer. [18] [40]

### **Tobacco cessation and oral cancer**

- Quitting is one of the best ways to avoid developing oral cancer.
- Quitting tobacco use can reduce the size of precancerous oral lesions.
- The risk of oral cancer starts to decrease within the first five years of quitting. If someone has quit smoking for 20 or more years, their risk of oral cancer is close to that of someone who has never smoked.
- Smoking cessation can still benefit someone diagnosed with oral cancer by improving their recovery and decreasing their risk of developing a new oral cancer.
- Continuing to smoke after a cancer diagnosis can lower the chances of survival and increase the risk for other cancers caused by smoking (e.g., lung cancer). [5] [40]

### **Health benefits of tobacco cessation**

Tobacco cessation is the most important thing someone can do to improve their health and is beneficial at any age. Even individuals who have smoked or used tobacco heavily for many years will benefit. For example, people who quit smoking after having a heart attack reduce their chances of having another heart attack by 50%.

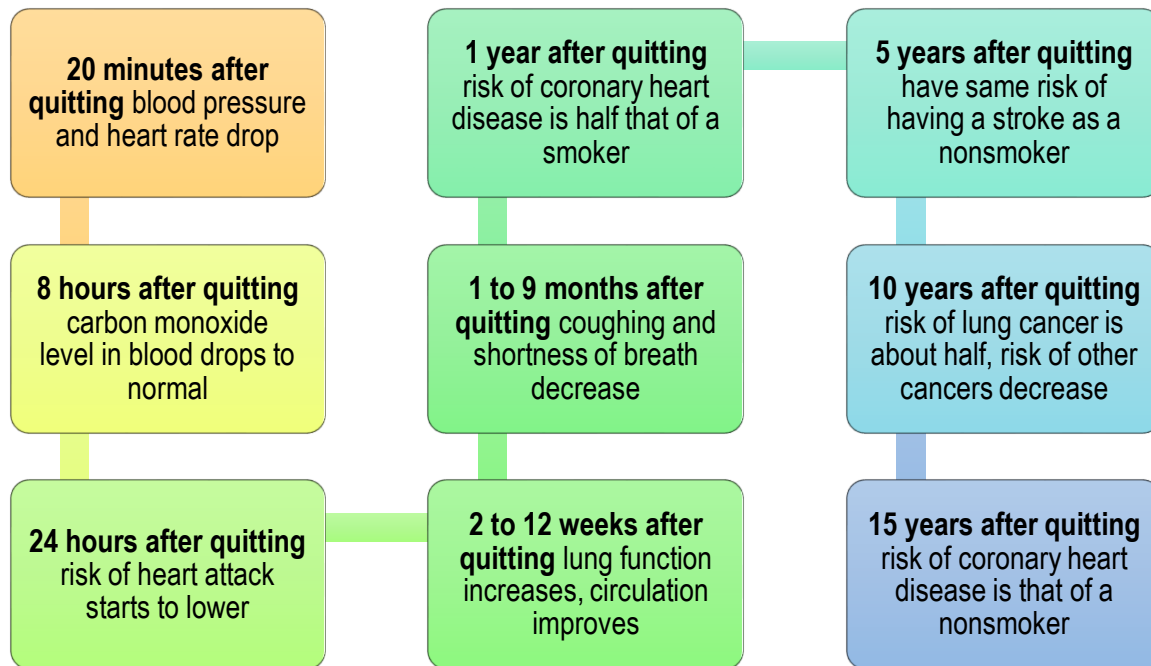
Tobacco cessation:

- Improves health and enhances quality of life.
- Reduces the risk of cardiovascular diseases, chronic obstructive pulmonary disease (COPD), cancer, and premature death, and can add as much as ten years to life expectancy.
- Reduces risk of impotence, having difficulty getting pregnant, having premature births, babies with low birth weights, and miscarriage.
- Decreases the excess risk of many diseases related to secondhand smoke in children, such as respiratory diseases (e.g., asthma) and ear infections.
- Saves money.<sup>6</sup> [5] [40] [41]

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<sup>6</sup> Cost calculator: How much do you spend on cigarettes?  
<https://health.canada.ca/en/forms/cigarettes-cost-calculator>

## Health benefits of smoking cessation [35] [41]



## Tobacco cessation and the environment

- Growing and producing tobacco involves significant amounts of deforestation. Agrochemicals, such as pesticides and fertilizers, are also used in this process. These chemicals harm the land and water and make it difficult to grow food crops. Tobacco cessation helps to improve biodiversity and land and water use.
- Tobacco product waste (e.g., cigarette butts) makes up the highest form of global pollution. Between 25-40% of all litter comes from tobacco product waste. Tobacco cessation lessens the impact of litter polluting the land and oceans. [35]

## Tobacco cessation

Most smokers who are aware of the dangers of tobacco want to quit. Counselling and medication can more than double a tobacco user's chance of successfully quitting.

Health professionals, including oral health professionals, have the greatest potential of any group to promote the reduction of tobacco use. Studies show few people understand the specific health risks of tobacco, which include lung cancer, heart disease and, stroke. Brief advice from health professionals can increase quitting success rates by up to 30%, while intensive advice increases the chance of quitting by 84%. [42]

## Nicotine

Nicotine is the main psychoactive ingredient in tobacco products. In its psychoactive effects, nicotine is a unique substance with a biphasic effect since it can have both a stimulant effect and a tranquilizing effect.

Nicotine can increase energy and concentration and decrease appetite. It also increases heart rate, blood pressure, and the amount of oxygen the heart uses. Nicotine

activates the pleasure center in the brain. Nicotine creates a temporary feeling of well-being and relaxation. As nicotine enters the body, it causes a surge of endorphins (hormones that help to reduce stress, relieve pain, and improve mood). Nicotine also increases dopamine, a neurotransmitter part of the brain's reward system, and creates feelings of pleasure and reward. The release of dopamine reinforces tobacco use behaviour.

Nicotine is also a highly addictive drug. The body quickly absorbs nicotine into the bloodstream and reaches the brain rapidly (e.g., within 10 seconds after smoking). Nicotine levels peak quickly after entering the body, so the feelings of reward are short-lived, creating a cycle of continued use to keep feeling the pleasurable sensations. Menthol added to tobacco products increases the addictive effects of nicotine, and some e-cigarettes and newer tobacco products deliver even more nicotine than traditional cigarettes.

Also, when ingested in larger doses, nicotine is a highly toxic poison that causes vomiting and nausea, headaches, stomach pains, and, in severe cases, convulsions, paralysis, and death. [43] [44] [45] [46] [47]

### **Nicotine addiction**

Nicotine addiction can look different from person to person. Even if an individual only uses tobacco products once in a while, they can be addicted and can have a hard time quitting.

Signs of nicotine addiction include:

- Cravings for tobacco products
- Going out of their way to get tobacco products
- Feeling anxious or irritable if they want to use tobacco products but cannot
- Continuing to use tobacco products because they find it hard to stop

### **Nicotine withdrawal**

Nicotine withdrawal symptoms include strong cravings, irritability, depression, anxiety, restlessness, cognitive and attention deficits, sleep disruption, insomnia, headaches, gastrointestinal disturbances, and increased appetite. Physical symptoms may begin as soon as a few hours after the last cigarette. Withdrawal symptoms generally peak within the first few days of quitting, and most subside within two to four weeks. However, for some individuals, symptoms (e.g., craving) may persist for months or even years. Weight gain is common, with an average gain of 4 to 5 kg. Weight gain is another reason for relapse. Temporary cough, headaches, and constipation may develop after quitting.

Although withdrawal is primarily related to the pharmacologic effects of nicotine, many behavioural factors (e.g., the feel, smell, or sight of a cigarette or the ritual involved with obtaining, handling, and lighting a cigarette) are associated with the pleasurable effects of smoking. These can also affect the severity of withdrawal symptoms. [10] [45]

## **Tobacco cessation interventions**

Most individuals who smoke want to quit and have tried doing so with limited success. Effective interventions include cessation counselling and pharmacotherapy, such as NRT, varenicline (e.g., Champix), and bupropion (e.g., Zyban). Alternative approaches to smoking cessation, such as acupuncture, lasers, and herbs, have not proved to be effective and cannot be recommended for routine use. [45]

Counselling and medications are both effective for treating tobacco use. Combining counselling and medications is more effective than either intervention alone.

### **Counselling involves following the 5 A's:**

- **Ask** at every visit whether the client uses tobacco and document the response.
- **Advise** all clients who use tobacco to quit in clear, strong, personalized, and nonjudgmental language.
- **Assess** clients' willingness to quit tobacco within the next 30 days. Emphasize the benefits of quitting to clients who are not intending to quit in the next 30 days.
- **Assist** clients willing to make a quit attempt by providing brief counselling and referral for pharmacotherapy.
- **Arrange** a follow-up, in person or by phone, preferably within the first week after the quit date and again later to prevent relapse. [10] [45]

### **Ask-Advise-Refer (AAR)**

Ask-Advise-Refer is an abbreviated version of the 5 A's approach.

- Ask clients about tobacco use.
- Advise clients to quit.
- Refer clients who are interested in quitting for additional assistance (e.g., to medical providers for pharmacotherapy, cessation counselling, tobacco quitlines, local group programs, and internet-based programs).

AAR takes only 3-5 minutes and increases the number of quit attempts and individuals who permanently quit. Using the Ask-Advise-Refer model is quick and easy and ensures every client who uses tobacco products is offered cessation support. [48]

## **Pharmacotherapy**

Mechanisms by which cessation medications work include:

- Providing an alternative source of nicotine without the toxins of tobacco smoke.
- Treating the symptoms of nicotine withdrawal.
- Reducing the rewarding effects of nicotine if someone lapses and smokes by blocking or desensitizing nicotinic receptors. [45]

## **Medications for tobacco cessation**

- Types of NRT products include gum, lozenges, transdermal patch, and nasal spray. Combinations of different nicotine replacement products are more effective than single products. For example, combining the nicotine patch with a shorter-acting nicotine replacement drug (e.g., lozenge, gum, nasal spray) is more effective than monotherapy. When used in combination, the patch helps maintain continuous

levels of nicotine, and the use of gum, lozenge, or nasal spray enables a rapid increase in nicotine levels in response to immediate cravings.

- Medications that act on nicotinic receptors include bupropion and varenicline.
- Bupropion increases the brain's release of norepinephrine and dopamine.
- Varenicline works at the nicotinic receptor, where it acts as a partial agonist, having some nicotinic effects, and as a partial antagonist, blocking the effects of nicotine. The effect of varenicline is to mitigate nicotine withdrawal symptoms and decrease the pleasurable effects of tobacco use if the person has a lapse. Varenicline is the most effective monotherapy available for smoking cessation.
- Varenicline or bupropion can be used in conjunction with NRT. [45]

Despite their proven efficacy, tobacco cessation medications are used by less than 25% of individuals attempting to quit smoking. Reasons for not using cessation medications include cost, low rates of insurance coverage, concerns about adverse effects and the safety of simultaneous smoking and NRT, and discouragement because of past unsuccessful quit attempts. [45]

#### **Possible side effects of NRT [22] [45] [49]**

<b>NRT product</b>	<b>Oral side effects</b>	<b>Systemic side effects</b>
Transdermal patches	N/A	Skin irritation and sensitivity Dizziness Racing heartbeat Sleep problems or unusual dreams (more common with the 24-hour patch) Headache Nausea Muscle aches and stiffness
Gum	Jaw discomfort Mouth sores Bad taste Throat irritation Hiccups Sticking to dental work and dentures	Nausea Racing heartbeat
Lozenges	Hiccups Sore throat Coughing	Nausea, heartburn, gas Headache Trouble sleeping Racing heart
Inhalator	Throat irritation Coughing Oral burning	Runny nose Upset stomach Racing heart Nervousness Headache
Nasal spray	Throat irritation Coughing	Nasal irritation, runny nose, sneezing Watery eyes Racing heart Nervousness Headache

## E-cigarettes and tobacco cessation

Many individuals use e-cigarettes to help stop smoking, and some clinicians suggest considering e-cigarettes for smoking cessation as another form of NRT. E-cigarettes allow users to inhale nicotine in a vapour rather than smoke. Because they do not burn tobacco, e-cigarettes do not expose users to the same levels of chemicals as conventional cigarettes.

A Cochrane review by [Lindson et al. \(2024\)](#) examined the safety, tolerability, and effectiveness of using electronic cigarettes to help individuals who smoke tobacco achieve long-term smoking abstinence, in comparison to non-nicotine e-cigarettes, other smoking cessation treatments, and no treatment.

The researchers found:

- People are more likely to stop smoking for at least six months using nicotine e-cigarettes versus NRT or e-cigarettes without nicotine.
- Nicotine e-cigarettes may work better than no support or behavioural support alone.
- However, more evidence is required, especially about newer types of e-cigarettes that have better nicotine delivery, as better nicotine delivery might help more individuals quit smoking.
- The most commonly reported unwanted effects of e-cigarette use were throat or mouth irritation, headache, cough, and nausea, which tended to dissipate with continued e-cigarette use. These appeared similar to those people experienced when using NRT.
- Evidence of serious harm from nicotine e-cigarettes was not detected. However, the longest follow-up was two years, and the number of studies was small. More research is required.

Some people who smoke can improve their health by quitting tobacco with the help of e-cigarettes.<sup>7</sup> However, those who do not smoke tobacco should avoid using e-cigarettes since they are not risk-free. [50]

Another Cochrane review by [Lindson et al. \(2023\)](#) investigated the comparative benefits, harms, and tolerability of different smoking cessation pharmacotherapies and e-cigarettes when used to help individuals stop smoking tobacco. The authors concluded the most effective interventions were nicotine e-cigarettes, varenicline, and cytisine (e.g., Tabex), all with high certainty evidence, followed by combination NRT. There was also high-certainty evidence for the effectiveness of nicotine patches, fast-acting NRT, and bupropion. Less certain evidence of benefit was present for nortriptyline (e.g., Norpress) (moderate certainty) and low certainty of evidence for both non-nicotine e-cigarettes and tapering of nicotine dose. More research is needed to compare interventions to aid in clinical decision-making. [51]

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<sup>7</sup> In April 2023, the UK government announced plans for the world-first national 'swap to stop' scheme encouraging smokers to switch to vaping by providing free starter vape kits and behavioural support to one million people across England. The scheme is part of a series of new measures to help the UK government meet its ambition of being smoke-free by 2030 (i.e., reducing smoking rates to 5% or less). Successful local pilots of 'swap to stop' schemes in many areas of England support the efficacy of the national plan. Details of the program are said to be released sometime in 2024. [64] [65]

### **Waterpipe smoking cessation**

A Cochrane review by Asfar et al. (2023) evaluated the effectiveness of tobacco cessation interventions for waterpipe users. The researchers found:

- Low-certainty evidence showed behavioural waterpipe cessation interventions increase waterpipe quit rates among users.
- There was not enough evidence to evaluate the effect of varenicline, bupropion, or e-health interventions for quitting waterpipe use.
- Further large and well-designed trials on behavioural and pharmacological waterpipe cessation interventions are needed. [52]

### **Smokeless tobacco cessation**

A Cochrane review by Ebbert et al. (2015) assessed the effects of behavioural and pharmacologic interventions for the treatment of smokeless tobacco use. The authors concluded varenicline, nicotine lozenges, and behavioural interventions might help smokeless tobacco users to quit. Confidence in results for nicotine lozenges was limited. [53]

### **Tobacco cessation interventions by oral health professionals**

A Cochrane review by Holliday et al. (2021) assessed the effectiveness, adverse events, and oral health effects of tobacco cessation interventions offered by oral health professionals. The review supported oral health professionals providing smoking cessation advice. The authors concluded:

- Advice and support from oral health professionals involving NRT or e-cigarettes are more likely to help clients stop smoking.
- Single or multiple sessions of advice and support may help clients stop smoking or using tobacco products. [54]

A randomized trial by Sujatha et al. (2023) assessed the outcomes of tailored tobacco cessation interventions in an oral health clinic over one year. A total of 1,206 participants were recruited. Salivary nicotine levels were used to confirm self-reported abstinence. Of the clients who completed the 12-month follow-up, 180 (18%) quit tobacco use, 342 (34%) reduced their tobacco usage by >50%, 415 (42%) exhibited no change, and 62 (6%) relapsed. The study confirms tobacco cessation programs by oral health professionals can successfully support clients to quit or reduce tobacco use. [55]

Studies have demonstrated most clients welcome smoking cessation advice from oral health practitioners, and receiving such advice from an oral health practitioner was associated with more attempts to quit smoking. However, research showed only half of the clients who currently smoke cigarettes reported having a conversation about tobacco cessation with an oral health practitioner during the previous year. Clients' sex was a significant factor related to the occurrence of a direct discussion about tobacco cessation. Females were twice as likely to report not having had such a conversation. [56] [57] [58]

Furthermore, oral cavity and oropharyngeal cancer (OOPC) is a devastating disease often caught in late stages. Individuals who use tobacco are at higher risk of OOPC. Tobacco cessation discussions and oral screenings are crucial factors in decreasing the

risk of OOPC or its late-stage diagnosis. However, data from 8 years of the National Health and Nutrition Examination Survey (2011–2018) showed among the 1,550 participants who met the inclusion criteria, only 10% received oral cancer screening and tobacco cessation counselling in the oral healthcare office, whereas 47% received neither. Being female was significantly associated with not receiving either service. The authors concluded there is an increased need for oral cancer screening and tobacco cessation counselling by oral health practitioners among their clients who use tobacco, particularly female clients. [59]

### **Take home messages**

- Tobacco use is strongly linked to an increased risk of oral cancer, dental caries, implant failure, and periodontal disease. Oral health professionals play a crucial role in identifying and addressing oral pathologies related to tobacco use and providing necessary care for smoking cessation. Brief educational interventions, either alone or in combination with pharmacotherapy, offer valuable approaches for the oral health team to support smoking cessation.
- Oral health professionals can help tobacco users quit by identifying clients who use any form of tobacco, documenting tobacco use history, advising cessation, offering brief advice, and providing information about cessation treatment, including tobacco cessation resources, referral to support programs, and medical providers for pharmacotherapy.
- It is increasingly vital for oral health professionals to be aware and knowledgeable of the various tobacco and tobacco-free products on the market and their possible implications on oral and general health to be able to advise clients accordingly.

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### **Client resources**

Smoker's Helpline

1-866-366-3667 <https://www.smokershelpline.ca/>

Refer your clients for proactive phone support

<https://smokershelpline.ca/healthcare/make-a-referral>

Quit with Confidence: Guide to a smoke-free life

<https://www.canada.ca/en/health-canada/services/smoking-tobacco/quit-smoking/introduction.html>

Tools for a smoke-free life

<https://www.canada.ca/en/health-canada/campaigns/quit-smoking.html>

Tobacco and Oral Disease

<https://www.canada.ca/en/health-canada/services/health-concerns/tobacco/legislation/tobacco-product-labelling/tobacco-oral-disease.html>

Cost calculator: How much do you spend on cigarettes?  
<https://health.canada.ca/en/forms/cigarettes-cost-calculator>

Quit to win  
<https://www.smokershelpline.ca/challenges/first-week-challenge/about>

A guide for oral disease patients to quit tobacco use  
<https://www.who.int/publications/i/item/9789241512503>

World Health Organization has created a digital health worker to help people quit smoking. <https://www.who.int/news-room/spotlight/using-ai-to-quit-tobacco>

Smoking and Smokeless Tobacco, ODHA factsheet  
<https://odha.on.ca/wp-content/uploads/2016/08/ODHA-Facts-Smoking.VFS19.1-copyright.pdf>

Hookah Pipe (Water Pipe), ODHA factsheet  
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E-cigarettes, ODHA factsheet  
<https://odha.on.ca/wp-content/uploads/2016/08/ODHA-Facts-E-Cigarettes.pdf>

You Can Make It Happen  
<https://www.youcanmakeithappen.ca/>

A comprehensive source of information, tools, and resources about tobacco cessation for healthcare providers.

### **Additional Resources**

WHO global report on trends in prevalence of tobacco use 2000–2030, World Health Organization, January 16, 2024 <https://www.who.int/publications/i/item/9789240088283>

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Smoke-Free Home Environments, Public Health Ontario, 2020, p 1-6  
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Smoking cessation: Other medications for smoking cessation, Centre for Addiction and Mental Health (CAMH), 2024  
<https://www.camh.ca/en/professionals/treating-conditions-and-disorders/smoking-cessation/smoking-cessation---treatment/smoking-cessation---other-medications-for-smoking-cessation>

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