INFORMATION SHEET

The role of flavours in increasing the appeal of tobacco, nicotine and related products

MAY 2025

Key messages

Tobacco, nicotine and related products contain a variety of flavouring agents that are designed to appeal and attract a new generation of users and retain existing ones.

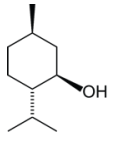
- Flavours are present in all tobacco, nicotine and related product categories.
- The presence of all flavours increases the appeal and attractiveness of these products.
- Flavours, which are introduced as flavour chemicals or enhancers, can encourage experimentation and initiation and sustain use.
- Flavoured tobacco, nicotine and related products often have appealing names and bright colours on packaging and are marketed aggressively, especially to children and young people, including on digital platforms.
- Some flavour chemicals (such as menthol) can also reduce the irritation of tobacco, nicotine and related products and thus increase their use, addictiveness and toxicity.
- Flavours in tobacco, nicotine and related products make it more difficult for users to quit.
- Flavours in tobacco, nicotine and related products have not been shown to be safe when inhaled and can have direct toxic effects and indirect adverse effects.
- Creating public awareness about the impact of flavours is key to protecting current and future generations from tobacco- and nicotine-related dangers.
- Countries should consider enacting and enforcing the following strong measures:
  - Ban flavours in tobacco, nicotine and related products to make them less attractive and appealing, especially to children and young people.
  - When banning is not feasible, consider strong regulations restricting the use of flavouring chemicals or agents as constituents and use of flavour images in packaging and marketing of tobacco and nicotine and related products to reduce their appeal.
  - Monitor the emergence of new and emerging products and flavours and of a potential illegal market that could undermine tobacco control or challenge existing regulations on flavours.

What are flavouring agents and how do they change flavours?

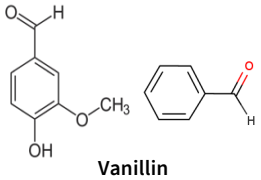
Flavouring agents are chemicals that are added to make a product more appealing or to mask its harshness *(1)*. They impart a specific taste or aroma to a product or change the sensory experience of the user in other ways upon ingestion or inhalation.

Flavours can be experienced through gustatory (tongue taste receptors), somatosensory (mouthfeel) and olfactory (smell) sensations. Most flavouring chemicals have receptor targets on the tongue, airways, brain or other parts of the body, including transient receptor potential (TRP) receptors, which detect sensations such as cold, pain and taste, and sweet receptors (T2R2, T1R3), which detect sweet taste and are important for nutrient sensing. For example, menthol targets the TRPM-8 receptors, which are responsible for temperature regulation and produce a cooling sensation. Other TRP receptors are responsible for the irritation and harshness of tobacco and nicotine, and the coolness produced by menthol can counteract this effect. Flavouring agents may include synthetic chemicals (e.g., Wilkinson-Sword) that, unlike menthol, do not have a smell but produce sensory effects such as cooling. Flavoured products may also include flavour enhancers (such as sugars and sweeteners) that may not only have their own flavour but can enhance the effects of other flavouring chemicals. In products such as electronic nicotine delivery systems (ENDS), colloquially referred to as electronic cigarettes (e-cigarettes), flavouring chemicals are added to create all flavours, including that of tobacco *(1)*.

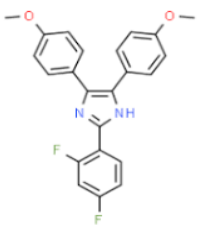
Examples of flavour chemicals are shown below.



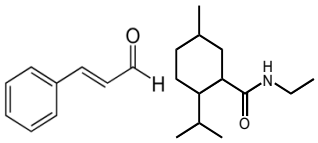
Menthol



Vanillin



Benzaldehyde



Peppermint cinnamaldehyde (Wilkinson-Sword-3)

Are flavouring agents in tobacco, nicotine and related products safe?

Flavouring chemicals are commonly used in food products to change or improve their taste. While many flavouring chemicals may be safe when they are eaten or ingested, they have not been shown to be safe when they are inhaled *(2)*.

Exposure to flavouring chemicals depends on the amount added to the product, how much the product is heated when smoked (such as cigarettes and heated tobacco products), when heated or aerosolized (such as e-cigarettes) and how much of the product is consumed by inhalation *(3)*. Some flavouring chemicals are present in products in very high amounts and can have direct toxic effects (e.g. allergic reactions, worsening of respiratory symptoms), especially when they are used at high doses and over a long time (e.g. diacetyl, cinnamaldehyde) *(2–4)*. Furthermore, some flavouring chemicals may have indirect adverse effects. For example, by increasing use of tobacco, nicotine and related products, they can have adverse health effects related to increased exposure to these products *(1,5)*.

What are flavour accessories?

Flavour accessories are products that have been developed to allow tobacco and nicotine consumers to introduce flavours into otherwise unflavoured products or to enhance the effects of existing flavours. They are often used in jurisdictions where flavours are prohibited and include flavour capsules (small crushable beads embedded in cigarette fillers that release bursts of flavour when crushed) and flavour cards (which can be inserted into cigarette packs), filter tips and tubes for make-your-own cigarettes as well as flavour drops and sprays. These products extend the availability of flavours in tobacco, nicotine and related products, circumventing regulations to restrict flavours *(6)*. As flavour accessories are often not included in regulations on flavours in tobacco products, they are commonly not regulated, although a few countries, such as Belgium, Denmark and Lithuania, include them in their regulations *(7)*.

Why are flavours used in tobacco, nicotine and related products?

Flavours are used to increase the appeal of tobacco, nicotine and related products by improving their taste and smell. Many mask the harsh taste and irritation of tobacco and nicotine, making the products more palatable and easier to use *(5)*. Flavours are used by the tobacco and nicotine industries to attract new users and to maintain consumption by existing users *(8)*.

How are flavours in these products marketed?

Images and descriptors of flavours, as well as colours, are used to market tobacco, nicotine and related products, resulting in highly attractive packaging which is appealing to users, especially young people *(9)*. Such marketing techniques have been used successfully by the tobacco industry to market products such as cigarettes, cigars and hookahs, and the same tactics are now being used for newer products such as e-cigarettes and nicotine pouches. Flavoured products are available and prominently displayed at many points of sale, often placed at the eye level of children, and in traditional venues (e.g. magazines, billboards). There has also been an increasing presence and marketing of products (often flavoured) on social media platforms such as TikTok, Instagram and Facebook, and youth have reported frequent exposure to digital tobacco marketing *(10)*.

What are the effects of flavours on use of tobacco, nicotine and related products?

Flavours, such as menthol, produce a cooling effect, which help to decrease the irritation and harshness of tobacco smoke or nicotine *(11)*. Advertising of sweet and fruit flavours in e-cigarettes can also activate reward centres in the brain of young adults and interfere with memory of health warnings *(1,12)*. Research has shown that most new users, particularly youth, first used a tobacco and nicotine product with a flavour *(1,13)*. Flavours in products, such as bubble gum, cotton candy and mango, as well as flavour marketing alter perceptions of harm, leading users to believe that the products are natural and "safer" to use *(14)*. Flavours are often cited as one of the primary reasons for youth to try a tobacco or nicotine product *(5)*, serving as a path from experimentation to regular use, and perpetuating the global tobacco epidemic. They also eventually sustain addiction and make it more difficult to quit. For example, people who use menthol cigarettes find it more difficult to quit smoking and are more likely to experience health problems because of increased use of cigarettes *(15,16)*.

Why regulate flavours and flavouring agents?

The commercial availability of flavoured tobacco, nicotine and related products and easy access to these products are huge public health concerns, as they increase and maintain uptake of such flavoured products, which are inherently addictive and toxic. Regulation of flavours and their marketing could decrease the attractiveness, addictiveness and toxicity of tobacco and nicotine products, thus protecting people from the health effects associated with long-term use of these products, including death. Under Articles 9 and 10 of the WHO Framework Convention on Tobacco Control (WHO FCTC), Parties are obliged to regulate the contents, emissions and disclosure of tobacco products, including those of flavours, and the Partial Guidelines for Implementation, agreed by Parties and drawing on the best available scientific evidence and the experience of Parties, assist WHO FCTC Parties in meeting their obligations. As of December 2024, over 50 countries had adopted policies on additives in tobacco products, most of which address flavouring additives and prohibit images or descriptors of flavours on packaging and/or restrict sales of flavoured products in retail outlets. Some countries also regulate the addition of flavouring additives during manufacture.

What approaches do countries use to regulate flavours?

Countries use various policies to regulate flavours. In some, sensory-focused policies are used to regulate

additives that have a "characterizing" or clearly noticeable smell or taste that differs from that of tobacco (e.g. European Union, United States of America), while, in others, the policies are based on health concerns, which restrict additives known to be harmful to health or to enhance nicotine intake (e.g. Gulf Cooperation Council), or are based on function, in which policies regulate use of any additive that is classified as a flavouring agent or enhances the effects of flavours (e.g. sugars), regardless of the quantity (e.g. Brazil, Canada) *(5,18,19)*. Netherlands (Kingdom of the) allows only certain tobacco flavour additives in e-cigarettes but bans any additive (regardless of whether they produce flavours) for which a health benefit is suggested (such as vitamins, minerals and stimulants) or that facilitate inhalation or nicotine uptake (such as menthol and other agents that act on TRPM-8 receptors) *(20)*.

The types of tobacco, nicotine and related products covered by these policies also vary, depending on the definition of a tobacco product in each country and on whether they include nicotine or related products. For example, ENDS and electronic non-nicotine delivery systems are included in some policies, but not all, and are occasionally exempted. Similarly, some policies exclude or explicitly include cigars, cigarillos, loose tobacco for roll-your-own cigarettes, hookah tobacco and smokeless tobacco products. The decision depends on factors such as which products are sold in the country, the objective(s) of the policy, the regulatory environment and whether the policy can be reasonably implemented and enforced.

Regardless of the type of policy, rigorous surveillance is instrumental in monitoring industry efforts to undermine flavour regulations, such as introduction of flavour accessories, modifications related to flavours, introduction of new flavour chemicals that do not meet the definition of flavours in regulations and the potential emergence of an illegal market.

What is WHO's stand on flavours, and what resources are available?

Flavours, flavouring agents and flavour accessories are used to attract new users and/or sustain use of tobacco, nicotine and related products. Articles 9 and 10 of the WHO FCTC provide that Parties to the Convention regulate the contents, emissions and disclosure of tobacco products. Additionally, recognizing that flavours can increase the palatability of tobacco products, the Partial Guidelines for Implementation of Articles 9 and 10 recognize that "from the perspective of public health, there is no justification for permitting the use of ingredients, such as flavouring agents, which help to make tobacco products attractive" *(17)*. The guidelines further recommend that Parties prohibit or restrict ingredients that enhance the palatability of tobacco products. By reviewing and evaluating scientific evidence on flavours and flavouring agents, the WHO Study Group on Tobacco Product Regulation has provided guidance on the regulation of flavours in order to reduce the demand for tobacco and nicotine products *(1,5,21,22)*. In view of the diversity of flavours available in products, effective measures must be adopted to provide the maximum protection of public health. Therefore, prohibition of flavours or, where not feasible, restriction of flavours and flavouring agents in all products, including tobacco, nicotine and related products, is necessary.

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Annex

Methods

The information sheet on the role of flavours in increasing the appeal of tobacco, nicotine and related products was conceptualized by the World Health Organization (WHO) in response to requests from WHO Member States after a WHO Global Consultation on Flavours held in June 2023. The scientific evidence underpinning the normative content on flavours and flavouring agents is well documented in the WHO Technical Report Series of the Study Group on Tobacco Product Regulation (Study Group), which represents each WHO region; however, WHO Member States requested that the scientific basis be simplified to make the information accessible to a broader audience, allowing for wider dissemination and visibility.

The information sheet was developed by international experts in flavours in collaboration with the WHO secretariat and subject matter experts from universities and research agencies (see below). After the twelfth meeting of the Study Group, on 10–13 December 2024, experts in flavour science and the attractiveness and appeal of nicotine and tobacco products were invited to develop an information sheet on flavours and flavouring agents based on a review of the most recent empirical scientific evidence and regulations on flavours and flavouring agents conducted for the Study Group's tenth report. The review was used to write a background paper, Flavours in tobacco products: new developments, implications and regulation, for the meeting. The evidence and recommendations were extensively reviewed and deliberated on by members of the Study Group, as well as subject matter experts before, during and after the meeting in December 2024. The information sheet was reviewed in several rounds by members of the Study Group, technical experts, WHO staff, including from regional offices, and WHO consultants to ensure alignment with the recommendations of WHO and of the Conference of the Parties to the WHO Framework Convention on Tobacco Control and its Partial Guidelines for implementation of Articles 9 and 10, which specifically prohibit use of ingredients that enhance the palatability of tobacco products.

Summary of evidence

It has been established that flavours in tobacco, nicotine and related products increase their appeal and attractiveness. Flavours mask the harshness of tobacco and nicotine, making the products more palatable and appealing, especially to children and young people. Further, evidence shows that flavoured products significantly increase the rates of initiation and regular use among adolescents. Removing flavours can reduce product attractiveness and deter uptake. Such measures also help to prevent industry circumvention of flavour bans.

Contributors

The Information Sheet was conceptualized by WHO, in consultation with subject matter experts on the science of flavours and flavouring agents. Professor Suchitra Krishnan-Sarin, Yale School of Medicine, New Haven, Connecticut, USA and Dr Reinskje Talhout, Centre for Health Protection, National Institute for Public Health and the Environment (RIVM), Netherlands (Kingdom of the) collaborated closely with WHO in the content development of the Information Sheet. All contributors, including the WHO FCTC Convention Secretariat, provided critical comments and approved the final version of the Information Sheet.

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The information sheet was also reviewed extensively by WHO colleagues at headquarters, including in the Department of Communications, and the regional offices to ensure wide applicability. .

Potential conflicts of interest

All contributors, including experts and reviewers, were required to complete declarations of interests, which were evaluated by a WHO technical unit (the No Tobacco Unit of the Health Promotion Department) and treated in line with WHO guidance.

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