CHAPTER TWO

Smokeless tobacco product design and marketing: targeting new populations in a changing regulatory environment

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Introduction

Smokeless tobacco (ST) has a long history and is the predominant form of tobacco in some global regions, yet it has garnered a somewhat lower priority for research and policy development than combusted forms. Some ST products have lower health risks than smoking because they do not expose consumers to many of the highly toxic chemical by-products of combustion. Still, ST use causes serious health problems, including increased risk of cancers of the head and neck.[1] The global ST market has undergone important changes in the past two decades, as combusted tobacco has become more heavily regulated in developed countries and consumers seek lower-risk alternatives. In response, cigarette manufacturers have entered the ST market with novel ST products that offer putative lower risk and greater personal convenience. The capacity of the tobacco industry to innovate has been well documented,[2,3] yet relatively less attention has been given to recent innovations in ST. This chapter will consider new developments in product design and marketing used by manufacturers to gain new consumers and retain existing ones, often through targeting subpopulations. By focusing on factors used by manufacturers to increase appeal rather than on health risk factors, this chapter will consider how tobacco control regulatory initiatives must address industry strategies. The goal of regulation should be not just to protect the health of current consumers but to prevent people from ever initiating use. In developed countries with a tradition of ST use, such as the United States and Scandinavian

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countries, demand for combusted tobacco is decreasing in favor of noncombusted products. Thus, a deeper understanding of strategies used by ST manufacturers to design and promote their products can inform future tobacco control regulations intended to reduce consumer demand for ST, while identifying opportunities to lower the health risks for adult smokers with properly regulated, reduced-risk ST products.

Types of products

ST is available globally in myriad forms that are used orally or nasally. Table 2.1 gives information on common forms, and Fig. 2.1 shows some examples. As with any product, ST is manufactured to meet the preferences and expectations of target consumer groups. Some forms are traditional, made with limited technology under rudimentary conditions. Others are technologically innovative, designed to attract consumers in competitive developed markets. Traditional forms occur mainly in developing countries in the Indian subcontinent, parts of Africa, and the Middle East. In India, which historically has had the largest ST industry by volume,[11] use exceeds that of combusted tobacco.[12] Popular products are dry snuff (e.g., bajjar, also known as tapkir), a finely ground tobacco powder used orally or nasally, and gutkha, khaini, and naswar ("nass"), which are made of dried and chopped tobacco blended with other ingredients including crushed areca nut, slaked lime, ash, and flavors such as catechu extract, cardamom, and menthol. Also popular is a powdered tobacco paste that is applied to the teeth and gums, sometimes as a dentifrice; common forms are gudakhu, gul, and mishri (Fig. 2.1). Mawa, zarda, kiwam/quiwam, and shamah blend flavorings and binders such as ground areca nut, lime, oils, and spices; this form is chewed or placed between the cheek and gum to deliver nicotine via the oral mucosa. In North Africa, dry snuff formulations such as naffa (also called tenfeha or nufha) are placed inside the lip. In southern Africa, a popular form of traditional snuff is a mix of powdered tobacco with charred plant and/or ash, which is alkaline and acts as a buffer to facilitating nicotine absorption. In the Sudan region, toombak is a moist product made from sundried tobacco that is fermented, mixed with sodium bicarbonate, and cast into small balls for oral use. Other countries have specific ST variants, such as maras in Turkey, which is powdered sundried tobacco mixed with oak or grape leaves, and chimó in Venezuela, a hardened paste made from crushed, boiled tobacco leaf mixed with sodium bicarbonate, sugar, ashes, and flavorings (Fig. 2.2).[5,13]

Table 2.1 Major types and characteristics of smokeless tobacco.

			Product characteristics				
Product type	**Brand names**	**Manufacturers**	**Total nicotine concentration (mg/g)[5–8]**	**Free nicotine concentration (mg/g)[5–7]**	**Common flavors/ Flavorants[4–10]**	**Preparation and formulations[5,6,4,9,7,8,10]**	**WHO region[1,4]**
Chewing tobacco	Red Man, Days Work, Apple, Brown, Natural Leaf, Union Standard, Tinsley, WNT, Levi Garrett, Taylors Pride, Cannon Ball, Moore's Red Leaf, Cumberland, Mammoth Cave, Cotton Boll, Kentucky, Warren County, Rough Country	Swedish Match North America, American Snuff Company	Plug variety: 5.1–15.1 Twist variety: 21.6–40.1 mg/g	Plug variety: 0.01–0.04 Twist variety: 0.02–0.22 mg/g	Licorice, sugar	Cured tobacco treated with leaf extract, flavored, and dried	Americas (primarily United States)
Moist snuff (dip)	Copenhagen, Skoal, Red Seal, Husky, Grizzly, Kodiak, Kayak, Redwood, Gold River, Silver Creek, Cooper, Silverado, Tim bar Wolf, Longhorn, Red Man	Conwood Company, National Tobacco Company, Swisher International, Swedish Match North America, US Tobacco	4.42–25.0 Mean of US brands: 12.3	Mean of US brands: 4.0	Mint, wintergreen, fruit, cinnamon	Cured, fermented, and flavored tobacco, fine or long cut; pouches or loose	Americas, Europe
Snus	General, Catch, Ettan, Grovsnus, Göteborgs Rapé, Kronan (Swedish Match); Lucky Strike, Pall Mall, du Maurier (British American Tobacco); Camel (R.J. Reynolds); Marlboro (Philip Morris); Skoal (U.S. Smokeless Tobacco Company); Knox, Skruf (Imperial Tobacco), Tobaccorette	R.J. Reynolds, Philip Morris, Swedish Match North America, US Tobacco	Sweden: 12.8–28.2 Mean of US brands: 10.46	Mean of US brands: 3.08	Mint, wintergreen, fruit, cinnamon, molasses	Pasteurized finely cut tobacco; pouches/sachets or loose	Americas, Europe (especially Scandinavia)
Dry snuff	Levi Garrett and Sons, Dental, Honest, Peach Sweet, Tube Rose, W.E. Garrett & Sons, Silver Dollar	American Snuff Company, Kretek International, Inc.	In US: 4.7–24.84	In US: 0.03–3.13		Fire-cured and fermented tobacco with added flavors; powder	Americas, Africa, Europe, South-East Asia
Bajjar/ tapkir	Typical cottage product or home-prepared		na	na	Menthol, floral	Roasted and powdered tobacco used as dentifrice	Americas, Europe, South-East Asia (primarily India)

(*Continued*)

Table 2.1 Major types and characteristics of smokeless tobacco.—cont'd

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Naffa/ tenfeha/ nufha	Typically cottage product or home-prepared		na	na		Dry snuff; used nasally	Africa
Gutka	Manikchand, Moolchand, Tulsi, Shimla, Parag, Sir, Goa, and Sikandar		0.16–4.20		Sweeteners or savory flavoring agents	Areca nut, slaked lime, and powdered tobacco	South-East Asia
Khaini	Raja Kuber, Wiz, Buddha Lal, Chaini, Raja Chap, Ansul Tobacco, Mirage, Ganesh tobacco 701, Patta Chhap Tei Tobacco		2.53–4.79	2.48–4.68		Areca nut, slaked lime, and sun-dried or fermented tobacco leaves; paste	South-East Asia
Naswar	Three Star, Wail Zaman, Sardar and Irfan, Lachiwaja	Karachi, Bannu, Swabj, Mardan, Charsadda, Quetta, Jhob, Mohamand	11.8–28.7	8.84–13.2	Cardamom, menthol	Dried tobacco, ash, colorants, oils; balled for oral use	Africa, Eastern Mediterranean, Europe
Gudakhu	Natraj		na	na	Molasses	Tobacco leaf dust, molasses, red soil; paste used as dentifrice	South-East Asia
Gul	Shajadi Gul, Mujamal Hussain Musarrf Bahi Shahi Eagle, Md. Mustafa Asgar AliGul		33.4–34.1			Pyrolized tobacco with tendu leaves; used as dentifrice	South-East Asia
Mishri	Typically cottage product or home-prepared		2.73	0.09		Baked or roasted tobacco; powder used as dentifrice	South-East Asia
Mawa	Typically cottage product or home-prepared		0.16–4.20	0.11		Areca nut, sun-cured tobacco flakes, and slaked lime	South-East Asia

Zarda	Baba, Baghban Zafrani Zarda, Ratna Zafrani Patti, Gopal (India); Zahoor Zafrani Patti, Raja Jani Zafrani Patti, Sunbrand Zafrani Banarasi Patti, Shahzadi Zafrani Patti, Najma Zaffran Patti (Pakistan); Dulal Mishti, Hakim Puri, Bat One Baba, Bullet, Surma (Bangaldesh)		14.6–65.0 Mean in India: 30.43	Mean in India: 0.05	Saffron, menthol	Chewing tobacco flakes with spices, dyes, lime, sometimes areca nut; chewed	South-East Asia, Eastern Mediterranean
Kiwam/ quiwam	Avon, Kashmiri, Nauratan, Raj Ratan, Pradip		na	na	Cardamom, saffron, aniseed, musk	Boiled tobacco leaves with flavors and additives; paste	South-East Asia
Toombak	Typically cottage product or home-prepared		9.56–28.2	5.16–10.6		Tobacco mixed with baking soda and water; balled for oral use	Africa (primarily Sudan, Chad)
Shamah/ shammah	Typically cottage product or home-prepared		na	na		Powdered tobacco, slaked lime, ash, black pepper, oils, and bombosa; powder or paste often wrapped in paper	Eastern Mediterranean, Europe
Maras	Typically cottage product or home-prepared		na	na	Oak, walnut	Powder of wood ash, dried, leaves, tobacco, and water	Europe (primarily Turkey)
Chimó	El Tovareño, El Tigrito, El Sabroso, El Gran Búfalo, El Dragon, El Morichal, San Carleño		5.29–30.1	1.32–27.4	Cocoa, brown sugar, vanilla	Tobacco leaf combined with baking soda, Mamón tree ashes, and flavorings; hardened paste	Americas (primarily Venezuela)
Creamy snuff	IPCO, Dentobac, Tona, Ganesh, Charotar, Musa Ka, Rehmat Khan, Chad Tara, Dulhan, Suraj, Asif Ka	Asha Industries, Goran Pharma Ltd.	5.62–10.0	2.36–3.82	Spearmint, menthol, camphor	Tobacco mixed with glycerin, aromatic substances, water, and oil; used as dentifrice	South-East Asia

Note: List of products is not exhaustive.

Figure 2.1 Some examples of smokeless tobacco products used in India: khaini (upper left), gutkha (lower left, left side), mishri (lower left, right side), and gul (right). *Photos courtesy of Clifford Watson, Centers for Disease Control and Prevention.*

In developed countries, commercially manufactured products dominate consumer markets and are concentrated in the United States and Scandinavia. For the first half of the 20th century, chewing tobacco was the most popular ST in the United States. It comes in loose leaf, pellet, and plug forms and is comprised of tobacco blended with sweetener and flavorings. In

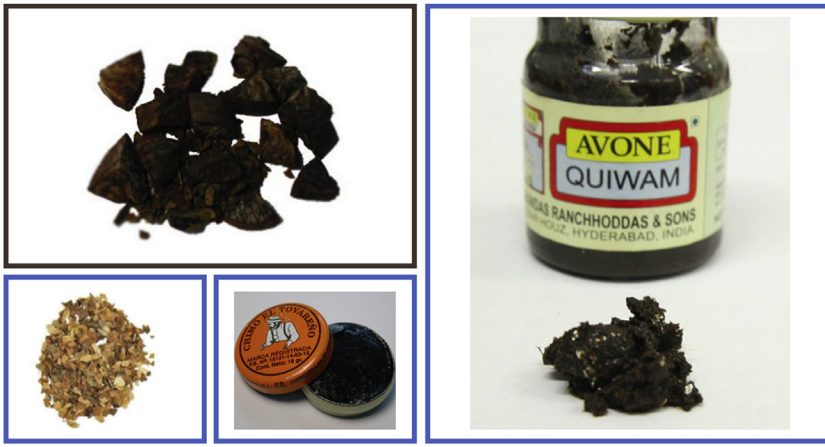

Figure 2.2 Some examples of smokeless tobacco products used in other global regions: mawa (upper left), zarda (lower left, left side), chimo (lower left, right side), and quiwam (right). *Photos courtesy of Clifford Watson, Centers for Disease Control and Prevention.*

recent decades, moist snuff, also called dip or chew, became dominated in the United States.[14] The tobacco is air or fire cured and aged before being cut, blended, fermented, and flavored. The form is based on the texture of the tobacco cut (long or fine) and flavor. The variant called snus has a lower moisture content and is made from finely cut tobacco that is pasteurized instead of fermented. Snus products, which originated in Sweden, are often portioned into small cellulose fiber pouches, each pouch a measured portion that makes placement between lip and gum convenient. In the past decade, dissolvable forms of oral products made from compressed, powered tobacco have been developed to appeal to health-conscious consumers. While earlier iterations of dissolvable tobacco lozenges did not meet with market success, new forms have recently been introduced in the United States. The range of ST designs used by manufacturers to enhance consumer appeal are discussed later in this chapter.

The evolving smokeless tobacco market

In 2017, the value of the global ST market was estimated at US$12.85 billion. Over 131,000 tonnes of tobacco were processed in some 18 countries.[11] Yet despite its size, ST represents just 1.6% of the total global tobacco market, and its value was surpassed in 2017 by that of the burgeoning e-cigarette (vaping) market. However, ST still dominates in some regions, such as India, where traditional products maintain a higher prevalence than combusted products.[15] The World Health Organization (WHO) South-East Asia region (Bangladesh, Bhutan, Democratic People's Republic of Korea, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand, and Timor-Leste), notably the Indian subcontinent, contains 90% of the world's 250 million ST consumers.[16] Moreover, the market has grown faster than that for cigarettes in some areas: in the United States, by 6.9% annually from 2003 to 2017, compared to 0.4% for cigarettes.[11] The US ST market was estimated at US$7.2 billion in 2018, making it the world's largest in value.[11]

The growth of the US market may be attributable to several factors, which are underpinned by an increasingly regulated cigarette market and changing consumer preferences. Tobacco control initiatives have been adopted in recent decades to communicate the risks of combusted tobacco, and increased knowledge of these risks, combined with increasing restrictions on indoor smoking, has contributed to making smoking less socially acceptable. Yet the fast-changing landscape of global tobacco control has

not been applied equally to all types of products. For example, although a majority of countries have implemented specific actions required by the WHO's Framework Convention of Tobacco Control (FCTC) relating to combusted products, most countries have not actively advanced efforts to curb ST use.[17] This inequity in implementation of prevention policies may have unintentionally led to greater opportunities for ST manufacturers to market their products to new consumers, including youth and health-conscious consumers looking for alternatives to combusted tobacco.[18]

Innovations in smokeless tobacco products: design and marketing strategies

Throughout the last century, tobacco manufacturers have sought to gain competitive advantage by the use of innovation in the way their products are designed and marketed. Product innovation typically involves sophisticated, highly researched changes in design and performance to attract new consumers and maintain existing ones. In turn, innovations in ST follow this pattern and have generally been aimed at enhancing two things: abuse liability and product appeal. The potential to produce dependence, or abuse liability, is the likelihood that a given product will result in a consumer becoming addicted and is achieved primarily through the mechanism of nicotine delivery.[19,20] Product appeal is a function of nonnicotine characteristics that enhance attractiveness, social acceptability, and ease of use. Traditionally, ST manufacturers were not as closely associated with product innovation as cigarette manufacturers, who relied heavily on it in the 20th century to give rise to the modern cigarette.[21] ST manufacturers took a more limited approach, such as the use of flavorings and variation in nicotine delivery.[22] However, since around the year 2000, novel ST products that reflect a substantial shift in the approaches used to recruit and retain users have been introduced.

Developments since the mid-2000s have transformed the ST market in the United States, as leading cigarette companies acquired ST companies and introduced new ST products. Strategically, these moves have aimed to attract current smokers and never smokers with ST products that purport to present lower health risks while ensuring ease and convenience of use. R.J. Reynolds, a leading cigarette manufacturer, acquired Conwood, the second largest ST manufacturer in the United States, in 2006, and Altria acquired U.S. Smokeless Tobacco Company in 2009. These acquisitions placed control of leading ST moist snuff brands Kodiak and Grizzly (Conwood) and Skoal and Copenhagen (U.S. Smokeless Tobacco Company)

in the hands of cigarette manufacturers, ostensibly to synergize marketing of cigarettes and ST products. These companies also introduced potential reduced risk snus products marketed under leading cigarette brand names, including Camel Snus and Marlboro Snus, and dissolvable products sold as Camel Dissolvables (Orbs, Sticks, and Strips) (Fig. 2.3). Data from Massachusetts show that the number of snus brands sold in that state increased from 4 in 2003 to 62 in 2011, before dropping to 26 in 2012, indicating a high point in snus product marketing.[6] Very recently, Altria acquired an 80% stake in Swiss ST manufacturer Burger Sohne, that produces a snus product marketed as On![23] These actions reflect a general trend toward expansion of the noncombusted market, as evidenced by Altria's acquisition of a 35% stake in the manufacturer of the JUUL e-cigarette and the pending introduction of Altria's heat-not-burn product, IQOS.[24,25]

Innovations in design are promoted in sophisticated ways to optimize consumer appeal and may subvert existing tobacco control regulations.[26–29] Therefore, control authorities must surveil the entire ST market to understand physical design, formulation, and constituents of products and the methods used by manufacturers to communicate to both old and new consumers.[30] Insights on innovations will inform potential regulatory strategies to prevent the emergence of new fronts in the ongoing tobacco epidemic by preventing initiation of ST use while providing lower risk alternative for adult smokers.

Figure 2.3 Some examples of smokeless tobacco products used in the United States: chewing tobacco twist (upper left), snus pouches (lower left, left side), dry snuff (lower left, right side), and dissolvable oral tobacco (right). *Photos courtesy of Clifford Watson, Centers for Disease Control and Prevention.*

Design features that promote use

For decades, tobacco manufacturers have systematically manipulated and continue to refine the design and formulation of their products to enhance consumer appeal.[31–33] ST manufacturers do likewise to meet the preferences of current consumers and to increase interest among targeted groups of potential consumers.[5] These features ultimately influence consumers' preferences by enhancing product appeal and potentially promoting tobacco dependence.[34]

ST manufacturers seek to enhance dependence—that is, abuse liability—by optimizing the speed and amount of nicotine dosing while providing appealing chemosensory characteristics such as taste, coolness, and smoothness to make the product easier and more pleasant to consume.[22,35–38] Three major areas of innovation—manipulation of nicotine delivery, product formulation, and flavoring—are considered in the following sections.

Nicotine

Nicotine is a leading feature of tobacco product design and provides the primary reinforcing effect that underpins dependence. Its effects are perceived by consumers as pleasurable (after sometimes negative symptoms from early exposure), which directly influences preferences and use behavior.[36] While ST delivers nicotine more slowly than smoking, as measured via blood plasma level,[37] overall delivery is about the same and is sufficient to promote and maintain dependence.[37]

Nicotine level varies substantially between and within products. The form of nicotine also can be varied by adjusting the proportion of that exists as free-base (unprotonated), which more readily permeates mucous membranes, including the buccal mucosa and the blood–brain barrier. This causes a more rapid onset of effect, thus supporting the development and maintenance of dependence.[38] The proportion of free nicotine is a function of pH. Higher (more alkaline) pH yields a greater proportion of free-base.[39,40] pH is readily altered by the addition of chemical buffering agents and salts, and there is extensive evidence that manufacturers have used this approach to modify product abuse liability.[41]

Since at least the 1980s, manipulation of free nicotine has been a mainstay of design.[38,42,43] Manufacturers made products, notably moist snuff, to provide variations in nicotine dosing that were convenient to consumers. This was done to advance the so-called graduation strategy, whereby

low-nicotine moist snuff was used to attract novice users who had not developed tolerance to high nicotine doses. The rationale was that nicotine is aversive in novices, and lower doses are more effective at promoting initiation because the product can be more easily and comfortably consumed. Some brands, such as Skoal Bandits, had nicotine levels as low as 7.5 mg/g, compared with 10.3–11.4 mg/g for other brands.[43] Products with iteratively higher doses are available to more experienced users to support increasing tolerance and dependence.[44] Nicotine levels in moist snuff sold in the United States now range from about 6 to 23 mg/g,[6,45] which is wide enough to suggest that there is considerable variation in consumer preference for nicotine levels.

Manufacturers have also manipulated physical characteristics to appeal to smokers, apparently to promote dual use with cigarettes rather than to support complete switching. Seidenberg and colleagues found that Swedish style pouched snus sold in the United States had a far lower concentration and proportion of unionized nicotine than that sold in Sweden.[46] While lower levels of free nicotine would be less likely to promote dependence and thus support higher use, the authors speculated that a lower abuse liability might be designed by manufacturers of American snus to promote dual use with smoking. Cullen and colleagues found that free nicotine in snus products sold in Massachusetts increased between 2003 and 2012 at an overall rate of 0.19 mg/g per year, with this increase driven by products made by Swedish Match North America (General Snus) and Reynolds (Camel Snus).[6] During the same period, free nicotine levels in moist snuff were relatively stable, although increases were seen in mint- and menthol-flavored and pouch products, as well as those made by U.S. Smokeless Tobacco Company (e.g., Copenhagen, Skoal).

Formulation

The range of formulations has evolved, giving rise to a variety of products targeted at subgroups of consumers. Companies in Sweden and the United States have varied the manner in which tobacco is prepared, packaged, and presented. For example, it may be dried and cured, which achieves a lighter, smoother quality, or fermented, which increases sweetness. Most moist snuffs in the United States are fermented and chopped or shredded in different grades to achieve a "cut" of a finer or longer form. Long cut tobacco is easier to manipulate into a wad for placement inside the cheek and has longer-lasting effects. Finer cuts are less convenient but have

more rapid effects, owing to a greater tobacco surface area in contact with mucosa. Manufacturers have also used design innovation to address health concerns among smokers and have developed products to reduce the perception of risk relative to smoking.[47] For example, Swedish snus is pasteurized by steam, resulting in lower concentrations of carcinogenic, tobacco-specific nitrosamines.[48,49] The GothiaTek standard used by Swedish Match requires that concentrations of *N*-nitrosonornicotine (NNN), 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK), lead, and aflatoxins not exceed specified limits, although these industry-established limits have been criticized as insufficient to protect the health of consumers.[50] Another variant is the range of powdered, compressed tobacco dissolvable products in the form of lozenges, tablets, toothpicklike sticks, and strips that resemble popular breath fresheners.

Spitless products

One targeted form is spitless moist snuff. Chewing or sucking on older products stimulates salivary excretion, which produces a dark, pungent fluid that cannot be swallowed because of irritation to the esophagus and gastrointestinal discomfort. Spitting is aversive to many users and a source of social stigma.[51] Lowering the moisture content and adding salt reduces saliva production. Swedish-style formulations such as Camel Snus are marketed as spitless to appeal to smokers and new potential ST users.[52]

Pouched products

Pouches are used primarily for finely ground snus. The user has the convenience of a premeasured portion of tobacco corresponding to a standard nicotine dose that is easy to place between the cheek and gum. The pouch material minimizes the discomfort of fine tobacco particles becoming embedded between the teeth or migrating to other parts of the mouth. The pouch is also less visible than loose snuff, and concealment of use may reduce the social stigma. The benefit is evident in marketing to US smokers, who have historically regarded ST as socially undesirable.[53,54]

Powdered, compressed tobacco

Commonly known as dissolvables, compressed tobacco is a recent innovation, having been introduced to the United States in 2001 as the Ariva lozenge, followed in 2003 by Stonewall. They dissolve in the mouth, a convenient and more socially acceptable means of consuming tobacco. Not surprisingly, they were positioned by their manufacturer, Star Scientific,

as lower risk alternatives to smoking. Reynolds American later introduced Camel Dissolvables in the variants Orbs, Sticks, and Strips, which were targeted at smokers as "adjacency" products that could be used where smoking was not possible, and suggesting lower health risk. Early concerns were expressed by the public health community about the sweet and mint flavoring and presentation of Camel Dissolvables, which resembled some candies popular with young people such as Tic-Tacs.[55] Further concern was raised about the potential for poisoning in children who accidentally consumed them,[55] although recent data suggest that this has not been substantiated perhaps because of the low prevalence of dissolvable use.[56] Likewise, the FDA's Tobacco Products Scientific Advisory Committee reported in 2012 that, while dissolvables could reduce an individual's risk of tobacco-related disease, the market penetrance was so low that estimates of population harm could not be made.[57] After a decade of poor sales, in 2012 Star Scientific withdrew Ariva and Stonewall and quit the tobacco business following an FDA ruling that disallowed claims of low health risk.[58] Camel Dissolvables were withdrawn from the US market in 2013 following low consumer acceptance and corresponding poor sales.[59] Lozenges were recently reintroduced by Reynolds American.[60]

Flavoring

Flavors make tobacco products more appealing. They are especially important for novices because plain tobacco can have harsh, smoky, or bitter qualities. Manufacturers use flavorings to minimize aversive characteristics and maximize sensory appeal. Older styles of ST were typically unflavored, although sugar and molasses were used for some chewing tobacco and moist snuff products. Wintergreen, a menthol-like cooling additive, was one of the few flavorings used in a limited number of early moist snuffs. Most current ST is flavored, and there is much variety, including fruit (peach, apple, grape), chocolate, spice (cinnamon), mint (wintergreen, spearmint, peppermint), and alcoholic drinks (bourbon, rum). Research has shown that flavor chemicals in some moist snuffs are present at higher levels than in candy.[61] A sample of 187 brands sold in Minnesota in 2013 found that 43% were flavored with mint (nonmenthol variants, including wintergreen) and 10% with fruit or sweet additives.[62] These findings were confirmed in a national sample, showing that about 60% of moist snuff brands sold in the United States are flavored.[63]

The use of flavorings has been criticized for targeting young people, including adolescents.[64] Indeed, analyses have shown that flavored moist

snuff is more likely to have lower pH and free nicotine, which is a characteristic of starter products. Concern has also been raised about the use of additives that are banned from food products, such as coumarin, which has been identified in Camel Orbs.[65]

Communicating innovations: marketing

Tobacco manufacturers make extensive use of opportunities to communicate their products. Communications are intended to raise product awareness among consumers, differentiate a product from its competitors, and facilitate appeal by conveying the characteristics that may be attractive to consumers. They use several channels to achieve those goals, most notably through advertising and promotion, as well as product packaging, which reflects and reinforces broader promotional efforts at the point of use. Communications aim to create a brand image by providing subjective pictures and suggestions that build a specific profile with which individuals might personally identify. Images often used in the United States have been oriented toward masculine outdoor themes such as rodeo, fishing, and baseball.[54] Newer products such as Camel Snus emphasize more sophisticated, urbane, indoor themes aimed toward new audiences, including urban women smokers.[52,54] Recent marketing has highlighted the substitutability of ST for cigarettes, especially in the context of indoor smoking bans, and the potential for lower health risk.[64,66] Marketing is also used to communicate design features, such as nicotine level, flavoring, and presentation. Product characteristics play an important part in shaping consumers' perceptions, and internal tobacco industry research suggests that these perceptions may further influence consumers' response to the product when it is sampled.[34] This is done by packaging: Cigarette manufacturers use images, written text phrases (e.g., rich, smooth, spicy), and colors to convey information about nicotine level or flavor characteristics,[67,68] and this can be applied to ST.[69] Sales of flavored ST (primarily moist snuff and snus) increased by 72% between 2005 and 2011, underscoring the importance of these products in the ST market.[63]

Communication channels

Strategies have changed over time. In 1985, the US Federal Trade Commission reported marketing expenditure by ST manufacturers of approximately US$80 million. This sum has increased steadily, to US$718 million in 2017.[14] So too have the mechanisms for reaching targeted audiences.

Previously the appeal was to males of lower socioeconomic position, often from rural areas. In the early 1970s, radio and television were the principal media. In 1986, a federal ban on advertising of ST products by electronic media was enacted,[70] and advertising moved to magazines in conjunction with other promotional activities through the 1990s. These included sponsorship of sports events such as NASCAR motor racing and rodeos, the use of product-branded merchandise such as T-shirts, caps, and bags, advertising at the point of sale, and payments to retailers for optimal product placement in stores.[71] The Smokeless Tobacco Master Settlement Agreement of 1998 (a legal settlement between 48 US states' attorney generals and the leading ST manufacturer, U.S. Smokeless Tobacco Company) resulted in bans on outdoor billboards and restrictions on marketing involving sports, sponsorship of public events, and promotional products.[72]

Given these restrictions, strategists took advantage of the digital revolution. This took the form of company websites, targeted online advertising, and sponsored social media, which grew from US$72,000 in 2002 to US$11 million in 2017.[14] Magazines have continued to be used, especially youth-oriented publications that cover music, the entertainment industry, outdoor recreation, and sports.[73] Sweepstakes, price reductions, and coupons continue, and brand websites have been added.[74,75] Social media are leveraged, including a strong presence on YouTube.[76,77] Social media and web content are easily accessible to young people, including minors.[78] Videos that promote specific ST brands and are created by users, including those under the age of 18, have been heavily represented on YouTube.[79]

Segmentation of target markets: communicating differences

For over half a century, tobacco manufacturers have used sophisticated techniques to innovate their products in order to reach new consumer subgroups.[54] Strategies fall into two main categories: designing products, especially cigarettes, to have optimal appeal and addictiveness, and communicating the appealing new features to enhance social acceptability. These twin strategies are used in parallel to synergistically augment their impact: Marketing, including pack messaging, reinforces the characteristics of a cigarette that certain consumers find appealing, and the appeal of those characteristics in turn reinforces the perception of the product that marketing communications are promoting. Evidence has shown that tobacco companies have tailored these strategies to address the needs and preferences of subgroups, especially vulnerable populations.[80,81]

As noted earlier, ST was originally designed to appeal to men, especially those of low socioeconomic status and rural background, with robust flavor and high nicotine levels, reinforced by visible and memorable marketing messages.[54] Adolescents have now been targeted with products that make initiation easier, such as variations in menthol and lower nicotine content. The tobacco industry has long claimed that they do not target youth with advertising or promotions, yet there is abundant evidence, including from industry's own internal documents, showing that they do.[82–84] Aggressive advertising conveys images of ST use as rugged, manly, sexually attractive, and cool, while reinforcing social acceptability of use and highlighting the excitement and reward it offers.[85] Youth-oriented marketing was targeted through magazines (e.g., *Rolling Stone*), billboards, and public promotions of sporting events such as motor racing and music festivals.[83] Use was portrayed as masculine, individualistic, risk-taking, and confident.[54] Despite the 1998 Smokeless Tobacco Master Settlement Agreement, evidence shows that adolescents continued to be targeted through youth-oriented magazines.[73]

Other promotional strategies were systematically applied to people of low socioeconomic status, including higher exposure to TV and radio advertising and greater density of tobacco retailers in low-income rural areas.[80] Meanwhile, promotions to change and shape the social acceptability of ST, including promotions of public events and celebrity endorsements, reinforced the message of social acceptance in that demographic. ST ads featured blue collar references; imagery of cowboys, hunters, and racecar drivers projected a rough, resilient, independent masculinity with brands such as Skoal, Grizzly, and Kodiak[86] in magazines such as *Sports Illustrated* and *Popular Mechanics* as well as at point of sale. Magazine messages also had a reinforcing and cumulative impact on social attitudes to smoking, making it more socially acceptable and creating a normative perception that a majority of one's peers smoked and that it was both enjoyable and a useful strategy to relieve stress and other emotional burdens.[83]

Pursuit of new markets: women and smokers

Tobacco manufacturers have a long history of aggressive marketing of products to attain new consumers and retain existing ones. This has certainly been true of ST companies before and after their acquisition by the tobacco giants.

In the past decade, women have been targeted with messages of social acceptability and personal convenience. Snus ads have focused on the convenience of ST in smoke-free environments, the absence of tobacco odor,

and lower health risk.[51,52] Moist snuff advertisements have appeared in magazines such as *Glamour*, *Marie Claire*, and *Vogue*, which present snus as attractive and fashionable.[87] The market remains heavily focused on male use, and some evidence suggests that women are unlikely to be easily persuaded, even to reduce the risks of smoking.[88]

Smokers have been targeted with novel products, including snus with the cigarette brand names Camel and Marlboro. This follows a trend among Swedish men, who have used snus to reduce or quit smoking.[89–91] ST is touted in the United States and other developed countries to reduce health concerns and lessen the impact of smoke-free laws, which have made smoking less personally convenient and created an incentive for cessation.[92] Evidence from current smokers around the time of release of these products in the United States suggests that interest in trying reduced exposure products was greatest among women, non-Hispanic whites, and heavy smokers concerned about health risks.[93] However, US smokers have remained generally unenthusiastic about ST in part because of poor taste qualities and inadequate nicotine dosing.[46,94] Most US smokers who have tried snus do not persist; smokers who report current use of snus were likely to say that they were trying to cut down on cigarettes.[94] In contrast, other evidence has shown that, among Swedish men, most snus users do not persist in smoking.[90] Marketing of ST to smokers has now been almost completely supplanted by noncombusted vaping products, which offer a lower-risk alternative that is more socially acceptable and convenient.

What is the evidence for the impact of innovations on use?

Over the past two decades, tobacco control initiatives in developed countries have lowered demand for conventional products, both combusted and smokeless. This reduction has been driven by price increases, health communication campaigns, pack warnings, cessation support, advertising restrictions, and social denormalization.[95] Innovation in product design and communication underpins the industry's effort to maintain a profitable consumer base in the face of waning demand. Some of the greatest reductions in demand for combusted tobacco have occurred in the United States and other developed countries, and the high perceived health risk of combusted products has been an important contributor to this trend. This has created opportunities for both ST manufacturers, who have sought to expand sales by introducing reduced risk products, and cigarette manufacturers, who

have sought to protect dwindling sales by providing ST options for smokers such as Camel Snus and Marlboro Snus.[52] Recently, cigarette manufacturers introduced new options such as Reynolds' Revel lozenges in the United States and pouched products Lyft and Epok in Europe as part of a "modern oral" line.[60] As ST products and marketing evolved from the early 2000s, certain impacts have been seen, including changes in sales and the profile of users. Evidence for the impact of nicotine, flavor, and formulation innovations can be gauged by research on consumer perceptions, prevalence of use, and sales.

Research has shown that overall ST consumption in the United States increased by as much as 23% between 2000 and 2015,[13,96] although other findings suggest that use remained relatively stable from 2002 to 2014.[97,98] However, the broad trend might mask changes in novel product use and population characteristics. For example, the proportion of US adults who were regular users of moist snuff increased 42% between 2001 and 2010, and the proportion of younger adults (aged 18 to 44) who were regular users increased 55%, to 2.8%, corresponding to 2.8 million.[99] Sales of moist snuff, the mainstay of ST manufacturers, increased by 66% from 2005 to 2011.[63] However, sales of newly marketed pouched snus products increased by 334% and contributed 28% of the ST market in the same period. Camel Snus was a top 10 selling moist snuff brand by 2011. Similarly, sales of flavored products increased 72%, contributing 59% of the ST market.[63] These trends were reflected among youth in New York City: While smoking rate declined by 53% from 2001 to 2013, ST rate increased by 400%.[100] During this period, ST quit rate slowed while smoking quit rate increased, further suggesting that ST manufacturers managed to retain market share, perhaps by providing products with lower perceived health risk, which, unlike combusted products, dissuaded consumers from quitting.[101]

While the evidence that might shed light on the impact of innovations in nicotine delivery and formulation in ST products is extremely limited, a growing body of research has addressed the role of flavors in shaping perceptions and patterns of use. Overwhelmingly, flavored tobacco products are perceived more favorably than nonflavored, and are more likely to be used by younger consumers.[102] Qualitative research has shown that flavors are important in promoting appeal among youth[64,103]; and flavors, chiefly mint and wintergreen, are preferred among smokers who switch to ST.[104,105] A study using data from the Population Assessment of Tobacco and Health (PATH) study of 7718 adolescents who had never used tobacco found that susceptibility for ST use was greatest among those who perceived

flavored products as easier to use than unflavored.[106] The implication that adolescents will be more likely to use a tobacco product if it is flavored was borne out in several large cross-sectional surveys of US youth and young adults. Over 80% of tobacco users, including combusted forms, e-cigarettes, hookah, and ST, reported using a flavored product.[107,108] Most telling are observations that a majority of users—70% to 81%—initiated with a flavored product,[108,109] and more than 75% of flavored product users reported no interest in continued use of their current tobacco product if it was not flavored.[107] Moreover, users of flavored noncigarette tobacco, which includes ST, have reduced odds of a quit attempt in the past year. While these findings are not all specific to ST, they suggest a strong preference for flavors across all tobacco products among younger users and underscore a reason why manufacturers strive to develop and promote flavored products that appeal to the young. In line with this view are data from the National Adult Tobacco Survey showing that approximately half of an estimated 4 million ST users in the United States used a flavored product in the past 30 days, with use highest among those aged 18 to 24.[105]

Evidence also shows that flavored ST has an advantage in the retail market. Sales of mentholated moist snuff and snus increased from 2011 to 2015, while sales of flavored nonmentholated moist snuff and snus declined.[110] This may be attributable to observations that ST manufacturers have made extensive use of advertising that promotes flavor options, including messages designed to elicit interest in ST among smokers.[54] Moist snuff sales were mostly menthol, which closely reflects findings on consumer preferences: Mentholated brands accounted for 57% of moist snuff sales and 89% of snus.[110] The profound impact of ST flavors on consumer preference and use is further informed by research on tobacco sales in New York City after sale of flavored products was banned in 2009. While flavored tobacco sales declined dramatically as expected,[111,112] further analyses showed that, 3 years after the ban, teens were 37% less likely to ever try a flavored tobacco product and 28% less likely to try any tobacco product.[112]

Thus, recent evidence drawn from a range of sources shows that flavors are a primary driver of interest in use, consumer preference, and current use of ST. Moreover, mint and menthol overwhelmingly are the preferred flavor options. The products sold by ST manufacturers are in close alignment with population use trends: In 2011, 51% of the total ST retail market was accounted for by mint and menthol; this corresponds to a 76% increase in mint and menthol sales from 2005.[63] Manufacturers have sought to meet consumer demand for mint and menthol by designing and marketing those

products. As a result, more youth have initiated ST use, and manufacturers have succeeded in expanding overall sales.

However, these broad trends may mask adoption of novel products among nontraditional populations of ST users, including youth, women, and those living in urban settings. For example, analysis of the 2011 US National Youth Tobacco Survey found that, of high school students using ST, 26.8% used a combination of novel and conventional products, while 9.2% used only a novel product.[113] Between 2001 and 2013, use by high school athletes increased by 10%, even while tobacco use was declining among high school nonathletes.[114] Young adults of a sexual minority (gay, lesbian, bisexual, or self-reported as "something else") were 2.1−3.3 times more likely to use ST, based on 2013/14 PATH survey data.[115]

Policy and regulatory strategies for an evolving market

Given the capacity and incentive of manufacturers to refine, innovate, and promote, the potential for expansion of ST use raises clear public health concerns. This is particularly so if their efforts are responsible for initiating use in youth, or if new products dissuade current tobacco users, including smokers, from quitting. Concerns have also been expressed about the potential for dual use of ST and combusted tobacco. While no tobacco use is safe, some forms such as low-nitrosamine ST are likely to lower individual risk compared to smoking.[116] Combusted tobacco use has declined in many developed countries, such as in the United States, where the rate of adult current use is 16.7%.[117] In countries in which consumers are increasingly concerned about the health risks of combusted tobacco, retail markets are rapidly adapting to accommodate consumer preferences. In this changing environment, ST manufacturers are seeking to obtain advantage by innovation, yet they face new challenges as cigarette manufacturers promote vaping and heat-not-burn alternatives.[118] The evidence shows that ST use has not declined at a population level in the United States with the decline of combusted tobacco over the past two decades. That is, ST maintains intrinsic appeal. This means that control measures are needed to prevent the appeal from causing young people to initiate use. At the same time, opportunities to regulate low-risk ST products as alternatives to smoking must be explored. Certainly, challenges posed by ST innovation must be addressed within a comprehensive tobacco control platform, in developed and developing countries alike.

Regulatory approaches to innovation of ST products

The WHO's FCTC, with over 180 countries as parties, has laid out a broad set of evidence-based antitobacco policy strategies with merit for use in regulating ST.[119] The articles call for strategies that include monitoring and surveillance, health warnings and anti-tobacco communications, bans on marketing, taxes, and cessation support. Because the FCTC applies to all tobacco products equally, many if not most policy approaches are directly relevant to ST. Therefore, strategies that include disclosure and regulation of contents (Articles 9 and 10) are especially important for ST, particularly if evidence points to design modifications that increase appeal among youth or mislead consumer perceptions of health risks. Likewise, regulations that restrict marketing, such as advertising or promotions that make claims of lowered risk, are important tools for addressing ST innovation. Even smoke-free laws, a key strategy under the FCTC, are relevant to ST: Because cigarette manufacturers have marketed smokeless products to smokers to help subvert indoor smoking bans,[120] smoke-free laws should be extended to include bans on all tobacco product use in regulated environments.

Regulatory agencies in a number of national jurisdictions have the authority to adopt ST policies. Under an act passed in 2009, the FDA can regulate the manufacture, sale, and marketing of tobacco products.[121] They can require manufacturers to apply for premarket approval of a new product, or for a claim of reduced risk. In October, 2019 the FDA granted the first-ever approval for a modified risk tobacco product claim to General Snus, a Swedish pouch-style snus product manufactured by Swedish Match North America. Similarly, the European Union's Tobacco Products Directive of 2014 regulates manufacture, presentation, and sale in member states. It bans the sale and marketing of Swedish snus, with exceptions for Sweden and Norway, where snus has a long-standing history.[122] Other forms of ST with a limited customer base, such as chewing tobacco and nasal snuff, are not subject to the directive.[123] Bans on ST sale and marketing have been introduced in a few other countries: Australia, Hong Kong, Singapore, and the United Arab Emirates. In India, the Food Safety and Standards Authority banned the sale of gutkha following a Supreme Court decision in 2012 pertaining to food safety laws.[124] However, product innovations have been used to subvert this regulation: Manufacturers of gutkha have since marketed and sold tobacco and other key constituents separately in "twin packs," which are then combined by the consumer.[125]

Globally, there are relatively few examples of regulatory actions that affect innovation in ST products to attract consumers. Rather, much of the focus has been on restriction of flavor additives, notably menthol. Flavored ST has been banned in a few countries, including Ethiopia, Chile, and Moldova. Canada banned flavor additives in cigarettes in 2009 and extended the ban to menthol in 2017. ST, waterpipe (shisha) tobacco, and alcohol-flavored cigarillos are not covered, leaving a potential regulatory loophole.[126] Likewise, the European Union banned flavored cigarettes in 2016, and Turkey banned menthol cigarettes in 2015, though these bans do not extend to other tobacco products. Brazilian regulators approved a ban on flavor additives, including menthol, in all tobacco products in 2012, yet the regulation remains suspended by litigation. In the United States, the FDA issued an advance notice of proposed rulemaking (ANPRM) in 2018 that will consider regulatory approaches for flavors in noncigarette tobacco products, including ST. The ANPRM will assess the role of flavors in youth initiation, as well as whether flavors play a role in helping adult smokers switch to a lower risk ST product.[127] Similarly, the FDA is considering regulating menthol in combusted and noncombusted products, which could see the future adoption of regulations on menthol in ST.[128] Globally, flavor regulations are complex, often beset with loopholes, vary across national and subnational jurisdictions, and will likely continue to change over time. Effective regulations on flavored ST should seek to prevent manufacturers from developing products that appeal to youth, but should also consider whether the products might encourage adult smokers to switch.

Regulation of nicotine level or the form of nicotine delivered in ST may help reduce abuse liability, yet this approach has seldom been proposed. While the FDA has issued an ANPRM to reduce nicotine below an addictive threshold, this applies only to cigarettes.[129] Few if any other countries have proposed regulation of nicotine, and ST remains an underrecognized regulatory target. Similarly, very few jurisdictions have sought to regulate presentation and packaging of ST, including pack size or, for pouched products such as snus, the size of the pouch. In South Africa, snus may be sold in cans of various sizes, including small ones which are more attractive to people unable to afford larger ones. In the United States, cigarettes have a mandated minimum pack size of 20, yet snus does not have a minimum number of pouches per pack. Smaller volume packs, which are lower priced, are more appealing and accessible to youth.[130]

Many jurisdictions have broad regulations to limit tobacco product advertising and promotion, and these generally apply to ST. Still, while articles of the FCTC apply equally to all tobacco products, they have not been evenly applied to ST and are often overlooked by the membership. A recent analysis found that just 16 (9%) of parties have adopted a ban on ST advertisement, promotion, and sponsorships.[17] This is concerning in light of the rapidly evolving nature of digital technology and the opportunities to market products using websites, apps, and social media. In the United States, the FDA has reissued a rule restricting sponsorship of sporting, entertainment, and social or cultural events by tobacco manufacturers, including ST. However, the current rules do not apply to digital media, leaving the door open for novel promotion technique and products.[131,132] Regulations that impose restrictions on product pack descriptors, colors, and other features have been imposed in some jurisdictions for combusted tobacco, but rarely for ST. Evidence-based regulation on the promotion of ST innovations via mass communication such as digital media and pack- and point-of-sale methods is urgently needed.[132]

Summary and conclusions

The rapidly changing tobacco market in some developed countries has seen a shift in consumer preferences from combusted toward noncombusted products. Manufacturers that traditionally made cigarettes are becoming increasingly involved in ST. As noncombusted forms of nicotine delivery become normalized, new market dynamics will come into play. ST will face competition from e-cigarettes, and evidence-based tobacco control interventions will continue to restrict ST, so that innovations in product design and marketing will be increasingly important. A nuanced understanding of innovation and its impact on retaining and expanding markets, especially those in developing countries, is necessary to protect public health. At the same time, urgent actions are needed in regions where the greatest proportion of ST users are located, even though innovation has occurred at a slower pace there. For example, in India, where some 90% of the world's ST users live, policies can be applied at state and local levels to reduce product appeal.[133,134] At a minimum, all parties to the FCTC should adopt and enforce a full complement of policies that aim to reduce ST demand.[17]

Because ST poses lower health risks than combusted products, regulatory opportunities to optimize harm reduction should be considered.[135,136] ST should be regulated in a way that supports a net reduction in tobacco-

related harm. Such policies should serve to prevent youth initiation, and policymakers must rigorously evaluate and regulate health claims made by ST manufacturers. Consumer responses to FDA-approved claims for modified risk, such as granted to General Snus, should be monitored to determine whether the use of modified risk products leads not only to lowered exposure but also to reduced consumption of products with higher health risks. ST product regulations should be aligned with those for combusted products so that lower risk products are available to adult smokers while rigorous measures are applied to prevent youth initiation.

Global lessons suggest that regulation should seek to limit the proliferation of new ST markets and to lower use in current markets by blocking opportunities to innovate products. However, relatively few countries have implemented regulations on ST products that would restrict manufacturers' ability to innovate and recruit new consumers. The FCTC and other regulatory mechanisms, including the US FSPTC Act and the European Directive on Tobacco Products, provide promising opportunities. Standards that require the elimination of toxic constituents to the extent possible should be adopted. Standards that restrict flavors and regulations on packaging and mass marketing strategies, including digital media, will minimize the appeal to youth. Standards that regulate nicotine delivery and the ease and convenience of use must be developed to support adult smokers' ability to switch to ST. An ambitious research agenda is needed to support standards that will yield minimal-risk alternatives to combusted tobacco. Existing comprehensive approaches to ST regulation, which include increased taxes, health warnings, cessation support, and antitobacco health communications, are effective and will continue to be needed.[137] In the context of a changing tobacco market, policies that limit ST manufacturers' capacity to develop new global markets while providing options for smokers to reduce their risk from more deadly combusted products will be indispensable.

References

1. IARC Working Group on the Evaluation of Carcinogenic Risk to Humans. *Personal Habits and Indoor Combustions. Smokeless Tobacco. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, No. 100E*. Lyon: International Agency for Research on Cancer; 2012.
2. Lee K, Eckhardt J. The globalisation strategies of five Asian tobacco companies: a comparative analysis and implications for global health governance. *Glob Public Health*. 2017;12(3):367–379. https://doi.org/10.1080/17441692.2016.1273370.
3. Lewis MJ, Wackowski O. Dealing with an innovative industry: a look at flavored cigarettes promoted by mainstream brands. *Am J Public Health*. 2006;96(2):244–251. https://doi.org/10.2105/AJPH.2004.061200.

4. WHO Framework Convention on Tobacco Control. *Commonly Used Smokeless Tobacco Products Around the Globe*; 2019. Geneva https://untobaccocontrol.org/kh/smokeless-tobacco/paan-betel-quid-tobacco/.
5. National Cancer Institute and Centers for Disease Control and Prevention. *Smokeless Tobacco and Public Health: A Global Perspective*. Bethesda, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Institutes of Health, National Cancer Institute. NIH Publication No. 14-7983; 2014.
6. Cullen D, Keithly L, Kane K, et al. Smokeless tobacco products sold in Massachusetts from 2003 to 2012: trends and variations in brand availability, nicotine contents and design features. *Tob Control*. 2015;24(3):256–262. https://doi.org/10.1136/tobaccocontrol-2013-051225.
7. Mehrotra R, Sinha DN, Tibor S. *Global Smokeless Tobacco Control Policies and Their Implementation*. Uttar Pradesh: National Institute of Cancer Prevention and Research; 2017.
8. Guven A, Tolun F. Effects of smokeless tobacco "maras powder" use on nitric oxide and cardiovascular risk parameters. *Int J Med Sci*. 2012;9(9):786–792. https://doi.org/10.7150/ijms.4563.
9. WHO South East Asian Regional Office (SEARO). *Report on Oral Tobacco Use and Its Implications in South-East Asia*; 2004. New Delhi http://www.searo.who.int/tobacco/topics/oral_tobacco_use.pdf.
10. Bhisey RA. Chemistry and toxicology of smokeless tobacco. *Indian J Cancer*. 2012;49(4):364–372. https://doi.org/10.4103/0019-509X.107735.
11. Euromonitor International. *Passport: Tobacco. Market Sizes*. 2019. Chicago, IL.
12. Singh A, Ladusingh L. Prevalence and determinants of tobacco use in India: evidence from recent Global Adult Tobacco Survey dataGorlova OY, ed. *PLoS One*. 2014;9(12):e114073. https://doi.org/10.1371/journal.pone.0114073.
13. Agaku IT, Alpert HR. Trends in annual sales and current use of cigarettes, cigars, roll-your-own tobacco, pipes, and smokeless tobacco among US adults, 2002–2012. *Tob Control*. 2016;25(4):451–457. https://doi.org/10.1136/tobaccocontrol-2014-052125.
14. Federal Trade Commission. *Federal Trade Commission Smokeless Tobacco Report for 2017*. 2019. Washington, DC.
15. Mohan P, Lando HA, Panneer S. Assessment of tobacco consumption and control in India. *Indian J Clin Med*. 2018;9. https://doi.org/10.1177/1179916118759289.
16. World Health Organization. *90% of Smokeless Tobacco Users Live in South-East Asia*; 2016. http://www.searo.who.int/mediacentre/releases/2013/pr1563/en/.
17. Mehrotra R, Yadav A, Sinha DN, et al. Smokeless tobacco control in 180 countries across the globe: call to action for full implementation of WHO FCTC measures. *Lancet Oncol*. 2019;20(4):e208–e217. https://doi.org/10.1016/S1470-2045(19)30084-1.
18. Macy MJT, Li J, Xun P, Presson CC, Chassin L. Dual trajectories of cigarette smoking and smokeless tobacco use from adolescence to midlife among males in a midwestern US community sample. *Nicotine Tob Res*. 2016;18(2):186–195. https://doi.org/10.1093/ntr/ntv070.
19. Jasinski DR, Henningfield JE. Human abuse liability assessment by measurement of subjective and physiological effects. *NIDA Res Monogr*. 1989;92:73–100.
20. Carter LP, Griffiths RR. Principles of laboratory assessment of drug abuse liability and implications for clinical development. *Drug Alcohol Depend*. 2009;105(Suppl):S14–S25.
21. Hoffmann D, Djordjevic MV, Hoffmann I. The changing cigarette. *Prev Med*. 1997;26(4):427–434. https://doi.org/10.1006/pmed.1997.0183.

22. Alpert HR, Koh H, Connolly GN. Free nicotine content and strategic marketing of moist snuff tobacco products in the United States: 2000–2006. *Tob Control*. 2008; 17(5):332–338. https://doi.org/10.1136/tc.2008.025247.
23. Duprey R. *Latest Altria Acquisition Bolsters its Smokeless Segment*. Yahoo Finance; June 2019. Published https://finance.yahoo.com/news/latest-altria-acquisition-bolsters-smokeless-170900208.html.
24. JUUL Labs. JUUL Statement About Altria Minority Investment and Service Agreements. https://ryghub.com/2018/12/juul-labs-issues-statement-about-altria-minority-investment-and-service-agreements/.
25. U.S. Food and Drug Administration. *FDA Permits Sale of IQOS Tobacco Heating System through Premarket Tobacco Product Application Pathway*; 2019. Washington, D.C. https://www.fda.gov/news-events/press-announcements/fda-permits-sale-iqos-tobacco-heating-system-through-premarket-tobacco-product-application-pathway
26. Kozlowski LT, Abrams DB. Obsolete tobacco control themes can be hazardous to public health: the need for updating views on absolute product risks and harm reduction. *BMC Public Health*. 2016;16(1):432. https://doi.org/10.1186/s12889-016-3079-9.
27. Berg CJ, Haardörfer R, Getachew B, Johnston T, Foster B, Windle M. Fighting fire with fire. *Soc Mark Q*. 2017;23(4):302–319. https://doi.org/10.1177/1524500417718533.
28. Lisha NE, Jordan JW, Ling PM. Peer crowd affiliation as a segmentation tool for young adult tobacco use. *Tob Control*. 2016;25(Suppl 1):i83–i89. https://doi.org/10.1136/tobaccocontrol-2016-053086.
29. Kasza KA, Ambrose BK, Conway KP, et al. Tobacco product use by adults and youths in the United States in 2013 and 2014. *N Engl J Med*. 2017;376(4):342–353. https://doi.org/10.1056/NEJMsa1607538.
30. O'Connor RJ, Cummings KM, Rees VW, et al. Surveillance methods for identifying, characterizing, and monitoring tobacco products: potential reduced exposure products as an example. *Cancer Epidemiol Biomarkers Prev*. 2009;18(12):3334–3348. https://doi.org/10.1158/1055-9965.EPI-09-0429.
31. Wayne GF, Connolly GN. How cigarette design can affect youth initiation into smoking: Camel cigarettes 1983–93. *Tob Control*. 2002;11(suppl 1):I32–I39. https://doi.org/10.1136/TC.11.SUPPL_1.I32.
32. Carpenter CM, Wayne GF, Connolly GN. The role of sensory perception in the development and targeting of tobacco products. *Addiction*. 2007;102(1):136–147.
33. Kreslake JM, Wayne GF, Alpert HR, Koh HK, Connolly GN. Tobacco industry control of menthol in cigarettes and targeting of adolescents and young adults. *Am J Public Health*. 2008;98(9):1685–1692.
34. Rees VW, Kreslake JM, Cummings KM, et al. Assessing consumer responses to potential reduced-exposure tobacco products: a review of tobacco industry and independent research methods. *Cancer Epidemiol Biomark Prev*. 2009;18(12). https://doi.org/10.1158/1055-9965.EPI-09-0946.
35. Carter LP, Stitzer ML, Henningfield JE, O'Connor RJ, Cummings KM, Hatsukami DK. Abuse liability assessment of tobacco products including potential reduced exposure products. *Cancer Epidemiol Biomark Prev*. 2009;18(12):3241–3262. https://doi.org/10.1158/1055-9965.EPI-09-0948.
36. Balfour DJK. The neuronal pathways mediating the behavioral and addictive properties of nicotine. In: *Nicotine Psychopharmacology*. Berlin, Heidelberg: Springer Berlin Heidelberg; 2009:209–233. https://doi.org/10.1007/978-3-540-69248-5_8.
37. Fant RV, Henningfield JE, Nelson RA, Pickworth WB. Pharmacokinetics and pharmacodynamics of moist snuff in humans. *Tob Control*. 1999;8(4):387–392. https://doi.org/10.1136/tc.8.4.387.

38. Tomar SL, Henningfield JE. Review of the evidence that pH is a determinant of nicotine dosage from oral use of smokeless tobacco. *Tob Control*. 1997;6(3):219–225. http://www.ncbi.nlm.nih.gov/pubmed/9396107.
39. Centers for Disease Control and Prevention (CDC). Determination of nicotine, pH, and moisture content of six U.S. commercial moist snuff products–Florida, January-February 1999. *MMWR Morb Mortal Wkly Rep*. 1999;48(19):398–401. http://www.ncbi.nlm.nih.gov/pubmed/10366135.
40. B Pickworth W, Rosenberry ZR, Gold W, Koszowski B. Nicotine absorption from smokeless tobacco modified to adjust pH. *J Addict Res Ther*. 2014;05(03):1–5. https://doi.org/10.4172/2155-6105.1000184.
41. Ferris Wayne G, Connolly GN, Henningfield JE. Brand differences of free-base nicotine delivery in cigarette smoke: the view of the tobacco industry documents. *Tob Control*. 2006;15(3):189–198. https://doi.org/10.1136/tc.2005.013805.
42. Tilashalski K, Rodu B, Mayfield C. Assessing the nicotine content of smokeless tobacco products. *J Am Dent Assoc*. 1994;125(5), 590-592, 594 http://www.ncbi.nlm.nih.gov/pubmed/8195501.
43. Henningfield JE, Radzius A, Cone EJ. Estimation of available nicotine content of six smokeless tobacco products. *Tob Control*. 1995;4(1):57. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1759397/.
44. Tomar SL, Giovino GA, Eriksen MP. Smokeless tobacco brand preference and brand switching among US adolescents and young adults. *Tob Control*. 1995;4:67–72. https://doi.org/10.2307/20747348.
45. Borgerding MF, Bodnar JA, Curtin GM, Swauger JE. The chemical composition of smokeless tobacco: a survey of products sold in the United States in 2006 and 2007. *Regul Toxicol Pharmacol*. 2012;64(3):367–387. https://doi.org/10.1016/j.yrtph.2012.09.003.
46. Seidenberg AB, Ayo-Yusuf OA, Rees VW. Characteristics of "American snus" and Swedish snus products for sale in Massachusetts, USA. *Nicotine Tob Res*. 2018;20(2). https://doi.org/10.1093/ntr/ntw334.
47. Feirman SP, Donaldson EA, Parascandola M, Snyder K, Tworek C. Monitoring harm perceptions of smokeless tobacco products among U.S. adults: health Information National Trends Survey 2012, 2014, 2015. *Addict Behav*. 2018;77:7–15. https://doi.org/10.1016/j.addbeh.2017.09.002.
48. Rutqvist LE, Curvall M, Hassler T, Ringberger T, Wahlberg I. Swedish snus and the GothiaTek® standard. *Harm Reduct J*. 2011;8(1):11. https://doi.org/10.1186/1477-7517-8-11.
49. Rickert WS, Joza PJ, Trivedi AH, Momin RA, Wagstaff WG, Lauterbach JH. Chemical and toxicological characterization of commercial smokeless tobacco products available on the Canadian market. *Regul Toxicol Pharmacol*. 2009;53(2):121–133. https://doi.org/10.1016/j.yrtph.2008.12.004.
50. Ayo-Yusuf OA, Connolly GN. Applying toxicological risk assessment principles to constituents of smokeless tobacco products: implications for product regulation. *Tob Control*. 2011;20(1):53–57. https://doi.org/10.1136/tc.2010.037135.
51. Sami M, Timberlake DS, Nelson R, et al. Smokers' perceptions of smokeless tobacco and harm reduction. *J Public Health Policy*. 2012;33(2):188–201. https://doi.org/10.1057/jphp.2012.9.
52. Timberlake DS, Pechmann C, Tran SY, Au V. A content analysis of Camel Snus advertisements in print media. *Nicotine Tob Res*. 2011;13(6):431–439. https://doi.org/10.1093/ntr/ntr020.
53. Agaku IT, Ayo-Yusuf OA. The effect of exposure to pro-tobacco advertising on experimentation with emerging tobacco products among U.S. adolescents. *Health Educ Behav*. 2014;41(3):275–280. https://doi.org/10.1177/1090198113511817.

54. Mejia AB, Ling PM. Tobacco industry consumer research on smokeless tobacco users and product development. *Am J Public Health*. 2010;100(1):78–87. https://doi.org/10.2105/AJPH.2008.152603.
55. Connolly GN, Richter P, Aleguas A, Pechacek TF, Stanfill SB, Alpert HR. Unintentional child poisonings through ingestion of conventional and novel tobacco products. *Pediatrics*. 2010;125(5):896–899. https://doi.org/10.1542/peds.2009-2835.
56. Wang B, Rostron B. Tobacco-related poison events involving young children in the US, 2001–2016. *Tob Regul Sci*. 2017;3(4):525–535. https://doi.org/10.18001/TRS.3.4.12.
57. Tobacco Products Scientific Advisory Committee. *TPSAC Report on Dissolvable Tobacco Products*; 2012. Washington, D.C.; https://wayback.archive-it.org/7993/20170405201701/https://www.fda.gov/downloads/AdvisoryCommittees/CommitteesMeetingMaterials/TobaccoProductsScientificAdvisoryCommittee/UCM295842.pdf.
58. CSP Daily News. *Star Scientific Exiting Tobacco Business*. CSP Daily News; 2012. https://www.cspdailynews.com/tobacco/star-scientific-exiting-tobacco-business.
59. Wall Street Journal. R.J. Reynolds Scales Back Marketing of Dissolvable Tobacco Products | Business | journalnow.com. https://www.journalnow.com/business/business_news/local/r-j-reynolds-scales-back-marketing-of-dissolvable-tobacco-products/article_9d001b58-f9f2-11e2-8fad-0019bb30f31a.html.
60. Carver R. Reynolds expands reach of dissolvable tobacco product with age-21 restrictions. *Winston Salem J*; March 30, 2019. https://www.journalnow.com/business/reynolds-expands-reach-of-dissolvable-tobacco-product-with-age-/article_ded61d79-cb05-525c-9188-26d8e46c796d.html.
61. Brown JE, Luo W, Isabelle LM, Pankow JF. Candy flavorings in tobacco. *N Engl J Med*. 2014;370(23):2250–2252. https://doi.org/10.1056/NEJMc1403015.
62. Tobacco Control Legal Consortium. *Flavored Tobacco on Sale in Minnesota: Research Findings*. Minnesota; 2013. https://www.publichealthlawcenter.org/sites/default/files/resources/tclc-fs-Morris-MN-flavored-tobacco-sold-2013.pdf.
63. Delnevo CD, Wackowski OA, Giovenco DP, Manderski MTB, Hrywna M, Ling PM. Examining market trends in the United States smokeless tobacco use: 2005–2011. *Tob Control*. 2014;23(2):107–112. https://doi.org/10.1136/tobaccocontrol-2012-050739.
64. Kostygina G, Ling PM. Tobacco industry use of flavourings to promote smokeless tobacco products. *Tob Control*. 2016;25(Suppl 2):ii40–ii49. https://doi.org/10.1136/tobaccocontrol-2016-053212.
65. Rainey CL, Conder PA, Goodpaster JV. Chemical characterization of dissolvable tobacco products promoted to reduce harm. *J Agric Food Chem*. 2011;59(6):2745–2751. https://doi.org/10.1021/jf103295d.
66. Mejia AB, Ling PM, Glantz SA. Quantifying the effects of promoting smokeless tobacco as a harm reduction strategy in the USA. *Tob Control*. 2010;19(4):297–305. https://doi.org/10.1136/tc.2009.031427.
67. Bansal-Travers M, O'Connor R, Fix BV, Cummings KM. What do cigarette pack colors communicate to smokers in the U.S.? *Am J Prev Med*. 2011;40(6):683–689. https://doi.org/10.1016/j.amepre.2011.01.019.
68. Connolly GN, Alpert HR. Has the tobacco industry evaded the FDA's ban on 'Light' cigarette descriptors? *Tob Control*. 2014;23(2):140–145. https://doi.org/10.1136/TOBACCOCONTROL-2012-050746.
69. Adkison SE, Bansal-Travers M, Smith DM, O'Connor RJ, Hyland AJ. Impact of smokeless tobacco packaging on perceptions and beliefs among youth, young adults, and adults in the U.S: findings from an internet-based cross-sectional survey. *Harm Reduct J*. 2014;11(1):2. https://doi.org/10.1186/1477-7517-11-2.

70. Ernster VL. Advertising and promotion of smokeless tobacco products. *NCI (Natl Cancer Inst) Monogr*. 1989;8:87–94. http://www.ncbi.nlm.nih.gov/pubmed/2654652.
71. Lynch BS, Bonnie RJ, Institute of Medicine (U.S.), Committee on Preventing Nicotine Addiction in Children and Youths. *Growing up Tobacco Free : Preventing Nicotine Addiction in Children and Youths*. National Academy Press; 1994.
72. National Association of Attorneys General. *Smokeless Tobacco Master Settlement Agreement*; 1998. Washington, D.C https://www.naag.org/assets/redesign/files/msa-tobacco/STMSA.pdf.
73. Morrison MA, Krugman DM, Park P. Under the radar: smokeless tobacco advertising in magazines with substantial youth readership. *Am J Public Health*. 2008;98(3):543–548. https://doi.org/10.2105/AJPH.2006.092775.
74. Moran MB, Heley K, Baldwin K, Xiao C, Lin V, Pierce JP. Selling tobacco: a comprehensive analysis of the U.S. tobacco advertising landscape. *Addict Behav*. 2019;96:100–109. https://doi.org/10.1016/j.addbeh.2019.04.024.
75. O'Brien EK, Navarro MA, Hoffman L. Mobile website characteristics of leading tobacco product brands: cigarettes, smokeless tobacco, e-cigarettes, hookah and cigars. *Tob Control*. August 2018. https://doi.org/10.1136/tobaccocontrol-2018-054549.
76. Seidenberg AB, Rees VW, Connolly GN. Swedish Match marketing on YouTube. *Tob Control*. 2010;19(6):512–513. https://doi.org/10.1136/tc.2010.038919.
77. Bromberg JE, Augustson EM, Backinger CL. Portrayal of smokeless tobacco in YouTube videos. *Nicotine Tob Res*. 2012;14(4):455–462. https://doi.org/10.1093/ntr/ntr235.
78. Navarro MA, O'Brien EK, Hoffman L. Cigarette and smokeless tobacco company smartphone applications. *Tob Control*. July 2018. https://doi.org/10.1136/tobacco-control-2018-054480.
79. Seidenberg AB, Rodgers EJ, Rees VW, Connolly GN. Youth access, creation, and content of smokeless tobacco ("dip") videos in social media. *J Adolesc Health*. 2012;50(4):334–338. https://doi.org/10.1016/j.jadohealth.2011.09.003.
80. Hackbarth DP, Silvestri B, Cosper W. Tobacco and alcohol billboards in 50 Chicago neighborhoods: market segmentation to sell dangerous products to the poor. *J Public Health Policy*. 1995;16(2):213. https://doi.org/10.2307/3342593.
81. Seidenberg AB, Caughey RW, Rees VW, Connolly GN. Storefront cigarette advertising differs by community demographic profile. *Am J Health Promot*. 2010;24(6):e26–31. https://doi.org/10.4278/ajhp.090618-QUAN-196.
82. U.S. Department of Health and Human Services. *Preventing Tobacco Use Among Youth and Young Adults : A Report of the Surgeon General*. Atlanta, GA: Dept. of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012.
83. National Cancer Institute. *The Role of the Media in Promoting and Reducing Tobacco use*. *Tobacco Control Monograph No 19*. Bethesda, MD. 2008.
84. Cummings KM, Morley CP, Horan JK, Steger C, Leavell N-R. Marketing to America's youth: evidence from corporate documents. *Tob Control*. 2002;11(Suppl 1):I5–I17. http://www.ncbi.nlm.nih.gov/pubmed/11893810.
85. Kostygina G, Glantz SA, Ling PM. Tobacco industry use of flavours to recruit new users of little cigars and cigarillos. *Tob Control*. 2014;25(1). https://doi.org/10.1136/tobaccocontrol-2014-051830.
86. Hendlin YH, Veffer JR, Lewis MJ, Ling PM. Beyond the brotherhood: Skoal Bandits' role in the evolution of marketing moist smokeless tobacco pouches. *Tob Induc Dis*. 2017;15(1):46. https://doi.org/10.1186/s12971-017-0150-y.

87. Dave D, Saffer H. Demand for smokeless tobacco: role of advertising. *J Health Econ*. 2013;32(4):682–697. https://doi.org/10.1016/j.jhealeco.2013.03.007.
88. Popova L, Kostygina G, Sheon NM, Ling PM. A qualitative study of smokers' responses to messages discouraging dual tobacco product use. *Health Educ Res*. 2014; 29(2):206–221. https://doi.org/10.1093/her/cyt150.
89. Lund KE, Scheffels J, McNeill A. The association between use of snus and quit rates for smoking: results from seven Norwegian cross-sectional studies. *Addiction*. 2011;106(1): 162–167. https://doi.org/10.1111/j.1360-0443.2010.03122.x.
90. Ramström L, Borland R, Wikmans T. Patterns of smoking and snus use in Sweden: implications for public health. *Int J Environ Res Public Health*. 2016;13(11):1110. https://doi.org/10.3390/ijerph13111110.
91. Maki J. The incentives created by a harm reduction approach to smoking cessation: snus and smoking in Sweden and Finland. *Int J Drug Policy*. 2015;26(6):569–574. https://doi.org/10.1016/j.drugpo.2014.08.003.
92. Pederson LL, Nelson DE. Literature review and summary of perceptions, attitudes, beliefs, and marketing of potentially reduced exposure products: communication implications. *Nicotine Tob Res*. 2007;9(5):525–534. https://doi.org/10.1080/14622200701239548.
93. Parascandola M, Augustson E, O'Connell ME, Marcus S. Consumer awareness and attitudes related to new potential reduced-exposure tobacco product brands. *Nicotine Tob Res*. 2009;11(7):886–895. https://doi.org/10.1093/ntr/ntp082.
94. Biener L, Roman AM, Inerney SAM, et al. Snus use and rejection in the USA. *Tob Control*. 2016;25(4):386–392. https://doi.org/10.1136/TOBACCOCONTROL-2013-051342.
95. U.S. Department of Health and Human Services. *The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General*. 2014. Atlanta, GA.
96. Wang TW, Kenemer B, Tynan MA, Singh T, King B. Consumption of combustible and smokeless tobacco - United States, 2000–2015. *MMWR Morb Mortal Wkly Rep*. 2016;65(48):1357–1363. https://doi.org/10.15585/mmwr.mm6548a1.
97. Lipari RN, Van Horn SL. *Trends in Smokeless Tobacco Use and Initiation: 2002 to 2014*; 2013. http://www.ncbi.nlm.nih.gov/pubmed/28636307.
98. Chang JT, Levy DT, Meza R. Trends and factors related to smokeless tobacco use in the United States. *Nicotine Tob Res*. 2016;18(8):1740–1748. https://doi.org/10.1093/ntr/ntw090.
99. Bhattacharyya N. Trends in the use of smokeless tobacco in United States, 2000–2010. *The Laryngoscope*. 2012;122(10):2175–2178. https://doi.org/10.1002/lary.23448.
100. Elfassy T, Yi SS, Kansagra SM. Trends in cigarette, cigar, and smokeless tobacco use among New York City public high school youth smokers, 2001–2013. *Prev Med Rep*. 2015;2:488–491. https://doi.org/10.1016/j.pmedr.2015.06.009.
101. Chang JT, Levy DT, Meza R. Examining the transitions between cigarette and smokeless tobacco product use in the United States using the 2002–2003 and 2010–2011 longitudinal cohorts. *Nicotine Tob Res*. 2018;20(11):1412–1416. https://doi.org/10.1093/ntr/ntx251.
102. Feirman SP, Lock D, Cohen JE, Holtgrave DR, Li T. Flavored tobacco products in the United States: a systematic review assessing use and attitudes. *Nicotine Tob Res*. 2016;18(5):739–749. https://doi.org/10.1093/ntr/ntv176.
103. Couch ET, Darius EF, Walsh MM, Chaffee BW. ST product characteristics and relationships with perceptions and behaviors among rural adolescent males: a qualitative study. *Health Educ Res*. 2017;32(6):537–545. https://doi.org/10.1093/her/cyx067.

104. Oliver AJ, Jensen JA, Vogel RI, Anderson AJ, Hatsukami DK. Flavored and nonflavored smokeless tobacco products: rate, pattern of use, and effects. *Nicotine Tob Res*. 2013;15(1):88. https://doi.org/10.1093/NTR/NTS093.
105. Bonhomme MG, Holder-Hayes E, Ambrose BK, et al. Flavoured non-cigarette tobacco product use among US adults: 2013–2014. *Tob Control*. 2016;25(Suppl 2):ii4–ii13. https://doi.org/10.1136/tobaccocontrol-2016-053373.
106. Chaffee BW, Urata J, Couch ET, Gansky SA. Perceived flavored smokeless tobacco ease-of-use and youth susceptibility. *Tob Regul Sci*. 2017;3(3):367–373. https://doi.org/10.18001/TRS.3.3.12.
107. Harrell MB, Loukas A, Jackson CD, Marti CN, Perry CL. Flavored tobacco product use among youth and young adults: what if flavors didn't exist? *Tob Regul Sci*. 2017;3(2):168–173. https://doi.org/10.18001/TRS.3.2.4.
108. Villanti AC, Johnson AL, Ambrose BK, et al. Flavored tobacco product use in youth and adults: findings from the first wave of the PATH study (2013–2014). *Am J Prev Med*. 2017;53(2):139–151. https://doi.org/10.1016/j.amepre.2017.01.026.
109. Smith DM, Bansal-Travers M, Huang J, Barker D, Hyland AJ, Chaloupka F. Association between use of flavoured tobacco products and quit behaviours: findings from a cross-sectional survey of US adult tobacco users. *Tob Control*. 2016;25(Suppl 2):ii73–ii80. https://doi.org/10.1136/tobaccocontrol-2016-053313.
110. Kuiper NM, Gammon D, Loomis B, et al. Trends in sales of flavored and menthol tobacco products in the United States during 2011–2015. *Nicotine Tob Res*. 2018;20(6):698–706. https://doi.org/10.1093/ntr/ntx123.
111. Rogers T, Brown EM, McCrae TM, et al. Compliance with a sales policy on flavored non-cigarette tobacco products. *Tob Regul Sci*. 2017;3(2 Suppl 1):S84–S93. https://doi.org/10.18001/TRS.3.2(Suppl1).9.
112. Farley SM, Johns M. New York City flavoured tobacco product sales ban evaluation. *Tob Control*. 2017;26(1):78–84. https://doi.org/10.1136/tobaccocontrol-2015-052418.
113. Agaku IT, Ayo-Yusuf OA, Vardavas CI, Alpert HR, Connolly GN. Use of conventional and novel smokeless tobacco products among US adolescents. *Pediatrics*. 2013;132(3):e578–e586. https://doi.org/10.1542/peds.2013-0843.
114. Agaku IT, Singh T, Jones SE, et al. Combustible and smokeless tobacco use among high school athletes — United States, 2001–2013. *MMWR Morb Mortal Wkly Rep*. 2015;64(34):935–939. https://doi.org/10.15585/mmwr.mm6434a2.
115. Wheldon CW, Kaufman AR, Kasza KA, Moser RP. Tobacco use among adults by sexual orientation: findings from the population assessment of tobacco and health study. *LGBT Health*. 2018;5(1):33–44. https://doi.org/10.1089/lgbt.2017.0175.
116. Levy DT, Mumford EA, Cummings KM, et al. The relative risks of a low-nitrosamine smokeless tobacco product compared with smoking cigarettes: estimates of a panel of experts. *Cancer Epidemiol Biomark Prev*. 2004;13(12):2035–2042. http://www.ncbi.nlm.nih.gov/pubmed/15598758.
117. Wang TW, Asman K, Gentzke AS, et al. Tobacco product use among adults — United States, 2017. *MMWR Morb Mortal Wkly Rep*. 2018;67(44):1225–1232. https://doi.org/10.15585/mmwr.mm6744a2.
118. Stone E, Marshall H. Tobacco and electronic nicotine delivery systems regulation. *Transl Lung Cancer Res*. 2019;8(Suppl 1):S67–S76. https://doi.org/10.21037/tlcr.2019.03.13.
119. WHO. Framework Convention on Tobacco Control. http://www.who.int/fctc/en/.
120. Carpenter CM, Connolly GN, Ayo-Yusuf OA, Wayne GF. Developing smokeless tobacco products for smokers: an examination of tobacco industry documents. *Tob Control*. 2009;18(1):54–59. https://doi.org/10.1136/tc.2008.026583.
121. US Department of Health and Human Services Food and Drug Administration. *Family Smoking Prevention and Tobacco Control Act*. Public Law; 2009:111–131.

122. Directive 2014/40/EU of the European Parliament and of the Council of 3 April 2014 on the Approximation of the Laws, Regulations and Administrative Provisions of the Member States Concerning the Manufacture, Presentation and Sale of Tobacco and Related Pr.
123. Leon ME, Lugo A, Boffetta P, et al. Smokeless tobacco use in Sweden and other 17 European countries. *Eur J Public Health*. 2016;26(5):817–821. https://doi.org/10.1093/eurpub/ckw032.
124. Yadav A, Singh A, Khadka BB, Amarasinghe H, Yadav N, Singh R. Smokeless tobacco control: litigation & judicial measures from Southeast Asia. *Indian J Med Res*. 2018;148(1):25–34. https://doi.org/10.4103/ijmr.IJMR_2063_17.
125. Kumar G, Kumar P. Smokeless tobacco (SLT) use in Delhi after three years of ban on gutka and one Year on all SLT products. *Natl J Commun Med*. 2018;9(11):836–839.
126. Government of Canada. Order amending the schedule to the tobacco act (menthol) P.C. 2017-256 March 24, 2017. *Canada Gaz*. 2017;151(7).
127. US Department of Health and Human Services Food and Drug Administration. Regulation of flavors in tobacco products. 21 CFR parts 1100, 1140, and 1143 [Docket No. FDA–2017–N–6565] RIN 0910–AH60. *Fed Regist*. 2018;83(55): 12294–12301.
128. Department of Health and Human Services Food and Drug Administration. Menthol in cigarettes, tobacco products; request for comments 21 CFR Part 1140 [Docket No. FDA–2013–N–0521]. *Fed Regist*. 2013;78(142):44484–44485.
129. Department of Health and Human Services Food and Drug Administration. Tobacco product standard for nicotine level of combusted cigarettes 21 CFR Part 1130 [Docket No. FDA–2017–N–6189] RIN 0910–AH86. *Fed Regist*. 2018;83(52): 11818–11843.
130. Chaloupka FJ, Cummings KM, Morley C, Horan J. Tax, price and cigarette smoking: evidence from the tobacco documents and implications for tobacco company marketing strategies. *Tob Control*. 2002;11:62–72. https://doi.org/10.1136/tc.11.suppl_1.i62.
131. Campaign for Tobacco-Free Kids. Tobacco Product Marketing on the Internet. Washington DC https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwigo5q2kYXjAhUk1VkKHfeyCEwQFjAAegQIARAC&url=https%3A%2F%2Fwww.tobaccofreekids.org%2Fassets%2Ffactsheets%2F0081.pdf&usg=AOvVaw2lnit2F8c31_8fH0xsf6Ag.
132. U.S. Food and Drug Administration. *The Public Health Rationale for Recommended Restrictions on New Tobacco Product Labeling, Advertising, Marketing, and Promotion*; 2019. Washington, D.C https://www.fda.gov/media/124174/download.
133. Kaur J, Jain DC. Tobacco control policies in India: implementation and challenges. *Indian J Public Health*. 2011;55(3):220–227. https://doi.org/10.4103/0019-557X.89941.
134. McKay AJ, Patel RKK, Majeed A. Strategies for tobacco control in India: a systematic review. *PLoS One*. 2015;10(4):e0122610. https://doi.org/10.1371/journal.pone.0122610.
135. Gartner C, Hall W. Harm reduction policies for tobacco users. *Int J Drug Policy*. 2010; 21(2):129–130. https://doi.org/10.1016/J.DRUGPO.2009.10.008.
136. Zeller M, Hatsukami D. Strategic Dialogue on Tobacco Harm Reduction Group. The strategic dialogue on tobacco harm reduction: a vision and blueprint for action in the US. *Tob Control*. 2009;18(4):324–332. https://doi.org/10.1136/tc.2008.027318.
137. Levy DT, Mays D, Boyle RG, Tam J, Chaloupka FJ. The effect of tobacco control policies on US smokeless tobacco use: a structured review. *Nicotine Tob Res*. 2017; 20(1):3–11. https://doi.org/10.1093/ntr/ntw291.