

Chapter 9

Smokeless Tobacco Use in the Region of the Americas

Chapter Contents

Description of the Region	275
Prevalence of Smokeless Tobacco Use.....	276
United States	280
General Population.....	280
Special Populations	281
Canada.....	281
Mexico	282
Venezuela.....	282
Brazil.....	283
Types of Smokeless Tobacco Products and Patterns of Use	283
Snuff.....	283
Chewing Tobacco	284
Dissolvables	284
Iqmik	284
Chimó.....	286
Rapé	287
Toxicity and Nicotine Profiles of Products.....	288
Moist Snuff	288
Iqmik.....	288
Chimó.....	288
Health Problems Associated With Product Use.....	289
North American Snuff.....	289
Snus.....	289
Iqmik	289
Chimó.....	290
Brazilian Products.....	290
Marketing and Production Practices of Industry	290
Interventions and Policies	291
United States	291
Canada.....	292
Mexico	292
Venezuela.....	293
Brazil.....	293
Summary and Conclusions	293
References.....	295

Tables, Figures, and Maps

Table 9-1	Population and land area of countries in the Americas Region	275
Table 9-2	Percentage of adolescents aged 13–15 years who currently used smokeless tobacco in the Americas Region, from the Global Youth Tobacco Surveys, 2007–2010	277
Table 9-3	Percentage of adults who currently used smokeless tobacco in the Americas Region, 2005–2012.....	278
Figure 9-1	Trends in the prevalence of current smokeless tobacco use by U.S. male high school students in grade 12, from the Monitoring the Future Survey and Youth Risk Behavior Survey, 1993–2009	281
Figure 9-2	Iqmik preparation and use.....	285
Figure 9-3	Examples of chimó product from Venezuela.....	286
Figure 9-4	Examples of Brazilian rapé.....	287
Map 9-1	Prevalence of smokeless tobacco use among adults in the World Health Organization’s Region of the Americas.....	279

Description of the Region

According to the United Nations' *World Population Prospects*, the World Health Organization (WHO) Region of the Americas includes 35 countries (Table 9-1), accounting for a land area of around 41 million square kilometers, from the northern reaches of the Canadian Arctic to the southern parts of Argentina and Chile just above Antarctica.¹

Table 9-1. Population and land area of countries in the Americas Region

Country*	Area (km ²)	Population (thousands)
Antigua and Barbuda†	440	90
Argentina	2,694,133	40,412
Bahamas	13,720	343
Barbados	429	273
Belize	22,286	312
Bolivia (Plurinational State of)	1,103,333	9,930
Brazil	8,475,913	194,946
Canada	11,339,000	34,017
Chile	744,087	17,114
Colombia	1,129,146	46,295
Costa Rica	51,198	4,659
Cuba	110,373	11,258
Dominica†	750	68
Dominican Republic	48,424	9,927
Ecuador	283,627	14,465
El Salvador	21,065	6,193
Grenada	342	104
Guatemala	109,008	14,389
Guyana	188,500	754
Haiti	27,758	9,993
Honduras	111,779	7,601
Jamaica	11,008	2,741
Mexico	1,955,569	113,423
Nicaragua	128,622	5,788
Panama	74,830	3,517
Paraguay	403,438	6,455
Peru	1,264,217	29,077
Saint Kitts and Nevis†	260	53

Country*	Area (km ²)	Population (thousands)
Saint Lucia	539	174
Saint Vincent and the Grenadines	387	109
Suriname	175,000	525
Trinidad and Tobago	5,138	1,341
United States of America	9,699,500	310,384
Uruguay	177,316	3,369
Venezuela (Bolivarian Republic of)	905,625	28,980
Total	41,276,760	929,079

*Unless otherwise indicated, data are from United Nations 2011 (1).

†World Bank, 2010–2011 (93).

Abbreviation: km = kilometer.

The Region of the Americas holds a special place in the history of tobacco use because the tobacco plant is thought to have originated in this region. Cultivation of tobacco in the Americas dates back at least 5,000 years, and Native Americans were probably the first people to smoke, chew, and inhale tobacco.

This chapter presents an overview of smokeless tobacco (ST) use in countries in the Region of the Americas for which data are available. It discusses prevalence of use and the various forms of ST used, their toxicity and nicotine profiles, and their adverse health effects. Prevalence is usually reported in terms of current use, which can be defined in various ways. For example, some surveys define current use as any use within the past 30 days, while other surveys ask about different time periods; some surveys collect data on daily use and use on some days, and still other surveys ask about “current” use without defining the term further.

Prevalence of Smokeless Tobacco Use

Data on ST use prevalence are available for only a limited number of countries in the region. For data on young people, the Global Youth Tobacco Survey (GYTS) collected data on ST use in 14 countries in the region during the period 2007–2010, although the samples in Brazil and Mexico were for specific localities in those two countries and were not nationally representative. For Canada, data on tobacco use by youth (grades 6–9) are from the Youth Smoking Survey (YSS)²; for the United States, data on tobacco use by youth (grades 6–8) are from the National Youth Tobacco Survey (NYTS).³ These data are summarized in Table 9-2. Because there are some differences in survey methods and questions (e.g., the inclusion criteria, question wording), comparisons of the estimates among the surveys should be made with caution. Overall national youth prevalence of current ST use ranged from 1.8% in Canada to 9.8% in Barbados. Smokeless tobacco use was more prevalent among boys than among girls in nearly all countries and localities. The prevalence of ST use among boys ranged from 2.6% in Canada to 11.5% in Barbados, and ST use among girls ranged from 0.8% (Canada) to 8.5% (Jamaica).

Table 9-2. Percentage of adolescents aged 13–15 years who currently used smokeless tobacco in the Americas Region, from the Global Youth Tobacco Surveys, 2007–2010

Country*	Year	Total (%)	Boys (%)	Girls (%)
Argentina	2007	4.3	5.5	3.2
Bahamas	2009	6.6	7.5	5.5
Barbados	2007	9.8	11.5	8.2
Brazil – Campo Grande	2009	8.2	9.1	7.5
Brazil – Vitória	2009	3.6	5.0	2.4
Brazil – São Paulo	2009	5.5	6.3	4.6
Canada†	2009	1.8	2.6	0.8
Dominica	2009	8.4	10.2	6.4
El Salvador	2009	3.7	4.5	2.8
Grenada	2009	8.4	10.1	6.9
Guyana	2010	7.5	7.9	6.6
Jamaica	2010	8.5	8.5	8.5
Mexico – Pachuca	2008	5.3	6.6	4.1
Mexico – Tlaxcala	2008	5.3	7.9	3.0
Mexico – Saltillo	2008	4.5	4.9	3.9
Mexico – Campeche	2008	6.3	5.1	7.2
Mexico – Villahermosa	2008	5.0	5.8	4.4
Mexico – Aguascalientes	2008	2.8	3.3	2.2
Mexico – Colima	2008	8.4	8.7	8.0
Mexico – Morelia	2008	4.4	5.6	3.3
Mexico – Queretaro	2008	4.1	4.6	3.5
Mexico – La Paz	2008	7.3	7.7	5.3
Mexico – San Luis Potosi	2008	4.1	5.3	3.1
Panama	2008	3.5	3.8	3.2
Peru	2007	4.7	4.3	4.8
Trinidad and Tobago	2007	5.5	5.4	5.5
United States of America‡	2009	2.6	4.1	1.2
Venezuela	2010	5.1	6.9	2.6

*Unless otherwise indicated, data are from the 2007–2010 Global Youth Tobacco Survey (35).

†Health Canada 2010 (2).

‡National Youth Tobacco Survey, Grades 6–8 (3).

For adults, basic ST prevalence data were available for nine countries in the region (Table 9-3; Map 9-1). Rates among men appear to be higher than among women, with the largest percentage among men reported in the United States (7.1%), and the highest rate among women, in Haiti (2.5%). (Statistical tests were not conducted.)

In general, detailed information on ST use is sparse or nonexistent for most countries in the Region of the Americas. This section describes trends for several countries where more detailed information exists.

Table 9-3. Percentage of adults who currently used smokeless tobacco in the Americas Region, 2005–2012

Country	Year	Age group (years)	Total (%)	Men (%)	Women (%)
Barbados*	2007	25+	0.3	0.0	0.6
Brazil†	2008	15+	0.4	0.6	0.3
Canada‡	2010	15+	1.0	1.0	—
Dominican Republic§	2007	Men, 15–59; Women, 15–49	—	1.9	0.3
Haiti§	2005–2006	Men, 15–59; Women, 15–49	—	—	2.5
Mexico†	2009	15+	0.3	0.3	0.3
Saint Kitts and Nevis (subnational)*	2007	25–64	0.1	0.3	0.1
United States¶	2012	18+	3.6	7.1	0.4
Uruguay†	2009	15+	0.0	0.0	0.0

*WHO Report on the Global Tobacco Epidemic, 2011 (94).

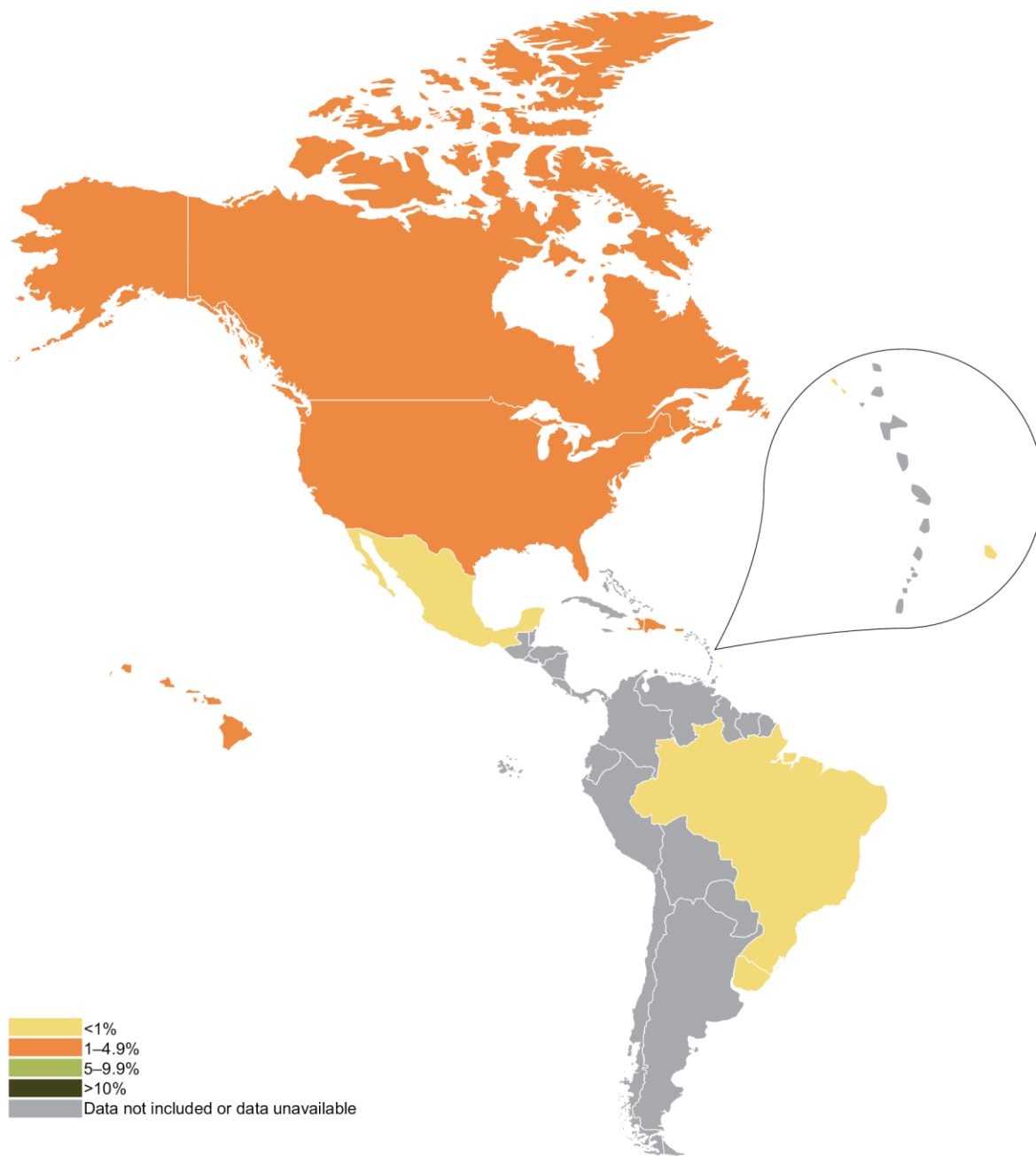
†Global Adult Tobacco Survey, 2008–2010 (34).

‡Canadian Tobacco Use Monitoring Survey, 2010 (95).

§Demographic and Health Survey, 2007 (96).

¶National Survey on Drug Use and Health, United States, 2012 (7).

Map 9-1. Prevalence of smokeless tobacco use among adults in the World Health Organization's Region of the Americas



Sources: WHO Report on the Global Tobacco Epidemic, 2011 (94); Global Adult Tobacco Survey, 2008-2010 (34); Canadian Tobacco Use Monitoring Survey (95); Demographic and Health Surveys (96); National Survey on Drug Use and Health (7).

United States

By total volume, the United States is among the world's largest producers and consumers of commercially manufactured ST products, and the vast majority of ST products consumed in the country are commercially manufactured. In 2008, 119.92 million pounds of ST (1.3 billion units) were sold in the United States, and another 31.7 million units were given away to wholesalers.⁴ However, a diversity of products are being used and prevalence varies widely by region, ethnicity, and other population characteristics. Most of the ST products used in the United States are broadly categorized as snuff or chewing tobacco. Moist snuff, the dominant product category, accounted for 68% of ST sales in 2007.⁵ Three companies account for nearly 90% of the retail market: U.S. Smokeless Tobacco Company (UST; a subsidiary of Altria), American Snuff Company (a subsidiary of Reynolds American, formerly Conwood Sales Company), and Swedish Match North America.⁶ Small retailers such as convenience stores and small groceries represented 72% of the ST sales volume in 2010.⁶

General Population

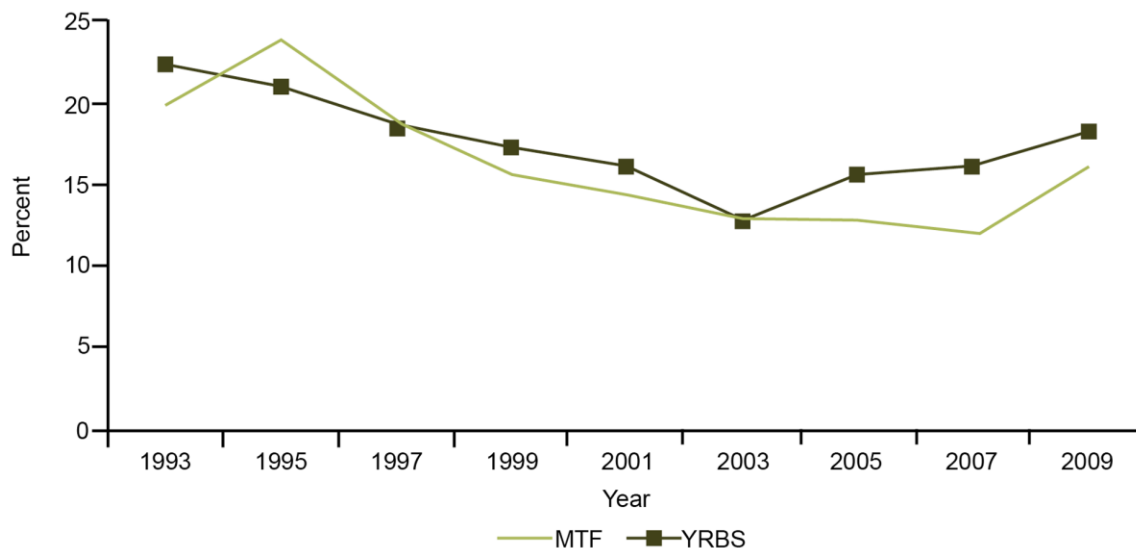
Most U.S. surveillance systems used to monitor the prevalence of tobacco use do not report separate data for snuff and chewing tobacco, but report the prevalence of ST use in aggregate.

Smokeless tobacco use is a predominantly male behavior in the United States, although use among females is relatively common in selected regions and populations. In 2012, 7.1% of U.S. men and 0.4% of U.S. women ages 18 years or older had used ST in the past month. Current use was more common among men ages 18–25 years (10.5%) than among males ages 12–17 years (3.7%) or 26 years old or older (6.5%).⁷ According to the 2009 Behavioral Risk Factor Surveillance System, the prevalence of current ST use by men varied widely among U.S. states, from a high of 17.1% in West Virginia to a low of 2.0% in the District of Columbia.⁸

Smokeless tobacco use by high school students had been declining for more than a decade when prevalence rates began to climb rapidly in about 2003 (Figure 9-1). The Youth Risk Behavior Survey found a 35% increase in the prevalence of current use by males in 12th grade between 2003 and 2009,^{9,10} a pattern that was confirmed by the Monitoring the Future Survey.¹¹

One emerging trend is a growing prevalence of dual use of cigarettes and ST, particularly among boys and young men. For example, about 60% of male high school students who use ST are also current smokers.¹² Most adult dual users are 18–34 years old, report using ST largely in places where they cannot smoke, and do not believe ST will help them quit smoking.¹³ Nearly half of U.S. dual users have no plans to quit using tobacco.¹³

Figure 9-1. Trends in the prevalence of current smokeless tobacco use by U.S. male high school students in grade 12, from the Monitoring the Future Survey and Youth Risk Behavior Survey, 1993–2009



Sources: Monitoring the Future (MTF) Surveys, 1975–2010 (11); Youth Risk Behavior Survey (YRBS), 2009 (10); YRBS, 1995–2009 (97); YRBS, 1993 (97).

Special Populations

A high prevalence of ST use has been reported among some groups of athletes in the United States, including about one-quarter of professional baseball players.^{14,15} Relatively high rates of ST use also have been reported among college athletes^{16–18} and high school athletes.^{16,19–21}

Nationally, Native Americans and Alaska Natives have a higher prevalence of current use of ST (8.9%) than any other racial or ethnic group.⁷ Alaska Native prevalence of use varies widely, ranging between 3% and 34%, and the statewide prevalence of ST use among Alaska Native adults is almost three times that of Alaska non-Native adults (11% vs. 4%).²² Tobacco use does not serve a spiritual function for Alaska Natives as it does for some Native American tribes.^{23–25} Both commercial and homemade chewing tobacco are used throughout Alaska. The homemade product known as iqmik, unique to Alaska, is most common in the western region of the state,^{23,24} where prevalence is 16–22% among adults.^{26,27}

Immigrants to North America frequently bring their patterns of ST usage with them. For example, use of gutka or betel quid with tobacco was found to be very common among first-generation immigrants from Bangladesh and India (Gujarati) living in New York City.²⁸ South Asian males living in New Jersey had the highest prevalence of ST use of any ethnic group in the northeast region of the United States.²⁹

Canada

Most of the ST products used in Canada are commercially manufactured and are categorized as snuff or chewing tobacco. Nearly all the snuff sold in Canada is U.S.-style moist snuff, and the chewing tobacco products available in Canada are predominantly the same as those sold in the United States. In 2010,

moist snuff accounted for 84% of ST sales by volume and 86% of sales by value.³⁰ The National Smokeless Tobacco Company dominates the Canadian market, with an 82% volume share; its primary brand names are Copenhagen and Skoal.

The prevalence of ST use among youth in Canada is similar to that in the United States. The Youth Smoking Survey, a school-based survey administered to 50,000 Canadian students in 2008–2009, showed that rates of ever having tried ST were 3.3% for boys and 1.1% for girls in grades 7–9, and 15.5% for boys and 3.8% for girls in grades 10–12.²

Based on the 2010 Canadian Tobacco Use Monitoring Survey (CTUMS), ST use within the 30 days before the survey was more prevalent among men than among women, although it was used by less than 1% of Canadians ages 15 years or older of either sex.³¹ Use of snuff or chewing tobacco was higher among adults ages 20–24 than among other age groups, although prevalence was still less than 2%. Usage rates show little regional variation, with the highest prevalence reported for Saskatchewan, 1.7% of adults, and less than 1% reported in all other provinces.³¹

Although sales of ST in Canada by weight have hit some high points and low points between 1989 and 2010, the long-term trend has been relatively flat during the past two decades.⁵

Mexico

Little information is available on ST use in Mexico. The only known type of commercial product on the Mexican market is imported U.S.-style moist snuff. The market is dominated by Lieb International SA (importing and distributing products made by Swisher International Group), which essentially dominates the competitive landscape, eliminating competition for ST products.³² Sales appear to be limited to one chain of variety stores and to tobacco specialty shops.

The 2009 Global Adult Tobacco Survey (GATS) conducted among a national sample of adults in Mexico reported an estimated prevalence of use of 0.3%, which did not differ appreciably by sex, age, education, or place of residence.^{33,34} The Global Youth Tobacco Survey (GYTS) was conducted among 13- to 15-year-old students in 11 Mexican cities in 2008 (Table 9-2).³⁵ Among those cities, the prevalence of current ST use ranged from 2.8% (Aguascalientes) to 8.4% (Colima), with a median of 5%. Current use of those products generally was higher among boys (median = 5.6%) than among girls (median = 3.9%).

Venezuela

The main ST product used in Venezuela is chimó, a mixture of cooked tobacco leaves and flavorings (described below). The Venezuelan GYTS, conducted among students in grades 7–9, was the first tobacco-specific population surveillance system to estimate the prevalence of smokeless use and related behaviors in that country. GYTS results for Venezuela nationally and for the states of Barinas, Cojedes, Monagas, Nueva Esparta, Trujillo, Zulia, Yaracuy, and Lara in the years 2000, 2004, and 2008 found that the prevalence of chimó use was not uniform among the states: It ranged from 3.8% to 20.7% for boys and from 2.0% to 6.6% for girls, with a higher overall prevalence in Barinas, Cojedes, Monagas, and Lara.³⁶ The GYTS also found that students in grade 7 used chimó more often than cigarettes, which

may reflect the fact that school-based tobacco prevention programs only address cigarette smoking.^{36–38} Based on the 2007 Lara State Heart Health Survey of adults over the age of 15, 15.4% of males and 3.1% of females reported ever using chimó, while 6.2% of males and 1.5% of females were current users.³⁹

Brazil

In 2010, Brazil was the world's second largest tobacco producer and the world's largest tobacco exporter.⁴⁰ Despite barriers to implementing effective tobacco control policies, the prevalence of current tobacco use declined from about 33% of Brazilians in 1989 to 17% in 2008.⁴¹ Brazil is among the few countries in the world to establish a public-health-based regulatory structure for tobacco products through its national health surveillance agency, ANVISA (Agência Nacional de Vigilância Sanitária) which was established in 1999.

There are two groups of smokeless products used in Brazil:

- Global products like dry snuff, snus, and chewing tobacco from multinational companies. These products are primarily used by young people and are common at rodeos and other rural-themed events.
- Regional products used only in Brazil, made by farmers, small tobacco industries, or native peoples. Examples of regional products include a type of dry snuff called rapé, chewing tobacco, and products used by natives, such as porronca. These products are available in a wide variety of flavors and forms (Andre Luiz Oliveira da Silva, unpublished results, 2012).

Data on the use of ST products in Brazil are very limited. About 17 million Brazilians use tobacco; most (>95%) are cigarette smokers. The use of ST is quite low, at around 0.4% of the general adult population (640,000 users), with 0.6% of men and 0.3% of women reporting current ST use. In Brazil, ST is primarily used in rural areas and is less common in urban environments.³⁴

Types of Smokeless Tobacco Products and Patterns of Use

Snuff

Two types of snuff are manufactured and used in the United States: moist snuff and dry snuff (also called Scotch snuff). Moist snuff is by far the most widely consumed type in the United States⁴ and Canada.³⁰ It is typically made from a mixture of fire-cured and air-cured tobacco laminae and stems, which are then shredded.⁴² Traditional moist snuff contains 20%–60% moisture and often is flavored with wintergreen or various fruit flavors. Moist snuff consists of small particles of tobacco product of varying particle size. It is typically sold in 1.2 ounce (34 gram) tins and is also available in small teabag-like sachets. It can be as inexpensive as \$1.50–\$2.50 per can for some wholesale brands.⁴³

Swedish-type “snus” moist snuff products were introduced on the U.S. market in about 2000. Although both Swedish snus and the U.S. product are marketed as “snus,” research suggests that snus sold in the United States is a modified version of its Swedish cousin, and limited research is available to specify exactly how U.S. and Swedish snus differ in terms of chemical composition or manufacturing process.⁴⁴ Some of the snus products marketed in the United States bear the same brand names as popular cigarette

brands (e.g., Marlboro Snus and Camel Snus). Snus products sold in the United States generally are marketed in sachet-form and have moisture contents on the order of 10%–30% by weight, which is lower than in traditional moist snuff and Swedish snus products.^{44,45}

Dry snuff is a finely powdered tobacco product produced mainly from Kentucky and Tennessee fire-cured tobaccos.⁴² It can be used either nasally or orally, although oral use predominates in North America.

Chewing Tobacco

Three types of chewing tobacco are sold in North America: loose leaf, plug, and twist. Loose-leaf chewing tobacco consists mainly of air-cured tobacco and generally is heavily treated with licorice and sugar.⁴² Plug tobacco is produced from heavier grades of tobacco leaves that are harvested from the top of the plant and separated from the stems. The tobacco then is immersed in a mixture of licorice and sugar, pressed into a plug, covered with a wrapper leaf, and reshaped. Twist tobacco is made from air- and fire-cured burley tobacco and is twisted to resemble a decorative rope. Prices vary for chewing tobacco products but average about \$3.00 per can.⁴⁶

Dissolvables

“Dissolvable tobacco products”, or “dissolvables” were introduced on the U.S. market starting in about 2001. Dissolvables are made of ground tobacco shaped into compressed pellets, lozenges, strips, or sticks and sometimes packaged to resemble breath-freshening mints or strips. These products include Camel Sticks, Strips, and Orbs (R.J. Reynolds), Marlboro and Skoal Smokeless Tobacco Sticks (Philip Morris USA and UST, respectively), and Ariva and Stonewall lozenges (Star Scientific). Camel dissolvables cost on average \$3.59–\$4.19 for each package.⁴⁷ In January 2013, Star Scientific discontinued the manufacture, distribution, and sale of Ariva and Stonewall lozenges, which were the first dissolvable products on the market, introduced in the early 2000s.⁴⁸ Some dissolvable tobacco products have only appeared in test markets.

Iqmik

Alaska Native people make an ST mixture known as iqmik (Figure 9-2) by combining tobacco with the ashes from fungus or wood.²³ This custom-made ST mixture, with some regional variations, is used among the indigenous populations in western Siberia, Yukon, Labrador, the coast of British Columbia, and Nova Scotia.⁴⁹

Iqmik, also known as “blackbull” or “dediguss,” is traditionally used by the Cup’ik and Yup’ik Eskimo people of Alaska. Fungus ash, also called punk or buluq, is prepared by burning the basidiocarps of *Phellinus igniarius*, a fungus that grows on birch trees throughout Alaska. If the region is devoid of birch trees, such as in the coastal regions, where tundra does not support their growth, ash from driftwood, willow wood (*Salix arbusculoides*), or alder bushes (*Betulaceae Alnus glutinosa*) is used. The uncut air- or fire-cured twisted or leaf tobacco used in iqmik is a commercially packaged tobacco available in local stores.^{23,24} Iqmik is prepared either by premastication or by hand mixing, using air- or fire-cured full leaf or twisted leaf tobacco in varying proportions, and different types of ashes based on

the user's personal practice.⁴⁹ In rural regions of Alaska, iqmik can be purchased for an estimated \$5.00 a can.⁵⁰

Figure 9-2. Iqmik preparation and use

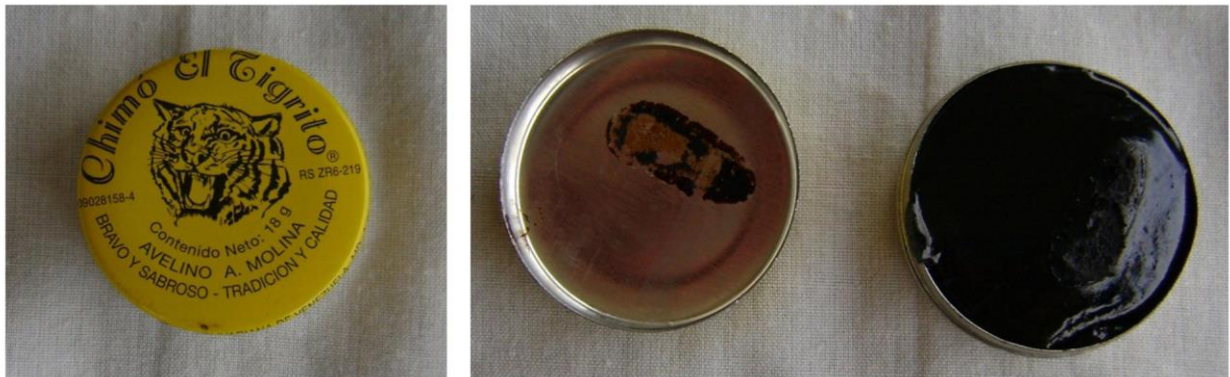


Source: Photos courtesy of Caroline Renner, Alaska Native Medical Center, 2011.

Chimó

Chimó is the main ST product used in Venezuela (Figure 9-3). Chimó is typically used by placing a small amount under the tongue or between the lip or cheek and the gum, and left in place for about 30 minutes. The black-stained saliva is then expectorated.³⁶

Figure 9-3. Examples of chimó product from Venezuela



Source: Photos courtesy of Scott Tomar, University of Florida School of Dentistry, 2011.

During the initial days of European exploration of the Americas, a 1497 report from Amerigo Vespucci provided one of the earliest written references to the Caribbean practice of chewing tobacco mixed with ashes.⁵¹ According to a popular legend, “Chimauchu” was the name of a “cacique” (aboriginal chief) who first used tobacco in the form of a paste, now called chimó. Traditionally, chimó was the primary type of ST used in Venezuela, the Colombian state of Norte de Santander, and at one point, in Cuba. Use of chimó declined in the second half of the 20th century with the increase in urbanization and the introduction of mass-produced cigarettes. By the 1980s, chimó use was regarded as confined to older adults living in poor rural areas. In the past 20 years, chimó has re-emerged as a trendy urban youth phenomenon and is perceived among some sectors of Venezuelan society as part of the national identity.

Most chimó production occurs in small family-operated factories scattered across the Andes and the flat lands of Venezuela and Colombia. However, commercially manufactured production of chimó is growing in Venezuela, with increasing sophistication of equipment and methods.³⁶ The process is simple: The factory buys leftover tobacco leaf (commonly *N. tabacum* or *N. rustica*) from commercial cigarette manufacturers and some local tobacco producers. The tobacco leaf is cooked in large metal containers for several days to discharge fiber and starch. Within 48 hours, the mixture turns from a light to a dark brown color and increases in viscosity. At the end of this phase the product is a sticky, heavy black liquid that exudes a penetrating odor. This product is called “basic” chimó paste, which is stored for maturation for up to 2 years. Production of 1 kilo of this concentrated product requires about 10 kilos of tobacco leaf. The basic paste is then mixed with other ingredients: sodium bicarbonate, brown sugar, molasses, ashes from tobacco leaf and mamón trees (*Melicocca bijuga*), vanilla, anisette, alkaline ash, yoco vine (*Paullinia yoco*), plantain peel, avocado seed, sodium hypochlorite, hot chili, burned sodium bicarbonate, and other ingredients that are part of a “secret” recipe that each factory has.

In Venezuela, chimó is widely available at local convenience stores across the country. It is produced by either commercial or cottage industries. Sold tax-free, chimó is relatively inexpensive compared with cigarettes, the price ranging from 1 bolívar fuerte (BsF) to 5 BsF (US\$0.23–US\$1.16) for each package, which contains at least 5 doses. In comparison, a hamburger meal at most international chain restaurants costs 47 BsF (US\$10.93).

Rapé

In Brazil, regional ST products include a type of dry snuff called rapé (Figure 9-4). Rapé is used primarily in rural areas and small towns, or by Brazilian aboriginals in the Amazon rainforest, and cultural and historical elements are connected with its use (Andre Luiz Oliveira da Silva, unpublished results, 2012). Preliminary data from analysis of Brazilian rapé in 2011 show that the major constituents of the rapé samples (tonka bean, clover, cinnamon powder, and camphor) are unique compared with components of other smokeless products (Andre Luiz Oliveira da Silva, unpublished results, 2012). Since this product is mostly sold locally and in cottage industry settings, typical pricing information and evidence-based literature on the manufacture and use of rapé are not readily available.

Figure 9-4. Examples of Brazilian rapé



Source: Photos courtesy of Clifford Watson and Stephen Stanfill, Centers for Disease Control and Prevention, 2011.

Toxicity and Nicotine Profiles of Products

Moist Snuff

During the processing (curing, fermentation, and aging) of moist snuff, nitrosation of nicotine and the minor tobacco alkaloids nornicotine, anatabine, and anabasine gives rise to carcinogenic tobacco-specific nitrosamines (TSNAs).⁵² TSNAs are widely considered the major class of carcinogens in ST products.^{42,53} TSNA levels in the 39 top-selling brands of United States moist snuff ranged from 4.87 micrograms per gram ($\mu\text{g/g}$) (wet weight) for Red Seal Long Cut Wintergreen to 90.0 $\mu\text{g/g}$ (wet weight) for Skoal Key.⁵⁴ All U.S. products had higher TSNA levels than the Swedish product Ettan snus (Swedish Match), which had a TSNA level of 2.8 $\mu\text{g/g}$. In the top selling U.S. brands, total nicotine ranged from 4.42 to 25 milligrams per gram (mg/g) (wet weight). The free nicotine in these same moist snuff products ranged from 0.01 to 7.81 mg/g (wet weight), which represents a free nicotine percentage between 0.3% and 79.9%, and pH values between 5.54 and 8.62.⁵⁴ Although the technology to reduce TSNA levels exists, U.S. smokeless tobacco manufacturers do not apply it to their most popular products.⁵⁵

Iqmik

Because the alkaline ash used in iqmik has extremely high pH levels, nearly all nicotine in iqmik is in the free form, which is more rapidly absorbed than bound nicotine, the more common form in ST products with lower pH levels.⁵⁶ The total nicotine and free nicotine levels in iqmik are much higher than in popular U.S. commercial smokeless products.

Chemical analysis of iqmik samples found pH values between 11 and 11.8, and a total nicotine concentration of 22.9–23.38 mg/g . In addition to high levels of free nicotine, iqmik contains other hazardous substances such as TSNAs, polycyclic aromatic hydrocarbons (PAHs), and heavy metals.⁵⁷ In 17 iqmik tobacco samples, the average arsenic, cadmium, lead, and nickel concentrations were 0.19 ± 0.06 $\mu\text{g/g}$, 1.41 ± 0.56 $\mu\text{g/g}$, 0.55 ± 0.19 $\mu\text{g/g}$, and 2.32 ± 1.63 $\mu\text{g/g}$, respectively.⁵⁸

Chimó

Chemical analysis of selected samples of commercially manufactured and cottage industry chimó products found the following upper values: pH = 9.82; total nicotine concentration = 30.1 mg/g ; percentage of free nicotine = 95.9%; and free nicotine concentration = 27.4 mg/g . Therefore, chimó could be characterized as having among the world's highest levels of nicotine content and alkalinity in an ST product.^{59,60} The concentrations of TSNAs were: *N'*-nitrosoanabasine (NAB), 57.3 ng/g ; *N'*-nitrosoanatabine (NAT), 965 ng/g ; *N'*-nitrosornicotine (NNN), 4,620 ng/g ; 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK), 2,600 ng/g ; 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol (NNAL), 1,330 ng/g ; and total TSNAs, 9,390 ng/g .⁶⁰

Health Problems Associated With Product Use

All ST products contain nicotine, an addictive substance that has cardiovascular and other physiologic effects. These products also contain varying levels of TSNA, several of which are human carcinogens.⁵³ This section summarizes documented health effects of various ST products used in the Region of the Americas. It should be noted that for some products, little research has been conducted.

North American Snuff

Use of U.S.-type snuff causes cancer in humans, particularly cancers of the oral cavity.⁵³ U.S. forms of snuff are strongly associated with oral mucosal lesions and localized gingival recession. Snuff use may increase the risk of fatal myocardial infarctions.

Snus

Although Swedish snus has been used in the Nordic region of Europe for many years, a modification of Swedish snus has only been marketed in North America since about 2000. Thus, as of 2012, no research is available on the long-term health effects of the products being marketed in the Americas. In Europe, the particular manufacturing process for Swedish snus has been in place for less than 15 years (since the late 1990s), so the health effects of long-term exposure to Swedish snus are largely unknown.

While snus use has demonstrated increased risks of oral cancer in some studies,⁶¹ there is a lack of clear and consistent evidence that snus use is associated with oral cancer.^{53,62,63} Several epidemiologic studies in Scandinavia and Asia have demonstrated a causal link between the use of snus (and other ST products) and pancreatic cancer.^{53,62,64}

Swedish snus use appears to increase the risk of mortality from cardiovascular disease, including myocardial infarction and stroke,⁶⁵ but the evidence regarding its relation to stroke is too limited to allow firm conclusions. Heavy use of Swedish snus appears to be associated with an increased risk of developing type 2 diabetes,⁶⁶ while evidence from a few studies on insulin resistance, metabolic syndrome, and diabetes have yielded conflicting results.^{53,66}

Using Swedish snus during pregnancy may increase the risk for adverse birth outcomes, including pre-term delivery, pre-eclampsia, stillbirth, neonatal apnea, and infants who are small for their gestational age.^{67,68}

Iqmik

Abnormal neonatal neurobehavioral outcomes associated with iqmik were assessed in a pilot study of 41 pregnant Alaska Native women.⁶⁹ Compared with women who used no tobacco products, women who used iqmik had significantly higher levels of nicotine and cotinine in umbilical cord blood and higher levels of cotinine in maternal blood. Neonates born to mothers who used iqmik during pregnancy had a significant increase in the number of abnormal neurobehavioral signs, as assessed by the Lipsitz score (a scoring system for neonatal drug-withdrawal),⁷⁰ compared with infants born to mothers who did not use tobacco.

Chimó

The acute physiologic effects of using chimó include elevation of blood pressure and heart rate. Chimó produces histologic changes in oral tissues, from tooth stain to orthokeratosis, epithelial dysplasia, granulocytes, hyperkeratosis, acanthosis, fibrosis, stroma collagen disease, chronic inflammation, and cancer.^{37,59,71}

The commercial and cultural profile of chimó can be explained by a matrix of factors including health beliefs. Popular folklore considers chimó a beneficial product for health, and some youth link it to the national identity.^{36,72} These beliefs even influence health professionals. For example, while the majority of dentists in Venezuela's Lara State think chimó is a drug that is and will remain a public health problem, 33% think it is harmless or even beneficial for health. Fourteen percent of male dentists and 18.8% of female dentists think it does not cause damage to oral tissues. However, few of those dentists had received information on this product, 79% never had a lesson about chimó as undergraduate students, and less than 30% had ever read a scientific article about chimó. Eighty percent of the dentists said they had not had a patient who used chimó in the last year, but among those dentists, 60% said they never asked their patient about their possible use. Eighty percent of dentists thought they were prepared to help patients stop using tobacco, but 40% never offered any counseling.⁷²

Brazilian Products

Data about health impacts of the products sold in Brazil are very limited. However, one study conducted among 129 ST users found that 49 had gingival recession, 25 exhibited leukoplakia, and 14 had dental pigmentation.⁷³

Marketing and Production Practices of Industry

Marketing practices vary throughout the Americas Region, depending on the type of product used and its scale of production. For example, while the U.S. market consists of many commercially manufactured brands (which are exported to many areas including Canada and Mexico), in countries like Brazil and Venezuela ST is a cottage industry product. For decades, the U.S. smokeless tobacco market was dominated by a small number of companies that sold only smokeless tobacco. That changed with the acquisitions of Conwood Company by R.J. Reynolds in 2006 and U.S. Smokeless Tobacco Company by Altria Group in 2009. Cigarette companies also have introduced new ST products, including moist snuff, snus, and dissolvable products, which are sold under cigarette brand names such as Marlboro and Camel.

Adolescent and young adult males have long been the primary target of ST marketing in North America.^{74,75} Two patterns of marketing and promotion of ST have emerged: (1) continued marketing to traditional targets such as men living in rural areas and those engaged in outdoor and sporting activities; and (2) increasing promotion of ST products as an alternative to cigarettes where smoking is not permitted.^{76,77} Smokeless tobacco continues to be heavily advertised in U.S. magazines with substantial youth readership, as it had been before the 1998 Smokeless Tobacco Master Settlement Agreement (STMSA) was reached between state attorneys general and the U.S. Smokeless Tobacco Company.⁷⁵ (The STMSA was executed specifically for ST products at the same time as the more widely known

Master Settlement Agreement for cigarettes.) Although data on advertising and promotional expenditures by ST companies are available only through 2008, the pattern during the past decade indicates a massive increase in spending to market moist snuff products. Expenditures to advertise and promote moist snuff in the United States increased by 257% between 1998 and 2008, from \$117.3 million to \$287.3 million.⁴ Not only has ST been marketed as an alternative to cigarettes and for use in indoor settings, but the proportion of advertisements related to flavored products increased markedly between 1998–1999 and 2005–2006.⁷⁷ In addition, ST manufacturers increasingly are using YouTube and other online social media to market their products.⁷⁸

Data are lacking on marketing of traditional and cottage industry products. In Venezuela, packaging of chimó is becoming more sophisticated, including the use of attractive candy-style packaging and small tin cans. In Brazil, no ST products, including rapé, are registered with the national health regulatory agency ANVISA, which means that these products are sold illegally. Because most users of rapé are residents of rural areas and small towns or are Brazilian aboriginals living in the rainforest, there are no large-scale marketing or advertising activities.

Interventions and Policies

United States

The Family Smoking Prevention and Tobacco Control Act (Tobacco Control Act) gave the U.S. Food and Drug Administration (FDA) regulatory authority over ST products.⁷⁹ Signed into law on June 22, 2009, the Tobacco Control Act required FDA to reissue regulations prohibiting: (1) sales of cigarettes and ST to individuals less than 18 years old; (2) sales of cigarettes and ST in vending machines, self-service displays, and other modes of sale that lack direct, face-to-face exchange, except in very limited situations; (3) tobacco brand name sponsorship of any athletic, musical, or other social or cultural event, or any team or entry in those events; and (4) gifts or other items in exchange for buying cigarettes or ST products, and sale or distribution of items with tobacco brands or logos, such as hats and tee shirts. The law also limits distribution of smokeless tobacco products and requires that audio advertisements use words only, with no music or sound effects. Effective July 22, 2010, the law prohibited the manufacturing, distributing, importing, selling, or advertising of ST products unless they carry text warnings that take up at least 30% of each principal display panel on the package and at least 20% of advertisements, with four specific rotating random messages: (1) “WARNING: This product can cause mouth cancer.” (2) “WARNING: This product can cause gum disease and tooth loss.” (3) “WARNING: This product is not a safe alternative to cigarettes.” (4) “WARNING: Smokeless tobacco is addictive.” [Sec. 204(a), Smokeless Tobacco Labels and Advertising Warnings⁷⁹].

The Tobacco Control Act also gives the FDA authority to set tobacco standards and establish manufacturing practices, requires premarket review of new tobacco products, and requires manufacturers who wish to market a tobacco product with a claim of reduced exposure, risk, or harm to obtain a marketing order from the FDA.

The requirements set forth in the Tobacco Control Act differ for regulation of smokeless tobacco manufacturing and marketing compared to cigarette manufacturing and marketing. For example, the Act does not require FDA to issue regulations requiring pictorial labeling on ST packaging as it does

for cigarettes; does not ban characterizing flavorings in smokeless tobacco as it does for cigarettes; and does not call for a report and recommendations on certain characterizing flavors (i.e., wintergreen) of ST products as it does for menthol cigarettes. However, the Act does give the FDA the authority to require pictorial warnings or ban flavorings in smokeless tobacco products by issuing a regulation.

In the United States, taxes are levied at the federal and state levels. The federal tax rate on snuff products in 2012 was \$1.51 per pound, which translates to 11.3 cents per typical (1.2 oz) package of moist snuff, and 1.6 to 7.7 cents per 20-piece package of snus or dissolvables. Chewing tobacco is taxed at 50.3 cents per pound, or 9.3 cents per 3-ounce package. This is compared to the \$1.01 federal tax on a pack of 20 cigarettes.^{80,81} State excise taxes on ST products vary widely in rate and formula. Some states apply an excise tax rate based on weight, ranging from Alabama's rate of 1.0 cent per ounce for snuff, to 202.0 cents per ounce in Maine in 2012.⁸² Other states set their ST excise tax rate as a percentage of wholesale price, ranging from a low of 5% in South Carolina to a high of 95% in Washington State.^{80,82,83}

U.S. prevention and cessation programs have largely been focused on cigarette smoking, given the higher percentage of use. However, effective interventions for ST use have been developed and are described in detail in chapter 7.

Canada

Advertising of smokeless tobacco is subject to the same restrictions as cigarette advertising: These products can only be advertised to retailers or to adults through direct mail or in adult-only venues such as bars. Tobacco products cannot be sold to children (that is, anyone under 18). Smokeless tobacco manufacturers must report their products' ingredients and additives to Health Canada. However, ST products in Canada can still be sweetened with sugar or contain fruit flavorings, even though such flavorings have been banned in cigarettes and little cigars. One of four rotating health messages is required on ST product packaging: (1) "This product is highly addictive." (2) "This product causes mouth diseases." (3) "Use of this product can cause cancer." (4) "This product is not a safe alternative to cigarettes." Unlike cigarettes, ST products do not have to display pictorial warnings. Although smoking has been banned in indoor public spaces and workplaces in Canada, ST products generally can be used in those venues.⁸⁴

Smokeless tobacco products are subject to federal and provincial tobacco laws in Canada, including taxation. Excise taxes on ST products vary by province, but they are taxed by weight at rates comparable to excise taxes on cigarettes.⁸⁵⁻⁸⁷ Smokeless tobacco products are not subject to a minimum package size as are cigarettes or little cigars, but they are taxed in a way that discourages the sale of quantities less than 50 grams.⁸⁴

Mexico

Mexico has few restrictions or policies related to smokeless tobacco. There are no bans on consumption, no known restrictions on advertising, no requirements for warning labels, and taxes are relatively low compared with taxes on cigarettes.³² The General Health Law of Mexico prohibits the sale of tobacco products including ST products to anyone younger than 18 years old.⁸⁸

Venezuela

In Venezuela, ST sales are subject to the same legal regulations as cigarettes and cigars, but chimó is not taxed. Resolutions 11 and 12 from the Ministry of Health prohibit sale of any tobacco product to anyone less than 18 years of age, and sales are prohibited in retail outlets near schools.^{89,90} Although pictorial health warnings covering 50% of the pack are required for cigarettes, no such warnings are required for ST products sold in Venezuela.^{91,92}

There are no specific ST prevention initiatives in Venezuela. A nongovernmental cardiovascular health organization called ASCARDIO offers a cessation program for chimó as part of its Tobacco Cessation Clinic.

Brazil

In Brazil, manufacturers must submit information about the contents, emissions, packaging, and design of every tobacco product to ANVISA, the national health surveillance agency. However, because the list of commercially permitted brands in Brazil does not include ST brands (effectively making ST product sales illegal), smokeless products marketed and sold illegally in Brazil usually do not contain any health warnings.

In the Brazilian legislation, ST products are classified as “other tobacco product (not cigarette).” Taxes include:

- Importation taxation: 14%
- PIS/COFINS (Social Integration Program/Contribution to Finance Social Security): 9.25%
- Industrialized products taxation: 30%
- State taxation on commercialized products: 25% (the same applies to cigarettes).

Still, ST prices in Brazil are considered very low, making purchasing them relatively affordable for young people.

Because of the much higher prevalence of cigarette smoking, health professionals generally do not focus on treating ST use. Health promotion and cessation efforts concerning smokeless products essentially do not exist.

Summary and Conclusions

The Region of the Americas holds a place of significance in the history of tobacco use because the tobacco plant is thought to have originated on the mainland in North, Central, or South America. In the United States and Canada, moist snuff is still the most widely consumed smokeless product type by far. Since 2001, companies in this region began selling novel ST products, which include dissolvables. Across North America, three types of chewing tobacco are sold: loose leaf, plug, and twist. Other types of products in the region include iqmik, traditionally used by Alaska Natives; chimó, the main smokeless product used in Venezuela; and rapé, a type of dry snuff used in Brazil.

In this region, current ST use among youth ranged from 1.8% in Canada to 9.8% in Barbados. Smokeless tobacco use was more prevalent among boys than among girls in nearly all countries and localities, with the greatest gender difference in the United States. For adult men, the highest prevalence of use was in the United States (6.9%), while use among women was highest in Haiti (2.5%). In general, detailed information on ST use is sparse or nonexistent for most countries in the region. Additionally, little is known about potential adverse health effects of many of the locally used products such as rapé and iqmik.

Regulation of ST products in the Americas is variable; in some countries it is generally weak or absent, while others have placed regulations on sales, marketing, and product ingredients. Many tobacco control measures applied to cigarettes are not applied to ST products or are less stringent, such as lower taxes, lack of pictorial warning labels, and lack of targeted cessation interventions. In Brazil, no ST products are licensed for sale, but they are still available in some areas. Stronger tobacco control policies and programs are needed that are targeted to smokeless tobacco. Established tobacco control measures, such as increased pricing (mainly achieved through taxation), graphic warning labels, and limits on advertising and promotion, are not currently applied consistently across all tobacco products. Taxation may be optimal if applied equally to all tobacco products, and taxes for both ST and cigarettes could then potentially be set at the same rate and increased at the same time, which would change the focus from ST tax structures or cigarette taxation to tax structures that address all tobacco use. Controlling and taxing cottage industry products such as rapé poses a greater challenge. Surveillance of ST products, particularly in areas where there are indications that these products are being used, could be enhanced. And continuation of epidemiologic studies on the adverse health effects of a variety of ST products, including traditional products, and of dual use of ST and cigarettes is critical.

Implementation of the World Health Organization Framework Convention on Tobacco Control and proliferation of smoke-free regulations throughout the region can be expected to accelerate the decline in consumption of cigarettes. The social acceptability of smoking continues to wane. At the same time, major cigarette manufacturers now control most of the ST industry in North America and are marketing novel products to non-traditional users, including cigarette smokers. Dual use of cigarettes and ST is an emerging pattern, especially among young people, and may be influenced by marketing that encourages dual use. In this dynamic and shifting landscape, it is increasingly urgent to address ST throughout the region, while preserving the gains made in reducing smoking consumption.

References

1. United Nations, Department of Economic and Social Affairs, Population Division. World population prospects, the 2010 revision. New York: United Nations; 2011. Available from: <http://esa.un.org/unpd/wpp/index.htm>
2. Health Canada. Canadian Tobacco Use Monitoring Survey (CTUMS) 2009. Ottawa, Ontario: Health Canada; 2010 [cited 2011 July 12]. Available from: http://www.hc-sc.gc.ca/hc-ps/tobac-tabac/research-recherche/stat/_ctums-esutc_2009/ann_summary-sommaire-eng.php
3. Centers for Disease Control and Prevention. National Youth Tobacco Survey (NYTS): NYTS data and documentation—2004–2011 [Internet database]. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2013 [cited 2013 Jan 29]. Available from: http://www.cdc.gov/tobacco/data_statistics/surveys/nyts/index.htm
4. U.S. Federal Trade Commission. Federal Trade Commission smokeless tobacco report for 2007 and 2008. Washington, DC: Federal Trade Commission; 2011.
5. Forey B, Hamling J, Hamling J, Thornton A, Lee P. International smoking statistics. Web ed. Sutton, UK: PN Lee Statistics & Computing, Ltd; 2011 [cited 2012 July 12]. Available from: http://www.pnlee.co.uk/Downloads/ISS/ISS-Sweden_111024.pdf
6. Euromonitor International. Country report: smokeless tobacco in the U.S. July 2011. Available by subscription from: <http://www.euromonitor.com>
7. Substance Abuse and Mental Health Services Administration. Results from the 2012 National Survey on Drug Use and Health: detailed tables. Rockville, MD: Substance Abuse and Mental Health Services Administration; 2013. Available from: <http://www.samhsa.gov/data/NSDUH/2012SummNatFindDefTables/DefTabs/NSDUH-DefTabsLOTsect2pe2012.htm#TopOfPage>
8. Centers for Disease Control and Prevention. State-specific prevalence of cigarette smoking and smokeless tobacco use among adults—United States, 2009. MMWR Morb Mortal Wkly Rep. 2010;59(43):1400–6. Available from: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5943a2.htm>
9. Centers for Disease Control and Prevention. Youth Risk Behavior Surveillance—United States, 2003. MMWR Surveill Summ. 2004;53(SS02):1–96. Erratum in: MMWR Surveill Summ. 2004;53(24/SS-2):536.
10. Centers for Disease Control and Prevention. Youth Risk Behavior Surveillance—United States, 2009. MMWR Surveill Summ. 2010;59(SS05):1–142.
11. Johnston LD, O'Malley PM, Bachman JG, Schulenberg JE. Monitoring the Future: national survey results on drug use, 1975–2010. Volume I: Secondary school students. Ann Arbor, MI: University of Michigan, Institute for Social Research; 2011. Available from: http://monitoringthefuture.org/pubs/monographs/mtf-vol1_2010.pdf
12. Tomar SL, Alpert HR, Connolly GN. Patterns of dual use of cigarettes and smokeless tobacco among US males: findings from national surveys. Tob Control. 2010;19(2):104–9.
13. McClave-Regan AK, Berkowitz J. Smokers who are also using smokeless tobacco products in the US: a national assessment of characteristics, behaviours and beliefs of “dual users.” Tob Control. 2011;20(3):239–42. doi: 10.1136/tc.2010.039115
14. Severson H, Klein K, Lichtensein E, Kaufman N, Orleans C. Smokeless tobacco use among professional baseball players: survey results, 1998 to 2003. Tob Control. 2005;14(1):31–6.
15. Sinusas K, Coroso JG. A 10-year study of smokeless tobacco use in a professional baseball organization. Med Sci Sports Exerc. 2006;38(7):1204–7.
16. Eaves T. The relationship between spit tobacco and baseball. J Sport Soc Issues. 2011;35(4): 437–2. Available from: <http://jss.sagepub.com/content/35/4/437.extract>
17. Green GA, Uryasz FD, Petr TA, Bray CD. NCAA study of substance use and abuse habits of college student-athletes. Clin J Sport Med. 2001;11(1):51–6.
18. Chakravorty B, Ahmed A, Buchanan RJ. Midproject findings from a study of the National Collegiate Athletic Association's policy on smokeless tobacco use. Subst Use Misuse. 2000;35(10):1431–41.
19. Terry-McElrath YM, O'Malley PM, Johnston LD. Exercise and substance use among American youth, 1991–2009. Am J Prev Med. 2011;40(5):530–40. Available from: <http://www.sciencedirect.com/science/article/pii/S0749379711000377>
20. Castrucci BC, Gerlach KK, Kaufman NJ, Orleans CT. Tobacco use and cessation behavior among adolescents participating in organized sports. Am J Health Behav. 2004;28(1):63–71.
21. Melnick MJ, Miller KE, Sabo DF, Farrell MP, Barnes GM. Tobacco use among high school athletes and nonathletes: results of the 1997 Youth Risk Behavior Survey. Adolescence. 2001;36(144):727–47.

22. Alaska Native Epidemiology Center and Alaska Native Tribal Health Consortium. Alaska Native health status report. Anchorage, AK: Alaska Native Epidemiology Center and Alaska Native Tribal Health Consortium; 2009. Available from: <http://www.anthc.org/chs/epicenter/upload/ANHSR.pdf>
23. Renner CC, Patten CA, Enoch C, Petraitis J, Offord KP, Angstman S, et al. Focus groups of Y-K Delta Alaska Natives: attitudes toward tobacco use and tobacco dependence interventions. *Prev Med.* 2004;38(4):421–31.
24. Blanchette RA, Renner CC, Held BW, Enoch C, Angstman S. The current use of *Phellinus igniarius* by the Eskimos of Western Alaska. *Mycologist.* 2002;16(4):142–5.
25. Ray DJ. The Eskimos of Bering Strait, 1650–1898. Seattle: University of Washington Press; 1976.
26. Alaska Department of Health and Social Services. [Database]. Anchorage, AK: Alaska Department of Health and Social Services, Division of Public Health; 2004 [cited 2012 Oct 12].
27. Alaska Department of Health and Social Services. Health risks in Alaska among adults. Alaska Behavioral Risk Factor Survey: 2007 annual report. Juneau, AK: Alaska Department of Health and Social Services, Division of Public Health; 2008 [cited 2012 Oct 12]. Available from: <http://dhss.alaska.gov/dph/Chronic/Documents/brfss/pubs/BRFSS07.pdf>
28. Changrani J, Gany FM, Cruz G, Kerr R, Katz R. Paan and gutka use in the United States: a pilot study in Bangladeshi and Indian-Gujarati immigrants in New York City. *J Immigr Refug Stud.* 2006;4(1):99–110.
29. Delnevo CD, Steinberg MB, Hudson SV, Ulpe R, DiPaola RS. Epidemiology of cigarette and smokeless tobacco use among South Asian immigrants in the northeastern United States. *J Oncol.* 2011; 2011:252675. doi: 10.1155/2011/252675
30. Euromonitor International. Country report: smokeless tobacco in Canada. July 2011. Available by subscription from: <http://www.euromonitor.com>
31. Reid JL, Hammond D, Burkhalter R, Ahmed R. Tobacco use in Canada: patterns and trends. 2012 ed. Waterloo, Ontario: University of Waterloo, Propel Centre for Population Health Impact; 2012. Available from: http://www.tobaccoreport.ca/2012/TobaccoUseinCanada_2012.pdf
32. Euromonitor International. Country report: smokeless tobacco in Mexico. September 2011. Available by subscription from: <http://www.euromonitor.com>
33. Instituto Nacional de Salud Pública y Organización Panamericana de la Salud. Encuesta Global de Tabaquismo en Adultos. México 2009. Cuernavaca, Morelos, México: Instituto Nacional de Salud Pública; Washington, DC: Organización Panamericana de la Salud; 2010. Available from: http://www.conadic.salud.gob.mx/pdfs/pie/GATS_2009.pdf. Spanish.
34. Centers for Disease Control and Prevention. Global Adult Tobacco Survey, 2008–2010. Percentage of adults who currently use smokeless tobacco. Global Tobacco Surveillance System data [Internet database]. Atlanta: Centers for Disease Control and Prevention; [no date] [cited 2012 Jan 25]. Available from: [http://apps.nccd.cdc.gov/GTSSData/default/IndicatorResults.aspx?TYPE=&SRCH=C&SUID=GATS&SYID=RY&CAID=Topic&SCID=C443&QUID=Q469&WHID=WW&COID=&LOID=LL&DCOL=\\$&FDSC=FD&FCHL=&FREL=&FAGL=&FSEL=&FPRL=&DSRT=DEFAULT&DODR=ASC&DSHO=False&DCIV=N&DCSZ=N&DOCT=0&XMAP=TAB&MPVW=&TREE=0](http://apps.nccd.cdc.gov/GTSSData/default/IndicatorResults.aspx?TYPE=&SRCH=C&SUID=GATS&SYID=RY&CAID=Topic&SCID=C443&QUID=Q469&WHID=WW&COID=&LOID=LL&DCOL=$&FDSC=FD&FCHL=&FREL=&FAGL=&FSEL=&FPRL=&DSRT=DEFAULT&DODR=ASC&DSHO=False&DCIV=N&DCSZ=N&DOCT=0&XMAP=TAB&MPVW=&TREE=0)
35. Centers for Disease Control and Prevention. [Unpublished data from the 2007–2010 Global Youth Tobacco Surveys (GYTS)]. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; [no date] [cited 2012 Jan 25].
36. Granero R, Jarpa P. Uso de chimo entre adolescentes en Venezuela. Encuesta Mundial sobre Tabaquismo en Jóvenes 1999–2008. *Acta Odontol Venezuel.* 2011;49(3):1–9. Spanish.
37. Granero R, Cabré S. Tendencias en el uso de tabaco y sus factores de riesgo entre estudiantes del séptimo al noveno grado de la escuela básica: estado Lara (Venezuela). Encuesta Mundial sobre Tabaquismo en Jóvenes 2000, 2004, y 2008. *Av Cardiol.* 2010;30(4):309–15. Spanish.
38. de Salazar L. Caracterización del programa Escuelas Libres de Humo de Tabaco en el marco de la Ley Orgánica de Protección al Niño, Niña y Adolescente (LOPNA). In: de Salazar L. Efectividad en promoción de la salud y salud pública: reflexiones sobre la práctica en América Latina y propuestas de cambio. Cali, Colombia: Universidad del Valle; 2009, p. 348–9. Spanish.
39. Infante E, Navarro A, Finizola R, Zevallos J, Moya D, Alvarado S, et al. Estudio de la salud cardiovascular en el estado Lara (escel 2008) metodología del proyecto y perfil de la muestra estudia. *Av Cardiol.* 2009;30(4):316–25. Spanish.
40. FAOSTAT. Exports—countries by commodity: top exports—tobacco, unmanufactured, 2010 [Internet database] [cited 2012 July 23]. Available from: <http://faostat.fao.org/desktopdefault.aspx?pageid=342&lang=en&country=21>
41. Szklo AS, de Almeida LM, Figueiredo VC, Autran M, Malta D, Caixeta R, et al. A snapshot of the striking decrease in cigarette smoking prevalence in Brazil between 1989 and 2008. *Prev Med.* 2012;54(2):162–7. Available from: <http://www.sciencedirect.com/science/article/pii/S009174351100483X>

42. Hoffmann D, Djordjevic MV. Chemical composition and carcinogenicity of smokeless tobacco. *Adv Dent Res*. 1997;11(3):322–9.
43. Swedish Match. Swedish Match announces new prices on moist snuff, for sale in the US. 2002 Feb 14. Available from: <http://www.swedishmatch.com/en/Media/Pressreleases/Press-releases/1996-2004/Swedish-Match-announces-new-prices-on-moist-snuff-for-sale-in-the-US/>
44. Foulds J, Furberg H. Is low-nicotine Marlboro snus really snus? *Harm Reduct J*. 2008;5:9. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2288606/>
45. Stepanov I, Jensen J, Hatsukami D, Hecht SS. New and traditional smokeless tobacco: comparison of toxicant and carcinogen levels. *Nicotine Tob Res*. 2008;10(12):1773–82.
46. National Institute of Dental and Craniofacial Research. Smokeless tobacco: a guide for quitting. NIH publication no. 12-3270. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Dental and Craniofacial Research; 2012. Available from: <http://www.nidcr.nih.gov/OralHealth/Topics/SmokelessTobacco/SmokelessTobaccoAGuideforQuitting.htm>
47. Romito LM, Saxton MK, Coan LL, Christen AG. Retail promotions and perceptions of R.J. Reynolds' novel dissolvable tobacco in a US test market. *Harm Reduct J*. 2011;8(1):10.
48. Star Scientific. Subsidiaries & products: Star Tobacco, Inc. December 2012 [cited 2013 Jan 28]. Available from: <http://www.starscientific.com/products/star-tobacco-inc/>
49. Renner CC, Enoch C, Patten CA, Ebbert JO, Hurt RD, Moyer TP, et al. Iqmiq: a form of smokeless tobacco used among Alaska Natives. *Am J Health Behav*. 2005;29(6):588–94.
50. California Rural Indian Health Board. Preventing smokeless (spit) tobacco use among American Indian youth [PowerPoint presentation]. Sacramento, CA: California Rural Indian Health Board, Tobacco Education and Prevention Technical Support Center; [no date] [cited 25 September 2013]. Available from: http://www.crihb.org/files/Smokeless_Tobacco_CTE%20_youth_Pres.pdf
51. Monteverde HR, Magaña AR. Breves comentarios sobre la historia del tabaco y el tabaquismo. *Rev Inst Nal Enf Resp Mex*. 2006;19(4):297–300. Available from: http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S0187-75852006000400013&lng=es. Spanish.
52. Hoffmann D, Brunneemann KD, Prokopczyk B, Djordjevic MV. Tobacco-specific *N*-nitrosamines and areca-derived *N*-nitrosamines: chemistry, biochemistry, carcinogenicity, and relevance to humans. *J Toxicol Environ Health*. 1994;41(1):1–52.
53. International Agency for Research on Cancer. Smokeless tobacco and some tobacco-specific *N*-nitrosamines. IARC monographs on the evaluation of carcinogenic risks to humans. Vol. 89. Lyon, France: World Health Organization, International Agency for Research on Cancer; 2007. Available from: <http://monographs.iarc.fr/ENG/Monographs/vol89/mono89.pdf>
54. Richter P, Hodge K, Stanfill S, Zhang L, Watson C. Surveillance of moist snuff: total nicotine, moisture, pH, un-ionized nicotine, and tobacco-specific nitrosamines. *Nicotine Tob Res*. 2008;10(11):1645–52.
55. Hecht SS, Stepanov I, Hatsukami DK. Major tobacco companies have technology to reduce carcinogen levels but do not apply it to popular smokeless tobacco products. *Tob Control*. 2011;20(6):443. doi: 10.1136/tc.2010.037648
56. Henningfield JE, Radzius A, Cone EJ. Estimation of available nicotine content of six smokeless tobacco products. *Tob Control*. 1995;4(1):57–61.
57. Hearn BA, Renner CC, Ding YS, Vaughan-Watson C, Stanfill SB, Zhang L, et al. Chemical analysis of Alaskan iqmik smokeless tobacco. *Nicotine Tob Res*. 2013;15(7):1283–8. Epub 2013 Jan 3. doi: 10.1093/ntr/nts270
58. Pappas RS, Stanfill SB, Watson CH, Ashley DL. Analysis of toxic metals in commercial moist snuff and Alaskan iqmik. *J Anal Toxicol*. 2008;32(4):281–91.
59. Jarpa P. Medición del pH de 12 preparaciones distintas de pasta de tabaco de mascar, relacionándolas con la adición a la nicotina. *Revista de la Facultad de Farmacia* 2003;45(2):7–11. Spanish.
60. Stanfill SB, Connolly GN, Zhang L, Jia LT, Henningfield JE, Richter P, et al. Global surveillance of oral tobacco products: total nicotine, unionised nicotine and tobacco-specific *N*-nitrosamines. *Tob Control*. 2011;20(3):e2. Epub 2010 Nov 25. doi: 10.1136/tc.2010.037465
61. Roosaar A, Johansson AL, Sandborgh-Englund G, Axéll T, Nyrén O. Cancer and mortality among users and nonusers of snus. *Int J Cancer*. 2008;123(1):168–73.
62. Boffetta P, Hecht S, Gray N, Gupta P, Straif K. Smokeless tobacco and cancer. *Lancet Oncol*. 2008;9(7):667–75.
63. Lee PN, Hamling J. Systematic review of the relation between smokeless tobacco and cancer in Europe and North America. *BMC Med*. 2009;7:36. doi: 10.1186/1741-7015-7-36

64. Sponsiello-Wang Z, Weitkunat R, Lee PN. Systematic review of the relation between smokeless tobacco and cancer of the pancreas in Europe and North America. *BMC Cancer*. 2008;8:356. doi: 10.1186/1471-2407-8-356
65. Hergens MP, Alfredsson L, Bolinder G, Lambe M, Pershagen G, Ye W. Long-term use of Swedish moist snuff and the risk of myocardial infarction amongst men. *J Intern Med*. 2007;262(3):351–9. Erratum in: *J Intern Med*. 2007;262(5):590.
66. Piano MR, Benowitz NL, Fitzgerald GA, Corbridge S, Heath J, Hahn E, et al. Impact of smokeless tobacco products on cardiovascular disease: implications for policy, prevention, and treatment. *Circulation*. 2010 Oct 12;122(15):1520–44.
67. Wikström AK, Cnattingius S, Galanti MR, Kieler H, Stephansson O. Effect of Swedish snuff (snus) on preterm birth. *BJOG*. 2010;117(8):1005–10.
68. Wikström AK, Stephansson O, Cnattingius S. Tobacco use during pregnancy and preeclampsia risk: effects of cigarette smoking and snuff. *Hypertension*. 2010;55(5):1254–9.
69. Hurt RD, Renner CC, Patten CA, Ebbert JO, Offord KP, Schroeder DR, et al. Iqmik—a form of smokeless tobacco used by pregnant Alaska natives: nicotine exposure in their neonates. *J Matern Fetal Neonatal Med*. 2005;17(4):281–9.
70. Lipsitz PJ. A proposed narcotic withdrawal score for use with newborn infants: a pragmatic evaluation of its efficacy. *Clin Pediatr*. 1975;14(6):592–4.
71. Sosa L, Rosales A, Dávila L, Quiñónez B, Jarpa P. Alteraciones histológicas ocasionadas por el tabaco de mascar venezolano (chimó) en los tejidos periodontales de ratas. [Histological alterations caused by Venezuelan chewing tobacco (chimó) present in periodontal tissues in rats]. *Rev Cubana Estomatol*. 2009;46(3):38–47. Available from: http://bvs.sld.cu/revistas/est/vol46_3_09/est05309.htm. Spanish.
72. Granero R, Escalona N, Pérez I. El problema del tabaquismo en odontología: creencias, conocimientos, actitudes y práctica clínica de profesionales de la odontología en relación al tabaco de uso oral. *Acta Odontol Venez*. 2006 [cited 2011 July 12];44(1). Available from: http://www.actaodontologica.com/ediciones/2006/1/tabaquismo_odontologia.asp. Spanish.
73. Figliolia SLC. Perfil do usuário do tabaco sem fumaça. Tese de mestrado. São Paulo, Brazil: Universidade de São Paulo; 2001. Portuguese.
74. Connolly GN. The marketing of nicotine addiction by one oral snuff manufacturer. *Tob Control*. 1995;4(1):73–9.
75. 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):543–8.
76. Ling PM, Haber LA, Wedl S. Branding the rodeo: a case study of tobacco sports sponsorship. *Am J Public Health*. 2010;100(1):32–41.
77. Curry LE, Pederson LL, Stryker JE. The changing marketing of smokeless tobacco in magazine advertisements. *Nicotine Tob Res*. 2011;13(7):540–7.
78. Seidenberg AB, Rees VW, Connolly GN. Swedish Match marketing on YouTube. *Tob Control*. 2010;19(6):512–3.
79. Family Smoking Prevention and Tobacco Control Act. Pub. L. 111-31 (June 22, 2009). Available from: <http://www.gpo.gov/fdsys/pkg/PLAW-111publ31/pdf/PLAW-111publ31.pdf>
80. Campaign for Tobacco-Free Kids. Creating federal tax equity among all tobacco products would increase federal revenues and promote public health. Washington, DC: Campaign for Tobacco-Free Kids; 2012. Available from: <http://www.tobaccofreekids.org/research/factsheets/pdf/0354.pdf>
81. Centers for Disease Control and Prevention. Federal and state cigarette excise taxes—United States, 1995–2009. *MMWR Morb Mortal Wkly Rep*. 2009;58(19):524–7.
82. Campaign for Tobacco-Free Kids. State excise tax rates for non-cigarette tobacco products. Washington, DC: Campaign for Tobacco-Free Kids; 2012. Available from: <http://www.tobaccofreekids.org/research/factsheets/pdf/0169.pdf>
83. Centers for Disease Control and Prevention. State Tobacco Activities Tracking and Evaluation (STATE) System [Internet database]. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2013 [cited 2013 Jan 29]. Available from: <http://apps.nccd.cdc.gov/statesystem/ComparisonReport/ComparisonReports.aspx#ReportDetail>
84. Physicians for a Smoke-Free Canada. Smokeless tobacco: new trends for an old product. Ottawa, Ontario: Physicians for a Smoke-Free Canada; 2011. Available from: http://www.smoke-free.ca/pdf_1/smokeless-2011b.pdf
85. Ontario Ministry of Finance. Important notice concerning changes to tobacco tax rates. Bulletin TT 1-2006. Oshawa, Ontario: Ontario Ministry of Finance; 2006 [cited 2012 Jan 25]. Available from: http://www.fin.gov.on.ca/en/bullefins/tt/1_2006.html

86. Alberta Treasury Board and Finance, Tax and Revenue Administration. Alberta Tobacco Tax Act special notice: vol. 3, no. 11. Tobacco tax increase. Edmonton, Alberta: Alberta Treasury Board and Finance, Tax and Revenue Administration; 2009 [cited 2012 Oct 24]. Available from: http://www.finance.alberta.ca/publications/tax_rebates/tobacco/tob14.html
87. Saskatchewan Finance. Information Bulletin TT-2. Tax rate changes under the Tobacco Tax Act, 1998. Regina, Saskatchewan: Saskatchewan Finance, Revenue Division; 1999 [cited 2012 Jan 25]. Available from: <http://www.finance.gov.sk.ca/budget/budget99/tob.pdf>
88. Centers for Disease Control and Prevention. Illegal sales of cigarettes to minors—Mexico City, Mexico, 1997. *MMWR Morb Mortal Wkly Rep.* 1997;46(20):440–4.
89. Venezuela Ministry of Health. Resolucion por la cual se regulan los puntos y formas de venta de productos derivados del tabaco. Gazette No. 38.375, Resolution No. 11. Caracas, Venezuela: Ministerio de Salud y Desarrollo Social, Republica Bolivariana de Venezuela; 2006 [cited 2013 May 13]. Available from: <http://www.tobaccocontrolaws.org/files/live/Venezuela/Venezuela%20-%20Point-of-Sale%20Restrictions%20-%20national.pdf>. Spanish.
90. Venezuela Ministry of Health. Resolucion por la cual no se permite la colocacion transitoria o permanente, distribucion o promocion en medios publicitarios o cualquier tipo de publicidad exterior, que inciten, promuevan o estimulen de cualquier forma el consumo de productos derivados del tabaco. Gazette No. 38.375, Resolution No. 12. Caracas, Venezuela: Ministerio de Salud y Desarrollo Social, Republica Bolivariana de Venezuela; 2006 [cited 2013 May 13]. Available from: <http://www.tobaccocontrolaws.org/files/live/Venezuela/Venezuela%20-%20Ads%2C%20Promotion%2C%20and%20Trademarks%20-%20national.pdf>. Spanish.
91. Venezuela Ministry of Health. Ministerio del poder popular para la salud y proteccion social. Gazette No. 368.355, Resolution No. 56. Caracas, Venezuela: Ministerio de Salud y Desarrollo Social, Republica Bolivariana de Venezuela; 2009 [cited 2013 May 13]. Available from: <http://www.tobaccocontrolaws.org/files/live/Venezuela/Venezuela%20-%20New%20Pictorial%20Health%20Warnings%20-%20national.pdf>. Spanish.
92. Venezuela Ministry of Health. Resolucion por la cual se regulan los empaques y embalaje de los cigarillos. Gazette No. 37.904, Resolution No. 110. Caracas, Venezuela: Ministerio de Salud y Desarrollo Social, Republica Bolivariana de Venezuela; 2004 [cited 2013 May 13]. Available from: <http://www.tobaccocontrolaws.org/files/live/Venezuela/Venezuela%20-%20Packaging%20Regulations%20-%20national.pdf>. Spanish.
93. World Bank. World development indicators and global development finance. 2010–2011. Washington, DC: The World Bank; 2011. Available from: <http://data.worldbank.org/country>
94. World Health Organization. WHO report on the global tobacco epidemic, 2011. Appendix VIII—Table 8.2: crude smokeless tobacco prevalence in WHO member states. Geneva: World Health Organization; 2011. Available from: http://www.who.int/tobacco/global_report/2011/en_tfi_global_report_2011_appendix_viii_table_2.pdf
95. Health Canada. Supplementary tables: Youth Smoking Survey 2008–2009. Ottawa, Ontario: Health Canada; 2010 [cited 2012 Jan 25]. Available from: http://www.hc-sc.gc.ca/hc-ps/tobac-tabac/research-recherche/stat/_survey-sondage_2008-2009/table-eng.php
96. Kishor S, et al. Prevalence of current cigarette smoking and tobacco use among women and men in developing countries. Forthcoming 2014 [cited 2012 Jan 25].
97. Centers for Disease Control and Prevention. Youth online: high school YRBS: used chewing tobacco, snuff, or dip on at least 1 day (during the 30 days before the survey), 1995–2009 [Internet database]. 2014 [cited 2014 Feb 3]. Available at: <http://apps.nccd.cdc.gov/youthonline/App/Default.aspx>
98. Williams BI, Ross JG, Kolbe IJ. Youth Risk Behavior Surveillance—United States, 1993. *MMWR Surveill Summ.* 1995;44(SS-1):1–55. Available from: <http://www.cdc.gov/mmwr/preview/mmwrhtml/00036855.htm#00001026.htm>

