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WHO STUDY GROUP ON SMOKELESS TOBACCO CONTROL

Geneva, 1–6 June 1987

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SMOKELESS TOBACCO CONTROL

Report of a WHO Study Group

A WHO Study Group on Smokeless Tobacco Control met in Geneva from 1 to 6 June 1987. Dr Lu Rushan, Assistant Director-General, opening the meeting on behalf of the Director-General, said that the fact that smokeless tobacco use was harmful to health was well established. While such use was traditional in some countries, particularly in South-East Asia, it was now being intensively promoted by the tobacco industry in industrialized countries where such use either had not previously existed or had declined markedly in recent years. The aim of the meeting was to summarize existing knowledge concerning the prevalence of smokeless tobacco use and its harmful health effects, as well as to make recommendations and propose strategy guidelines for use by governments in controlling such use where it already existed and in preventing the emergence of a new threat to health where it did not. Resolution WHA39.14, adopted by the Thirty-ninth World Health Assembly in 1986, clearly affirmed that “the use of tobacco in all its forms is incompatible with the attainment of health for all by the year 2000”. Action was therefore needed now to deal with this danger to health before smokeless tobacco use spread to yet more countries and reached the proportions of cigarette smoking.

1. INTRODUCTION

There is mounting concern at the extent of the death and disease caused by smokeless tobacco throughout the world, particularly in certain developing countries, and the recent resurgence of smokeless tobacco use by young people in major industrialized countries.

The Study Group expressed alarm at the well financed, highly sophisticated marketing programmes that transnational tobacco manufacturers have recently initiated in order to promote smokeless tobacco worldwide. It was the Group’s opinion that, if countries did not act now, tens of millions of children would become dependent on nicotine and the progress made in controlling the smoking epidemic would be nullified by the diseases caused by smokeless tobacco.
After reviewing the evidence, the Group considered that governments had a unique historical opportunity to prevent this from occurring. Countries with a history of smokeless tobacco use were urged immediately to institute aggressive regulatory and educational programmes to combat it, while those with no recent history of such use were urged to ban the introduction of the various products or any other new form of tobacco in order to prevent the spread of the smokeless tobacco epidemic. The Group noted that nicotine products containing little or no tobacco were being developed, and urged all countries to control them strictly.

The Study Group concluded that: (1) the use of smokeless tobacco caused cancer in humans, the evidence for causality being strongest for cancers of the oral cavity; (2) there was some evidence that the habit also increased the risk of cancer of the nasal cavity, pharynx, larynx, oesophagus, pancreas, and urinary tract; and (3) laboratory studies clearly supported the observation that smokeless tobacco use caused a number of precancerous oral lesions and non-cancerous oral conditions, such as gingival recession.

The Group considered that, although the evidence relating smokeless tobacco use to other diseases was less conclusive; it might contribute to or support the pathogenesis of coronary artery and peripheral vascular diseases, hypertension, peptic ulcers, and fetal toxicity. There was ample evidence that the blood nicotine levels of smokeless tobacco users were as high as or even higher than those found in many cigarette smokers. Its continued use therefore, did cause addiction and dependence in humans.

Within the past 20 years there has been a sharp increase in the production and sale of smokeless tobacco in some developed countries, particularly Sweden and the USA. Where previously the use of smokeless tobacco was declining and was most common among older people, the practice has now been taken up by large numbers of teenage and young adult males. In the USA alone, 12 million people are estimated to have used smokeless tobacco during 1985, and of these 3 million were under the age of 21. Moist snuff, taken orally, is the most popular form among young people. Aggressive promotion of such products is credited with the resurgence of smokeless tobacco use and the creation of a new market among young people in these countries. There is great concern that, as a result of the marketing programmes previously mentioned, large numbers of children and adults will become users of smokeless tobacco.
In Asia there is a long-established practice of using different forms of tobacco, for instance, as part of betel quid chewing. It is estimated that, in India and Pakistan alone, over 100 million people use some form of smokeless tobacco. There is some evidence that these practices are more common among the older generation and are gradually declining in the general population, although this decline is offset by increases in cigarette smoking. There remains the danger that both national and transnational companies may attempt to convert smokeless tobacco in Asia from a cottage industry into a vigorously promoted large-scale manufacturing enterprise and/or introduce the new forms of smokeless tobacco that have become popular among the youth of some industrialized countries.

This report makes a number of recommendations addressed to WHO and its Member States, the United Nations system, and intergovernmental and nongovernmental organizations. Most of these recommendations are directed towards the implementation of appropriate legislative or educational strategies. The Study Group stressed that there is already overwhelming evidence of the harmful health consequences of smokeless tobacco use. Research on various aspects of smokeless tobacco and its control may still be required, but only in so far as such research contributes to a better understanding of the toxic and carcinogenic effects of smokeless tobacco and of nicotine addiction and is accompanied by speedy implementation of smokeless tobacco control programmes. It must be stressed that smokeless tobacco use is dangerous to health and should not be viewed as less harmful than, or as an alternative to, smoking.

In countries where there is no established use of smokeless tobacco, firm action taken in time can prevent the introduction of this serious health hazard. Countries and territories that have successfully prevented the introduction of new smokeless tobacco products (e.g., Hong Kong, Israel and New Zealand) have done so by treating smokeless tobacco in the same way as any other health hazard, and banning its manufacture, import, promotion and sale, either under existing public health legislation, or by amending such legislation (e.g., the 1987 amendment to the Toxic Substances Act of 1979 in New Zealand).

The public health approach, when used by a government with a firm commitment to tobacco control, is clearly the most effective and least expensive way to deal with new tobacco products. It may not always be feasible, however, e.g., in countries where smokeless tobacco use is already well established. In such cases, governments
committed to action can devise and implement overall strategies that will prevent the introduction of new forms of tobacco, while at the same time reducing the level of use of established products by measures such as the control of promotion, the prevention of sales to children and the education of the public. The ultimate goal should be the eradication of the habit.

This report contains suggestions as to the content and implementation of strategies to control smokeless tobacco, depending on the particular circumstances prevailing in the country concerned. In some areas full-scale public information programmes will be required, whereas in others care must be taken not to stimulate interest in a tobacco habit new to the population. The use of taxation, legislation on sales to children, and the importance of controlling the promotion of smokeless tobacco are discussed. Throughout the discussion emphasis is placed on the need to protect children and young people.

If the goal of health for all by the year 2000 is to be achieved, the use of smokeless tobacco must be curbed and, if possible, eradicated. The elements of the strategy to be adopted for this purpose will vary from country to country, but an overall tobacco control programme should be initiated, including appropriate legislative or regulatory action and a carefully structured programme of information and education. Central to such a control programme are the following key recommendations.

• In countries where smokeless tobacco use is not an established habit, the Study Group recommends that the manufacture, import and sale of all smokeless tobacco products should be banned before they are introduced. In such countries there is a unique opportunity to prevent an epidemic caused by a new form of tobacco use.

• In countries where smokeless tobacco is already in use, the Study Group recommends that, while a tobacco-free society should be the single most important objective of the programme, the following interim measures should be taken:
  — All promotion should be banned or, where this is impossible in the short term, strictly controlled in the interests of health and to protect children.
  — The tax on smokeless tobacco should be increased annually.
  — Priority should be given to replacing tobacco by other crops.
  — Sales to minors should be prohibited.
—The prominent display of health warnings on smokeless tobacco products should be made compulsory and such warnings should be changed at intervals.
—Smokeless tobacco use should be banned in all public places.
—Information and education programmes should be directed to decision-makers and opinion leaders, professional groups and, where appropriate, to the young.
—Cessation programmes should be introduced.
—Smokeless tobacco control should be an integral part of the WHO programme aimed at combating the harmful effects of tobacco.
—WHO should cooperate with all relevant international organizations to promote action to control smokeless tobacco.

2. CHEMICAL CONSTITUENTS, BIOCHEMISTRY AND BIOASSAYS FOR CARCINOGENICITY

2.1 Introduction

A wide variety of smokeless tobacco products exists as a result of the various tobaccos, additives, and processing methods used. In many countries, especially in northern Europe and North America, chewing tobacco and snuff are still the main smokeless tobacco products, and the chemical and bioassay data reported in the literature relate primarily to these products. However, other forms of smokeless tobacco, primarily hand-made mixtures containing a number of other ingredients, are consumed by millions of people. Thus, in Asia, tobacco is most often an ingredient of the betel quid which is widely used in this part of the world.

2.2 Chemical constituents

Unadulterated tobacco contains more than 2500 identified constituents (1). These include, apart from polysaccharides and proteins, the habit-forming *Nicotiana* alkaloids (0.5–5.0%), alkanes (0.1–0.4%), terpenes (0.1–3.0%), polyphenols (0.5–11.0%), phytosterols (0.1–2.5%), carboxylic acids (0.1–0.7%), alkali nitrate (0.2–5.0%), at least 30 metallic compounds and a large number of alcohols, aldehydes, ketones, amines, amides and heterocyclic compounds.
2.2.1 Snuff

Snuff contains added sugars, especially fructose, in amounts of up to 10% (2). Data on the major known toxic and carcinogenic agents in oral snuff (3, 4) are presented in Tables 1A and 1B. Those identified as being most probably associated with the increased risk of oral cancer in snuff users (dippers) are certain volatile aldehydes, polynuclear aromatic hydrocarbons (PAH), polonium-210, volatile N-nitrosamines (VNA), and especially the tobacco-specific N-nitrosamines (TSNA). The latter are formed from the Nicotiana alkaloids during tobacco processing (Fig. 1) and are present in commercial snuff in concentrations exceeding by three orders of magnitude those found in any other consumer product so far analysed. The main TSNA, N'-nitrosornornicotine (NNN) and 4-(methylamino)-1-(3-pyridyl)-1-butanone (NNK), are strong carcinogens in mice, rats, and hamsters, inducing both benign and malignant tumours of the oesophagus, nasal cavity, lung and liver (5). A solution of NNN and NNK (0.16 and 0.009 mmol/l, respectively) applied by daily swabbing of the oral cavity also induced tumours at this site in rats (6). The presence of tobacco-specific N-nitrosamines in the saliva of snuff-dippers has been documented (5, 7). Hand-made snuff for nasal use in Swaziland contained significantly higher concentrations of copper, chromium, zinc, nickel and PAH than snuff products manufactured in Europe and North America (8, 9).

<p>| Table 1A. Toxic and tumorigenic agents in snuff: agents other than N-nitrosamines in brands marketed in the USA, 1985–1986 |</p>
<table>
<thead>
<tr>
<th>Agent</th>
<th>Type of snuff</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Moist*</td>
</tr>
<tr>
<td>Alkaloids</td>
<td></td>
</tr>
<tr>
<td>nicotine, mg/g</td>
<td>14.6–36.7</td>
</tr>
<tr>
<td>norisocaine, mg/g</td>
<td>0.9–1.8</td>
</tr>
<tr>
<td>anabasine, µg/g</td>
<td>20</td>
</tr>
<tr>
<td>anatabine, µg/g</td>
<td>150–640</td>
</tr>
<tr>
<td>Polyphenols</td>
<td></td>
</tr>
<tr>
<td>kaempferol, %</td>
<td>0.17–1.25</td>
</tr>
<tr>
<td>3 major polyphenols, %</td>
<td>0.51–1.45</td>
</tr>
<tr>
<td>Volatile aldehydes</td>
<td></td>
</tr>
<tr>
<td>formaldehyde, µg/g</td>
<td>3.9–6.1</td>
</tr>
<tr>
<td>acetaldehyde, µg/g</td>
<td>4.1–7.4</td>
</tr>
<tr>
<td>acrolein, µg/g</td>
<td>0.3–0.6</td>
</tr>
</tbody>
</table>

*Moisture: 45–51%; pH: 7.8–8.2; nitrate: 2.5–3.2% (4 brands).
*Moisture: 4.7–6.6%; pH: 5.9–6.1; nitrate: 1.5–4.7% (3 brands).
<table>
<thead>
<tr>
<th>Nitrosamine</th>
<th>USA Dry</th>
<th>USA Moist</th>
<th>Sweden (moist)</th>
<th>Denmark (moist)</th>
<th>Canada (moist)</th>
<th>Federal Republic of Germany (moist)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volatile</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDMA, ng/g</td>
<td>ND-19(3)</td>
<td>ND-215(31)</td>
<td>ND-50(33)</td>
<td>NA</td>
<td>23-73(2)</td>
<td>NA</td>
</tr>
<tr>
<td>NPYR, ng/g</td>
<td>72-148(3)</td>
<td>ND-291(21)</td>
<td>ND-210(27)</td>
<td>NA</td>
<td>320-340(2)</td>
<td>NA</td>
</tr>
<tr>
<td>NPHP, ng/g</td>
<td>ND-99(3)</td>
<td>ND-107(16)</td>
<td>ND-95(17)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>NMOR, ng/g</td>
<td>ND-69(3)</td>
<td>ND-79(3)</td>
<td>ND-12(3)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>NDDELA, ng/g</td>
<td>0.03-0.38(3)</td>
<td>0.05-6.8(8)</td>
<td>0.23-0.39(8)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>TSNA</td>
<td>NNN, μg/g</td>
<td>9.4-55(3)</td>
<td>1.6-135(26)</td>
<td>3.9-154(34)</td>
<td>4.5-100(3)</td>
<td>50-79(3)</td>
</tr>
<tr>
<td></td>
<td>NNK, μg/g</td>
<td>1.9-14(3)</td>
<td>0.1-13.6(26)</td>
<td>0.5-2.9(34)</td>
<td>1.3-7.0(3)</td>
<td>3.2-5.8(2)</td>
</tr>
<tr>
<td></td>
<td>NAT, μg/g</td>
<td>19-40(3)</td>
<td>1.6-338(26)</td>
<td>1.6-21.4(34)</td>
<td>2.7-6.2(3)</td>
<td>150-170(2)</td>
</tr>
<tr>
<td></td>
<td>NAB, μg/g</td>
<td>0.7-12(3)</td>
<td>0.01-6.7(16)</td>
<td>0.11-0.15(16)</td>
<td>NA</td>
<td>4-4.8(2)</td>
</tr>
<tr>
<td></td>
<td>iso-NNAI, μg/g</td>
<td>0.07-0.15(3)</td>
<td>ND-2.2(5)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

*Figures in parentheses indicate the number of samples analysed. ND, not detected; NA, not determined in the analysis; NDMA, N-nitrosodimethylamine; NPYR, nitrosopyrrolidine; NPHP, nitrosopiperidine; NMOR, N-nitrosonornicotine; NDDELA, N-nitrosodimethylnitrosamine; TSNA, tobacco-specific nitrosamines; NNN, N'-nitrosonornicotine; NNK, N-(4-methylaminomethyl)-1-(3-pyridyl)-1-butanone; NAT, N'-nitrososomabulline; NAB, N'-nitrosourea; iso-NNAI, 4-(N-methyl-N-nitrosamino)-1-(3-pyridyl)-1-butanol.
Fig. 1. Formation of tobacco-specific N-nitrosamines:

Nitrosation:
- NICOTINE
- NORNICOTINE
- ANATABINE
- ANABASINE

Reduction:
- NNA
- NIK
- NNN
- NAT
- NAB
- Iso-NNAL
- NNAL

NNA, 4-(methylisourea)-4-(3-pyridyl)butanol; NIK, 4-(methylisourea)-1-(3-pyridyl)-1-butanone; NNN, N-nitrosourea; NAT, N'-nitrosourea; NAB, N'-nitrosoureas; Iso-NNAL, 4-(methylisourea)-4-(3-pyridyl)-1-butanol; NNAL, 4-(methylisourea)-1-(3-pyridyl)-1-butanol.
2.2.2 Chewing tobacco

Table 2 shows the types and amounts of carcinogenic N-nitrosamines found in chewing tobacco, including four types of mass, a mixture of tobacco ash, cotton oil and lime used in a district of Samarkand in the USSR where the high prevalence of oral cancer has been attributed to its use (10, 11).

2.2.3 Betel quid

The chewing of betel quid is widespread in South-East Asia, the South Pacific and elsewhere among people of Asian origin. While betel quid chewing is practised in several different ways, the quid consists essentially of betel leaf, areca nut, catechu and slaked lime, together with a variety of additives (e.g., cardamom, cloves, grated fresh coconut, ginger, sugar, aniseed), depending on taste and locality. Tobacco is almost always added by habitual users in India.

The leaf contains the essential oil eugenol (an animal carcinogen), terpenes and potassium nitrate, but the main pharmacological effect comes from the alkaloids in the areca nut, the major alkaloid being arecoline, while other alkaloids (arecaidine, guvacine, and guvacoline) are also present (Fig. 2). Nitrosation of arecoline leads to the formation of areca-nut-specific nitrosamines, namely nitrosoguvacoline (NG), nitrosoguvacine (NGC), 3-(methyl-nitrosamino) propionaldehyde (MNPA), and 3-(methylnitrosamino) propionitrile (MNPN) (Fig. 3). Areca-nut-specific nitrosamines (NG, NGC and MNPN) have been found in the saliva of betel quid chewers, and MNPN has been shown to be a powerful animal carcinogen (3, 13–15) and to alkylate DNA (13). In perfumed tobacco as used for betel quid chewing, two nitromusks, one of which (5-tert-butyl-1,3-dinitro-4-methoxy-2-methylbenzene) is genotoxic (16), account for up to 2% of the betel quid–tobacco mixture.

Both areca nut with tobacco and extract of betel quid with tobacco have been shown to induce preneoplastic and neoplastic lesions under some experimental conditions (17). Studies of chewers of betel quid in India and the Philippines have shown a high frequency of micronucleated cells in the buccal mucosa at the site where the betel quid is habitually kept and this is related to the number of betel quids chewed per day (18–20). The frequency of sister chromatid exchanges in peripheral lymphocytes has also been shown to be elevated in chewers of betel quid with or without
<table>
<thead>
<tr>
<th>Nitrosamine</th>
<th>USA</th>
<th>Sweden</th>
<th>Denmark</th>
<th>India</th>
<th>USSR*</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDOMA, ng/g</td>
<td>ND-380(4)</td>
<td>ND-0.6(9)</td>
<td>ND-8.6(6)</td>
<td>ND-0.6(4)</td>
<td>ND(4)</td>
</tr>
<tr>
<td>NPYR, ng/g</td>
<td>ND-1.2(4)</td>
<td>0.9-3.7(4)</td>
<td>7.0-26(6)</td>
<td>1.6-4.5(4)</td>
<td>1.7-8.8(4)</td>
</tr>
<tr>
<td>NMOR, ng/g</td>
<td>ND-2.9(4)</td>
<td>ND-0.8(2)</td>
<td>ND-33(6)</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>NDDELA, µg/g</td>
<td>0.22-0.68(3)</td>
<td>NA</td>
<td>NA</td>
<td>0.03-0.11(4)</td>
<td>0.04(4)</td>
</tr>
<tr>
<td>SNA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NNN, µg/g</td>
<td>0.6-6.2(12)</td>
<td>0.35-2.1(3)</td>
<td>0.21-1.4(4)</td>
<td>0.47-2.4(5)</td>
<td>0.12-0.52(4)</td>
</tr>
<tr>
<td>NNK, µg/g</td>
<td>ND-0.4(4)</td>
<td>ND-0.24(3)</td>
<td>ND-0.21(4)</td>
<td>0.15-0.23(4)</td>
<td>0.02-0.13(4)</td>
</tr>
<tr>
<td>NAB, µg/g</td>
<td>ND-0.14(5)</td>
<td>ND-0.1(3)</td>
<td>ND-0.06(4)</td>
<td>0.03-0.07(4)</td>
<td>0.008-0.03(4)</td>
</tr>
</tbody>
</table>

*ND, not detected; NA, not analysed; figures in parentheses indicate the number of samples analysed; for abbreviations, see Table 1B. Source: Brunnemann (12).

**The data are for nasa as used in Samarkand, Uzbek SSR.**
Fig. 2. Major areca alkaloids

Arecoline  Arecaidine

Guvecoline  Guvacine

Fig. 3. Formation of areca-derived N-nitrosamines:

MNPA  MNPN  NG  NGC

MNPA, 3-(methylamino)propionaldehyde;
MNPN, 3-(methylamino)propionitrile;
NG, nitrosoguvecoline; NGC, nitrosoguvacine.
tobacco (21, 22). Finally, experimental studies have shown that extracts of betel quid with tobacco exert mutagenic effects in short-term tests (17).

2.3 Biochemistry

Little is known about the biochemical consequences of tobacco chewing, snuff dipping and betel quid use. In terms of the association of these tobacco habits with oral cancer, the Study Group assigned the greatest significance to the fact that in vitro observations of tissues from animals and humans, and in vivo studies of laboratory animals have demonstrated that metabolites of tobacco-specific N-nitrosamines, as well as of the arecolin-derived 3-methyl-nitrosamino propionitrile (MNPN), are capable of alkylating DNA (5, 13). The link between nicotine and arecoline, and the formation of the promutagenic DNA adduct, O\(^6\)-methylguanine, are shown in Fig. 4. NNK is also known to form the promutagenic DNA adduct, O\(^4\)-methylthymidine (17), while both NNN and NNK form pyridylazobutyl adducts with DNA (23). Metabolism of MNPN also leads to 2-cyanoethyl adducts with DNA in addition to methylation reactions (13).

2.4 Bioassays for carcinogenicity

In vitro tests have shown that chewing tobacco and snuff are genotoxic (24–27). However, the majority of bioassays with snuff in laboratory animals have not led to a significant incidence of oral tumours, although daily insertions of snuff into a surgically created canal in the lower lip of rats have induced a few isolated tumours at this site (22, 28). The statistical efficacy of this methodology should be checked in an appropriately designed large-scale bioassay with rats. A second bioassay in which oral tumours were induced involved repeated pretreatments of hamsters with alpha-herpesvirus types 1 and 2 followed by daily instillations of snuff into the pouch. After 6 months, a high percentage of hamsters had developed oral carcinoma. Snuff alone, or treatment with the viruses alone, did not lead to oral tumours (29).

Oral intubation of chewing tobacco in mice led to a significant number of lung adenocarcinomas as well as carcinomas of the liver. However, in mice, rats and hamsters, the application of chewing tobacco has not led to the induction of oral tumours (4).
Fig. 4. Formation of the promutagenic DNA adduct, O\textsuperscript{6}-methylguanine, from nicotine and arecoline
Repeated cheek-pouch applications of betel quid extracts with tobacco induced carcinoma both at this site and in the forestomach of Syrian golden hamsters (30). This bioassay needs to be repeated with statistically appropriate numbers of animals.

3. HEALTH EFFECTS

3.1 Introduction

There is conclusive scientific evidence that the use of smokeless tobacco causes cancer in humans (17, 31). The evidence for causality is strongest for cancers of the oral cavity, but use of smokeless tobacco has also been shown to increase the risk of cancer of the pharynx, larynx, oesophagus, pancreas and urinary tract. This conclusion is based on a number of findings, including the presence of high levels of carcinogens in smokeless tobacco, the metabolic conversion of smokeless tobacco products into genotoxic agents, the fact that an association between oral cancer and smokeless tobacco has been consistently found in epidemiological investigations conducted in a number of different places in the world, the tendency for oral cancer risk to increase with duration of exposure, the strength of the association with oral cancer, and the association of the highest risk for cancers with the anatomical sites where tobacco exposures are the greatest.

In addition, a number of clinical observations and epidemiological and clinical studies have demonstrated an association between smokeless tobacco use and a variety of non-cancerous and precancerous oral conditions, of which the most important is leukoplakia. The risk of developing leukoplakia increases with increased exposure. Malignant transformation of leukoplakia to dysplasia and further to carcinoma has been reported in certain cases (see section 3.4.1).

Smokeless tobacco, as used in both developing and developed countries, contains as much nicotine as the tobacco used in cigarettes, if not more. Studies have clearly shown that the smokeless tobacco user can have blood nicotine levels as high as, or even higher than, those found in cigarette smokers. The nicotine in smokeless tobacco, like that in cigarette smoke, produces nicotine addiction in users (see section 3.5.5).
Finally, there is evidence implicating smokeless tobacco use in the pathogenesis of coronary artery and peripheral vascular disease, hypertension, peptic ulcers and fetal toxicity (see section 3.5).

3.2 Oral cancer

The evidence for a causal relationship between use of smokeless tobacco products and cancer has recently been reviewed (17, 31). Data from many countries, e.g., India, Norway, Pakistan, Thailand and the USA, strongly indicate that oral use of such products is a cause of oral cancer. These data have been reviewed in depth by several agencies, all of which have arrived at the same conclusion: smokeless tobacco causes oral cancer.

In the USA, the smokeless tobacco product that has been most frequently studied is oral snuff. In several case-control studies a significantly high relative risk was found among snuff users. Thus, in a case-control study of women in North Carolina, for example, 232 women with oral and pharyngeal cancers were selected as cases and compared with 410 controls matched for age, race and residence. Among white non-smokers, the relative risk for snuff users was 4.8. A positive dose-response relationship (in terms of numbers of years of snuff use) was demonstrated and among long-term users of snuff (over 50 years of age), there was an approximately 50-fold increase in the risk of cancer of the gum and buccal mucosa (Table 3). The relative risks could not be explained by possible confounding factors.

Table 3. Relative risks of oral cancer according to duration of snuff use in non-smokers *

<table>
<thead>
<tr>
<th>Site</th>
<th>Duration of use (years)</th>
<th>No. of cases</th>
<th>No. of controls</th>
<th>Relative risk</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gum and buccal mucosa</td>
<td>0</td>
<td>2</td>
<td>34</td>
<td>1.0</td>
<td>--</td>
</tr>
<tr>
<td>1-24</td>
<td>3</td>
<td>3</td>
<td>13.8</td>
<td>1.9-98.0</td>
<td></td>
</tr>
<tr>
<td>25-49</td>
<td>10</td>
<td>11</td>
<td>12.8</td>
<td>2.7-68.3</td>
<td></td>
</tr>
<tr>
<td>≥50</td>
<td>15</td>
<td>4</td>
<td>47.5</td>
<td>9.1-249.5</td>
<td></td>
</tr>
<tr>
<td>Other mouth and pharynx</td>
<td>0</td>
<td>22</td>
<td>61</td>
<td>1.0</td>
<td>--</td>
</tr>
<tr>
<td>1-24</td>
<td>3</td>
<td>5</td>
<td>1.7</td>
<td>0.4-7.2</td>
<td></td>
</tr>
<tr>
<td>25-49</td>
<td>14</td>
<td>10</td>
<td>3.8</td>
<td>1.5-8.6</td>
<td></td>
</tr>
<tr>
<td>≥50</td>
<td>8</td>
<td>18</td>
<td>1.3</td>
<td>0.5-3.2</td>
<td></td>
</tr>
</tbody>
</table>

*Excludes one person who did not consent to use of medical records and 19 controls whose matched cases were not interviewed. The study-sample mean value of 45 years was used for the 7.7% of snuff dippers for whom the number of years of use was unknown. Source: Wilk et al. (32).
such as smoking, alcohol, poor dentition, diet, use of mouthwash, etc. (32–33).

Bjelke & Schuman (36) and Schuman et al. (37) reported the results of a cohort study of 12,945 men in Norway who had been followed for more than 10 years (1967–1978). Relative risks for regular users of oral tobacco were 2.8 for oral cavity and pharyngeal cancer and 3.1 for oesophageal cancer; these were both statistically significant. In addition, users experienced a relative risk of 2.2 for histologically-confirmed cases of pancreatic cancer (reported to be “significant”).

In India, two types of smokeless tobacco use (chewing habits as they have been traditionally called) have been well studied. These are chewing of betel quid with tobacco and khaini—a mixture of tobacco and lime, which may also contain areca nut. In numerous case–control studies, high relative cancer risks were recorded. In one case–control study, for example, 2005 cancer cases were compared with 2005 matched controls, the former including cancers of the oral cavity, oropharynx, hypopharynx, larynx, nasopharynx and oesophagus. After controlling for smoking, the authors found highly significant relative risks for all cancers except cancer of the nasopharynx (38).

A dose–response relationship between betel quid chewing and cancer of the oral cavity was established in two studies (Table 4) (39, 40).

<table>
<thead>
<tr>
<th>Frequency of chewing</th>
<th>Relative risk* Reference 44</th>
<th>Reference 43</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>&lt; twice a day</td>
<td>8.4</td>
<td>4.9</td>
</tr>
<tr>
<td>3–5 times a day</td>
<td>14.2</td>
<td>17.7</td>
</tr>
<tr>
<td>6 times or more</td>
<td>17.8</td>
<td>68</td>
</tr>
<tr>
<td>Quid retained during sleep</td>
<td>63</td>
<td>212.5</td>
</tr>
</tbody>
</table>

*Calculated by an IARC working group (17).

In several cross-sectional surveys reported from India, a large number of individuals were questioned about tobacco usage and examined for oral cancer. In a hospital-based study, 10,000 dental outpatients were examined (41). In house-to-house studies 101,761
individuals were examined in one area (42); no oral cancer was found among those who did not use tobacco, whereas many cases were found in tobacco users. In another study of 57 000 industrial workers (43), the prevalence was 4.5 times higher in those who both chewed and smoked tobacco as compared with those who did neither.

In a prospective study of two types of tobacco-lime use (Mainpuri and Pattiwala tobaccos), a significantly high prevalence of oral cancer was found among both groups of users after controlling for smoking and alcohol. The dose-response relationship was studied in terms of six different criteria and was found to be significant for each one (44).

In a 10-year follow-up study of 10 000 individuals in Ernakulam district, Kerala, India, all new oral cancers were found among tobacco chewers (45). In another cohort study of 57 518 individuals, all new oral cancers were found among chewers and/or smokers of tobacco (46).

In a recently reported behavioural intervention study on primary prevention of oral cancer (see also section 4.2.1 and Annex 3), 36 000 tobacco users in three areas of India were exposed to health education. Among those who stopped or reduced their tobacco habit a significantly higher reversion rate of precancerous lesions was found after one year (47). After 5 years, in two out of three study areas, a significantly higher percentage of individuals had stopped and reduced their tobacco usage in the intervention group as compared with the control group, and the reduction in the incidence rates of oral precancerous lesions ranged from one-half to one-sixth (48). Since, in an earlier 10-year follow-up study, all oral cancers were preceded by oral precancerous lesions, these results should indicate a greatly reduced oral cancer risk within the study cohort.

Results are also available from a case-control study in Pakistan; this showed a high relative risk for betel quid with tobacco as well as for tobacco alone (49). Multivariate regression analysis was used in a case-control study in Thailand which included 88 cases of oral and oropharyngeal cancers, 96 cases of laryngeal and hypopharyngeal cancers and 1113 controls. After adjusting and controlling for all variables that showed a significant relationship in the univariate analysis, the authors found that the relative risk of smokeless tobacco use remained significant (50).

By definition, the habits of chewing betel quid without tobacco and chewing areca nut alone are not smokeless tobacco usage. It
should be pointed out, however, that the evidence regarding the carcinogenicity of these practices is inconclusive.

Overall, the foregoing discussion clearly indicates a causal relationship between smokeless tobacco use and oral cancer. This relationship has been widely demonstrated for snuff, betel quid with tobacco and khaini. Since there is no convincing evidence to the contrary, every existing smokeless tobacco preparation or product must be considered as carcinogenic until proved otherwise.

### 3.3 Other cancers

#### 3.3.1 Nasal cavity

In some areas of the world, snuff is inhaled, thus bringing nasal tissue into contact with tobacco. In one case-control study in the USA on nasal and paranasal cancer involving 193 patients, no significant association was found with nasal use of snuff (51). Two retrospective studies among Bantus in Africa showed a moderately elevated risk of nasal sinus cancer in relation to "sniffling" (52, 53). The snuff used by Africans is made of powdered local tobacco mixed with the ashes of incinerated plants or herbs, such as Aloe marlothii. These products were found to contain relatively large amounts of carcinogenic hydrocarbons as well as copper, chromium, and nickel (54, 55).

#### 3.2.2 Pharynx

In most epidemiological studies, cancers of the mouth and pharynx have not been dealt with separately. Nevertheless, in one large case-control study in the southern USA, it has been shown that female snuff dippers had an increased risk of cancer of the pharynx and that this risk increased with the duration of use (32) (see Table 3).

In some studies carried out in southern Asia, oral and pharyngeal cancers were dealt with separately and stronger evidence of increased risk is available, for example, in a case-control study conducted in India and Sri Lanka and another study of this type in Bombay (56). Here the relative risks were highly significant for betel quid chewing with tobacco after controlling for smoking.
3.3.3 Oesophagus

The relative risks of persons exposed to chewing tobacco and snuff have been explored in four case-control studies in the USA and Puerto Rico (31), in three of which an increased risk of cancer of the oesophagus was found, although this was not dose-related. No allowance was made for the effect of smoking or tobacco chewing in these studies. An increased risk of oesophageal cancer has also been found in betel quid chewers, and especially in those who chewed quid containing tobacco (38).

3.3.4 Larynx

One case-control study and a case-control analysis of interview data from the Third National Cancer Survey indicate that, in the USA, tobacco chewers and snuff dippers have an increased risk of cancer of the larynx, but the risks are not statistically significant (57, 58). Interviews with 560 laryngeal cancer patients and 2,000 controls in Bombay demonstrated an increased risk for chewers (38).

3.3.5 Pancreas

A large prospective study in Norway indicated an increased risk of cancer of the pancreas in snuff dippers and tobacco chewers. After controlling for cigarette smoking and alcohol consumption, the authors found a relative risk of 2.2 for cancer of the pancreas; this was considered to be significant (59).

3.3.6 Urinary tract

Nine reports on case-control studies of cancer of the urinary tract in long-term users of smokeless tobacco have been published, of which several have indicated an increased risk of cancer of the urinary bladder (31). In addition, one study in 1986 reported a significantly increased risk of cancer of the urinary bladder in female snuff dippers (60). Other studies have shown a significant association between tobacco chewing and kidney cancer (61). The evidence for such an association is strengthened by the fact that N-nitrosamines, some of which induce cancer of the urinary tract in laboratory animals, are present in smokeless tobacco (62).
3.4 Oral mucosal and dental effects

3.4.1 Oral mucosal effects

Oral leukoplakia and other oral lesions have been commonly found at the habitual sites of placement of smokeless tobacco, including the buccal mucosa and groove, labial mucosa and groove, gingivae, anterior two-thirds of the tongue and floor of the mouth.

In the study by Gupta et al. (45), the annual rates of oral lesions were 3.9 per 1000 men and 6.01 per 1000 women. Such observations gave rise to a number of epidemiological studies, especially in Asia, Scandinavia and the USA, aimed at investigating the association of oral leukoplakia and other mucosal pathology with smokeless tobacco use by examining the prevalence, incidence, and malignant transformation of these lesions. The results of these studies support the conclusion that smokeless tobacco use plays a causal role in the development and malignant transformation of oral leukoplakia, as discussed in an IARC monograph (17) and the Surgeon General’s Report on the Health Consequences of Smokeless Tobacco Use (31). Some of the studies are discussed below.

In cross-sectional surveys of more than 50 000 individuals in five districts of India, the prevalence of oral leukoplakia ranged from 0.4% to 1.8% among users of smokeless tobacco as compared with almost zero prevalence in non-users (63). In another survey of 100 000 individuals, the age-adjusted prevalence of leukoplakia was 1.2% among men and 1.8% among women users of smokeless tobacco as compared with 0.05% in non-users (42). The existence of a dose–response relationship was confirmed in two cross-sectional studies (64, 65).

In a cohort study of 10 000 individuals followed over a period of 10 years, the incidence of leukoplakia was 2.5 per 1000 among men and 3 per 1000 among women, as compared with zero among those who did not use smokeless tobacco (45).

In several studies on the oral effects of discontinuation of smokeless tobacco use, it was found that oral leukoplakia apparently regressed (32, 34, 40, 66, 67). There was a significant decline in the incidence of oral leukoplakia in a group given special health education on the harmful effects of tobacco use as compared with that in the control cohort (47).
Finally, malignant transformation of leukoplakia induced by smokeless tobacco has been reported by Silverman et al. (68) and Gupta et al. (45) in 2- and 10-year follow-up studies respectively.

3.4.2 Dental effects

The relationship between smokeless tobacco use and the health of gingival and periodontal tissue has been little studied. Furthermore, because of variations in study design and diagnostic criteria, comparisons between such reports as are available are often impossible. Thus the effects of smokeless tobacco in relation to gingivitis are not clearly established. However, gingival recession at the site of placement is a common finding among teenage users of smokeless tobacco, between 26% and 60% of them having such lesions. In addition, 77–87% of those who had gingival recession also had evidence of related oral mucosal pathology. Such soft-tissue changes were also found at the site of tobacco placement (69, 70).

Evidence that smokeless tobacco has adverse effects on the teeth has been provided by several cross-sectional studies, a limited number of case reports, and a number of investigations of the possibility that smokeless tobacco constituents may serve as predisposing or etiological agents in the development of dental caries (71, 72). Some studies, however, have suggested a potential protective effect (73, 74), since the increased salivary flow resulting from tobacco use could provide increased salivary buffering, and hence reduce caries. It is also known that various forms of smokeless tobacco contain fluoride, which could well offer some protection against caries (75), both directly to the teeth and also via the dental plaque. While some products contain caries-promoting fermentable carbohydrates (76), others use non-fermentable artificial sweeteners which would not increase the plaque’s potential to produce caries-inducing acids. In view of all these differences between the different products, it is not surprising that inconsistent results have been obtained by different investigators. However, since gingival recession occurs prematurely in young users of smokeless tobacco, premature root caries seem likely to occur, whether as a result of lesions induced by fermentable carbohydrate or simply of premature root dentine exposure within the oral cavity.

It has also been suggested that smokeless tobacco, or some of its components, may contribute to degenerative changes (and even to more severe damage) in human salivary glands (77, 78). However,
the data are inconclusive, and it has been suggested that salivary
gland fibrosis and degenerative changes may be associated only with
particular tobacco brands, and are thus not a generalized reaction to
all tobaccos (31). Furthermore, it has been shown that snuff users
have a significantly higher resting salivary flow than non-snuff-
taking controls (79). In view of the above, salivary gland data should
be interpreted with caution and it should be remembered that any
reduction in salivary flow will result in a decrease in protective
factors for the oral epithelium, as well as for the exposed crown and
root surfaces.

Finally, it has also been suggested that excessive tooth surface
wear may occur at the site of tobacco use. However, such evidence
as exists is related mainly to tobacco chewers rather than snuff
users, and surface wear is probably the result of the mechanical
abrasion caused by the chewing action rather than of any chemical
effect of the tobacco or its by-products. Firm evidence from
controlled studies on calculus and staining in tobacco users, as
compared with non-users, is also lacking, only case reports being
available (31).

3.5 Other health effects

3.5.1 Cardiovascular effects

Nicotine, the major addictive agent in smokeless tobacco, can
increase heart rate, blood pressure, cardiac stroke volume and
output, and coronary blood flow (80, 81). In one study on smokeless
tobacco users, it was shown that changes in heart rate and blood
pressure were similar in magnitude to those seen in cigarette smokers
(82). A survey of 710 males and 923 females aged over 18 years
showed that the diastolic blood pressure was significantly higher in
smokeless tobacco users than in non-users (83). It can be concluded,
therefore, that the use of smokeless tobacco is associated with higher
blood pressure in young adults. In a recent study of male college
athletes, both heart rate and blood pressure increased significantly
when they used smokeless tobacco under experimental conditions
(84). The effect of the tobacco on the heart rate being additional to
that caused by exercise. The athletes' recovery was significantly
slower when smokeless tobacco was used.
3.5.2 Digestive effects

Smoking is strongly linked to the prevalence of peptic ulcer, and failure to stop smoking is the major predictor of failure to respond to ulcer therapy (85). Smoking decreases the secretion of pancreatic fluid and bicarbonate and thus leads to greater and more prolonged acidity of the gastric fluid of the duodenal bulb (86). The swallowing of tobacco juice containing nicotine in high concentration may thus conceivably have local effects on the digestive tract (31).

3.5.3 Fetal toxicity

There are strong indications that nicotine causes a reduction in uterine blood flow and has a direct effect on fetal function (87, 88). Tobacco chewing during pregnancy can thus be expected to lead to transplacental toxicity to the fetus. In one Indian study, the stillbirth rate in women who chewed tobacco was 50 per 1000 live births, as compared with only 17 per 1000 live births in women who did not (89). Furthermore, when the offspring of tobacco-chewing mothers were compared with those of controls, the former weighed about 500 g less on average. This lower birth weight was associated with a decrease in mean gestation period. In another Indian study, the mean weight of newborn babies of 70 tobacco users was about 14% less than that of 70 control babies (90). These data strongly suggest that the oral use of smokeless tobacco can have a toxic transplacental effect on the fetus.

3.5.4 Overall mortality

Reports on mortality rates associated with different forms of smokeless tobacco use are available from two cohort studies carried out in rural areas of India. Unfortunately, no death certification system existed, so that the precise causes of death were unknown.

In the first of these studies in Ernakulam district of Kerala, a random sample of 10,287 individuals aged 15 years and over was followed for a period of 10 years (91). Chewing of betel quid, consisting of areca nut, betel leaf, lime and tobacco, was a common habit. The relative risk of overall mortality for those with chewing habits was 1.3 and was highly significant. This excess risk could not be explained by oral cancer alone, since this accounted for only a very small fraction of the excess mortality.
In the second study, in Srikakulam district of Andhra Pradesh, another random sample of 10,169 individuals aged 15 years and over was followed for 10 years (92). Although chewing of betel quid was uncommon, the relative risk of overall mortality among chewers was 1.9 ($P < 0.01$) and could not be explained by oral cancer alone.

These studies raised for the first time the possibility that tobacco chewers may experience a significantly higher mortality from causes other than oral cancer that are as yet unknown.

3.5.5 *Addiction and dependence*¹

Drug dependence is substance-seeking behaviour caused by the action of a drug on the central nervous system. It displaces other forms of behaviour so that the dependent person ultimately gives the highest priority to drug seeking. Tolerance and physiological dependence may or may not be present and the severity of dependence may vary considerably from one individual to another (17, 93).

All the available evidence supports the conclusion that some users of smokeless tobacco are unable to abstain permanently from their habit even when ill health clearly results from it (94). This suggests that smokeless tobacco use can become a form of drug addiction.

It is well established that nicotine is the major addictive agent in both smokeless tobacco and tobacco smoke (17, 31). In recent years a number of tobacco substitutes containing nicotine have been marketed in various parts of the world, especially Europe and North America (see section 4.4). Whereas controlled nicotine-containing drugs may be helpful in the cessation of tobacco chewing and smoking, all types of commercial products containing nicotine or tobacco, whether used orally, nasally, or applied to the skin, can induce nicotine addiction. Especially in the hands of children and adolescents, these nicotine preparations may lead to tobacco chewing, snuff dipping, or smoking and eventually to an addictive tobacco habit.

¹ The terms “addiction” and “dependence” are used more or less interchangeably in this section. While there are arguments for and against both of these terms, what is important here is that both refer to the situation in which nicotine from smoking or use of smokeless tobacco leads an individual to lose voluntary control over his or her use of tobacco products.
4. PREVALENCE, PATTERNS AND TRENDS

4.1 Introduction

While the production and consumption of some forms of smokeless tobacco have declined markedly throughout the present century, in certain developed countries the trend has been in the opposite direction as far as moist snuff is concerned. In the USA, consumption of loose-leaf tobacco has also increased, but to a lesser extent. Increased consumption in Sweden and the USA is accounted for mainly by the creation of a new market among young people. In both these countries, use was primarily limited to older persons prior to the 1970s, whereas the highest prevalence of use is now found among teenagers and young adult males.

The use of different forms of tobacco as a part of betel-quid chewing is a well-established practice in most of South-East Asia. In the Eastern Mediterranean region and parts of Central Asia, tobacco is most often chewed in combination with flavouring agents, with or without lime. Although prevalence of use varies widely, it is estimated that at least 100 million persons in India and Pakistan alone use smokeless tobacco. There is some evidence from India, Indonesia and Pakistan that tobacco chewing is a habit of the older generation and is gradually declining, but that this decline in popularity has been offset by increased cigarette smoking, particularly among males.

Both demographic and regional variations in prevalence of use may exist within individual countries. In the industrialized countries, a reciprocal relationship often exists between cigarette smoking and smokeless tobacco use, and individuals may change from one form of tobacco use to another. In Asia, use of both chewing and smoking tobacco is common.

Aggressive marketing of smokeless tobacco products has played an important role in the resurgence of this form of tobacco use in Sweden and the USA, and these products are now widely used by young people and adults in both countries. Clearly, the absence of established use in a population does not protect people against new, cleverly designed products promoted through aggressive marketing strategies.

In Asia, the national and transnational tobacco companies have not attempted to replace locally produced smokeless tobacco products and have confined themselves to manufacturing cigarettes,
whose sales are on the increase. Given the experience in North America and Europe, however, there is a danger that they may attempt to convert what is essentially a cottage industry into a vigorously promoted large-scale manufacturing enterprise. In fact, they have recently initiated marketing programmes to promote the use of their products throughout the world, such programmes including many of the highly successful promotional and advertising measures that have been used in the USA. In addition, the companies have modified their smokeless tobacco products to appeal to the particular preferences of countries that have been targeted as new markets.

4.2 Prevalence and patterns of use

Current data on smokeless tobacco production are not available for most countries because the figures are usually combined with those for smoking tobacco, pipe tobacco, sheet tobacco and/or other manufactured tobacco. Some data on international trade are available, but because they are not available for all countries, or even for all major producers and consumers, it is not possible to draw any conclusions from them.

4.2.1 Developing countries

Asia and the Eastern Mediterranean. Traditionally, the people of South-East Asia, India, and the Eastern Mediterranean have used a number of different plant products for chewing. Tobacco, when it was introduced into this part of the world in the 16th century, was therefore readily accepted as an additional ingredient in the various chewing mixtures.

The forms in which tobacco is taken orally vary widely in their manner of preparation, ingredients, and the manner in which they are used (chewed and taken out or swallowed). Most of the products are prepared on a small scale, and the formulas are often carefully guarded secrets.

Tobacco is most often taken in combination with a variety of other ingredients. Only a small percentage of users chew tobacco alone. In Bangladesh, India, Malaysia, Pakistan, Sri Lanka and Thailand, tobacco is usually taken together with pan (betel quid), either as powdered dried leaves (pati) or as a paste (kiwam, zarda). In many parts of India, the chewing of tobacco mixed with lime
(khaini or mawa) is a common habit, while in Afghanistan and northwestern Pakistan, naswar (a combination of tobacco, flavouring agents and ashes; with or without lime) is most commonly chewed. Common chewing preparations, with and without tobacco, are defined in Annex 1.

Tobacco is also used in parts of the Indian subcontinent for cleaning the teeth (mishri, gudaku), a practice that gradually leads to addiction and increased use. A toothpaste containing tobacco has recently been introduced in India.

Population-based surveys conducted in seven rural areas of India in the 1960s indicated that 15–60% of the adult population used tobacco orally in one form or another (95) (Table 5). In all the areas surveyed, men were more likely than women to use some form of tobacco. In four areas, the predominant tobacco habit among women was chewing. The form in which tobacco is chewed varies in the different regions of India. The commonest form of usage is in combination with pan (betel quid), but in Pune (south India) and Bhavnagar (western India), women mostly use tobacco by applying it to their gums (mishri/bajjar/gudaku).

Little is known about the psychology of tobacco addiction in India, but studies in three areas indicated that tobacco use is learned from parents and other elders, or from peers. It is perceived to be of medicinal value for various conditions, such as toothache, and nothing is known of the serious health risks associated with its use.

<table>
<thead>
<tr>
<th>Area</th>
<th>Men</th>
<th></th>
<th></th>
<th>Women</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chew</td>
<td>Smoke</td>
<td>Mixed</td>
<td>Chew</td>
<td>Smoke</td>
<td>Mixed</td>
</tr>
<tr>
<td>Surveys conducted between 1960 and 1970</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bhavnagar</td>
<td>9</td>
<td>56</td>
<td>6</td>
<td>15</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Ernakulam</td>
<td>14</td>
<td>45</td>
<td>22</td>
<td>38</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Srikakulam</td>
<td>4</td>
<td>70</td>
<td>7</td>
<td>3</td>
<td>64</td>
<td>–</td>
</tr>
<tr>
<td>Singhbhum</td>
<td>17</td>
<td>50</td>
<td>14</td>
<td>28</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Darbhanga</td>
<td>28</td>
<td>24</td>
<td>26</td>
<td>7</td>
<td>41</td>
<td>1</td>
</tr>
<tr>
<td>Pune</td>
<td>53</td>
<td>6</td>
<td>2</td>
<td>49</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Malinpur</td>
<td>21</td>
<td>41</td>
<td>20</td>
<td>9</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>Surveys conducted prior to 1960</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maharashtra and Karnataka</td>
<td>38</td>
<td>35</td>
<td>11</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Uttar Pradesh</td>
<td>56</td>
<td>14</td>
<td>12</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>83</td>
<td>18</td>
<td>7</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

* Source: Mehta (42, 69), Khanolkar (66).
(96). This information was used in designing the first large-scale intervention programme on smokeless tobacco use, previously mentioned, in which 36,000 tobacco users were exposed to educational materials and individually counselled to give up their tobacco habit. The programme is described in greater detail in Annex 3. Logistic regression analysis indicated that, in the absence of intervention, women were much more likely to give up their tobacco habit than were men (27:1), smokers were more likely to give up than chewers (10:1), and those who had been using tobacco for a short time (1–5 years) were more likely to give up than those who had used tobacco for more than 10 years (14:1). The intervention was most efficacious with the difficult subgroups—men, chewers, and long-term tobacco users—and the odds ratios for each group were much smaller as a result of the intervention (2.1, 1.2, and 1.9, respectively). The addictive nature of oral tobacco use is demonstrated by the fact that chewers were less likely to give up their habit than smokers and long-term users were less likely to do so than those acquiring the habit more recently. The programme demonstrates the potential for modification of tobacco-use habits through intervention, even in areas where such use is traditional.

Traditionally, use of smokeless tobacco in India has not depended on commercially marketed consumer products. However, the situation is changing and some indigenous smokeless tobacco products are now commercially manufactured and have penetrated some of the market. Manufacturers have also found ways of taking advantage of the electronic media, despite a ban on the advertising of tobacco products on radio and television. Thus the advertising of one particular chewing material is permitted because it does not contain any tobacco. Another technique for bypassing advertising restrictions is through the sponsorship of televised sporting events; logos and advertising slogans are then clearly visible to viewers. There are no restrictions on advertising in the press or on hoardings, and both are used for product promotion.

In Karachi, Pakistan, a population-based survey conducted between 1967 and 1972 indicated that about 23% of the adult population used oral tobacco, primarily in combination with pan (Table 6). The average quantity of tobacco (kiwam/patti) chewed by males was 3.6 g per day and by females 2.9 g per day (97).

In some parts of India, smoking was more prevalent among males and tobacco chewing more common among females. Anecdotal accounts of the use of naswar in the northwestern provinces of
Pakistan and parts of Afghanistan suggest that a large majority of adult males in the rural areas regularly use this product. In 1975, 2.3 thousand tonnes of tobacco were used for this purpose (17).

In Indonesia, the chewing of betel quid is widespread, being much more common among women than men. Finely cut tobacco is added to remove the remnants of the betel quid and the saturated tobacco is then placed close to the labial commissure until a euphoric state is achieved (17). As already pointed out, there is also some evidence from both India and Pakistan that tobacco chewing is a habit of the older generation and is gradually declining. One of the noticeable effects of this decline is that carcinoma of the oral cavity has also declined in Karachi (Pakistan) and Bombay (India). Concurrently, the number of male smokers has greatly increased, and carcinoma of the bronchus is now the most common malignancy in this group. Carcinomas of the oropharynx and hypopharynx have become more common than carcinoma of the oral cavity. This is considered to be a result of the change in tobacco use from chewing to smoking.

Africa. Both oral and nasal use of snuff have been reported to be widely practised by Bantu men and women, for whom its use has important cultural and ritual significance (17). Typically, the product contains tobacco leaves and ash from aloe; oil, lemon juice, and herbs may also be added. Small-scale surveys have provided estimates of prevalence of use ranging from 4 to 30%, varying with age, sex, and location. Other tribes in East Africa are also reported to use some forms of snuff.
4.2.2 Industrialized countries

Today, smokeless tobacco is produced in two general forms in developed countries—chewing tobacco and snuff, the former being chewed and held in the cheek or lower lip. Three main types of chewing tobacco are marketed: loose-leaf, plug, and twist, of which loose-leaf is the most popular. Snuff has a much finer consistency than chewing tobacco and is held in place in the mouth without chewing, a practice sometimes referred to as “dipping”. It is marketed in both dry and moist forms. Dry snuff may also be taken nasally. This practice is primarily limited to Austria, the southern part of the Federal Republic of Germany, Switzerland and the United Kingdom (17, 31).

Information on smokeless tobacco use is most readily available for Sweden and the USA, and the situation in these countries will therefore be described here.

United States of America. Between 1944 and 1968, total production of smokeless tobacco in the USA declined by 38.4% from 68 200 tonnes to 42 000 tonnes, but production subsequently increased, reaching 61 600 tonnes in 1985.

Between 1970 and 1985, total snuff production increased by 56% from 14 200 to 22 000 tonnes as a result of increased production of moist snuff; the manufacture of dry snuff declined. Separate production data for the two types of snuff only became available in 1981. Between 1970 and 1981, however, the production of fine-cut tobacco, used in the manufacture of some moist snuff, increased threefold, from 2200 to 6900 tonnes (Tables 7 and 8).

Between 1970 and 1985, the production of chewing tobacco increased by 36% from 29 000 to 39 500 tonnes as a result of the increase in the production of loose-leaf tobacco by 87.3% from 18 000 to 33 600 tonnes. The production of plug and twist tobacco declined during this period (Tables 7 and 8).

In the first part of the present century, use of smokeless tobacco in the USA was confined primarily to rural areas and to particular occupational groups, such as miners and agricultural workers (98, 99). Prevalence was highest among people over the age of 50 years (31). Recently, however, there has been a marked increase in use by adolescents and young adults.

Most surveys in the USA have referred to snuff and chewing tobacco collectively as “smokeless tobacco”, and prevalence data are reported here accordingly. In studies where use of snuff and chewing
Table 7. Production of smokeless tobacco, USA, 1944–1980 (thousand tonnes)*

<table>
<thead>
<tr>
<th>Period</th>
<th>Plug</th>
<th>Twist</th>
<th>Loose-leaf</th>
<th>Fine-cut*</th>
<th>Snuff*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1944–1948*</td>
<td>24.2</td>
<td>2.7</td>
<td>21.0</td>
<td>1.7</td>
<td>18.6</td>
</tr>
<tr>
<td>1949–1953*</td>
<td>18.1</td>
<td>2.3</td>
<td>17.9</td>
<td>1.3</td>
<td>18.0</td>
</tr>
<tr>
<td>1954–1958*</td>
<td>15.2</td>
<td>2.0</td>
<td>15.9</td>
<td>1.3</td>
<td>17.9</td>
</tr>
<tr>
<td>1959–1963</td>
<td>12.0</td>
<td>1.5</td>
<td>14.9</td>
<td>1.5</td>
<td>15.2</td>
</tr>
<tr>
<td>1965</td>
<td>11.2</td>
<td>1.3</td>
<td>15.4</td>
<td>1.7</td>
<td>13.5</td>
</tr>
<tr>
<td>1970</td>
<td>10.0</td>
<td>1.1</td>
<td>18.0</td>
<td>2.2</td>
<td>12.8</td>
</tr>
<tr>
<td>1975</td>
<td>8.2</td>
<td>1.0</td>
<td>24.4</td>
<td>3.3</td>
<td>11.1</td>
</tr>
<tr>
<td>1980</td>
<td>7.9</td>
<td>0.9</td>
<td>32.5</td>
<td>6.7</td>
<td>11.0</td>
</tr>
</tbody>
</table>


*Figures are average annual production.

*Includes both dry and moist snuff.

Table 8. Production of smokeless tobacco, USA, 1981–1986 (thousand tonnes)*

<table>
<thead>
<tr>
<th>Year</th>
<th>Plug</th>
<th>Twist</th>
<th>Loose-leaf</th>
<th>Dry snuff</th>
<th>Moist snuff</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>8.1</td>
<td>0.8</td>
<td>32.0</td>
<td>6.3</td>
<td>14.0</td>
</tr>
<tr>
<td>1982</td>
<td>7.1</td>
<td>0.8</td>
<td>33.2</td>
<td>4.7</td>
<td>15.2</td>
</tr>
<tr>
<td>1983</td>
<td>6.4</td>
<td>0.8</td>
<td>32.3</td>
<td>4.8</td>
<td>16.5</td>
</tr>
<tr>
<td>1984</td>
<td>5.8</td>
<td>0.8</td>
<td>33.8</td>
<td>4.6</td>
<td>17.8</td>
</tr>
<tr>
<td>1985</td>
<td>5.2</td>
<td>0.7</td>
<td>33.6</td>
<td>4.2</td>
<td>18.0</td>
</tr>
<tr>
<td>1986</td>
<td>4.7</td>
<td>0.6</td>
<td>31.6</td>
<td>4.0</td>
<td>17.5</td>
</tr>
</tbody>
</table>


In 1970, fewer than 1% of teenage and young adult males nationwide reportedly used any form of smokeless tobacco (31). By 1985, 25% of white males aged 12–24 years used snuff or chewing tobacco, 6% of males aged 12–17 years, and 12% of those aged 18–24 years using smokeless tobacco daily (Table 9) (100). Local surveys indicated considerable regional variation in prevalence estimates, and rates much higher than those quoted in this report were often observed (31, 101). Use was no longer confined to rural areas; high rates of use were reported in metropolitan areas where smokeless tobacco had not previously been used.
Table 9. Prevalence of smokeless tobacco use by white males in the USA, 1985 (%)*

<table>
<thead>
<tr>
<th>Frequency of use*</th>
<th>Age group</th>
<th>12–17</th>
<th>18–25</th>
<th>26–34</th>
<th>35+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most days</td>
<td></td>
<td>6</td>
<td>12</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>1–2 days per week</td>
<td></td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>More than 1 day per week</td>
<td></td>
<td>8</td>
<td>14</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>3–61 days per year</td>
<td></td>
<td>10</td>
<td>8</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>1–2 days per year</td>
<td></td>
<td>7</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Any use in past year</td>
<td></td>
<td>25</td>
<td>25</td>
<td>12</td>
<td>9</td>
</tr>
</tbody>
</table>

* Source: Rouse (100).

Use is generally more common among white than black or Hispanic youth, although in some areas rates of use among Hispanics are as high as those among white youth (100, 101). Use is confined primarily to males, although a notable exception to this pattern occurs among American Indian youth, where females are almost as likely as males to use smokeless tobacco (102, 103).

A number of factors have been identified that may motivate children and adolescents to use smokeless tobacco, though it is important to bear in mind that motivations for smokeless tobacco use may vary between different areas, age groups and individuals. Peer groups and family members, however, are consistently found to be an important influence (104, 105). Some studies have found that children and adolescents are less knowledgeable about the health risks associated with smokeless tobacco use than they are about those associated with cigarettes (106–108), so that smokeless tobacco may be viewed by them as a safe alternative to smoking. For some young people, but not all, use of smokeless tobacco may represent a form of rebellion or defiant behaviour, similar to precocious use of alcohol, cigarettes, or illegal drugs.

Addiction or dependence is a potential danger. Even very young users are likely to experience significant exposure to nicotine, and many young people dip or chew tobacco frequently enough to establish dependence. Many studies have shown that frequency of use of smokeless tobacco, and hence nicotine exposure, increases with age (100, 101). In one study, a positive relationship was found between the number of years of smokeless tobacco use, the number of minutes per day of reported use, and urinary nicotine and cotinine levels (7). Such relationships are consistent with the development of tolerance and dependence. Cessation programmes in the USA to aid
Smokeless tobacco users who want to give up the habit have had very low success rates, testifying to the strength of the addiction to these products that can develop (108).

- Use of smokeless tobacco has frequently been found to be associated with use of cigarettes, alcohol and other substances, and often appears to be part of an overall pattern of experimentation and risk-taking. Studies vary in the degree of correlation observed between cigarette smoking and smokeless tobacco use, as a result, in part, of regional and age differences between the various study populations. Several studies have found evidence to show that a reciprocal relationship exists between cigarette smoking and smokeless tobacco use in which decreases in one habit were associated with increases in the other (109).

In the past 15–20 years, smokeless tobacco has been marketed aggressively in the USA through sophisticated advertising campaigns. Sporting events are widely sponsored, serving both to associate products with athleticism and to circumvent the existing ban on television advertising (110). Celebrity spokesmen, including professional athletes, have appeared in advertisements designed to introduce smokeless tobacco to those who have never used it. Instructions on how to use the products are provided, including encouragements such as "... getting the hang of 'going smokeless' is all part of the fun. In a couple of weeks you'll be a 'pro'" (111).

One way of appealing to novice users has been the development of a new low-nicotine product. Moist snuff is packaged in small sachets, thus obviating the messiness of holding loose tobacco in the mouth. This product has also been marketed as an alternative to smoking, with the implication that it is "safe" (112).

Free samples of the low-nicotine product have been widely distributed; advertisements containing coupons that could be used to obtain free samples appeared in six magazines during a 3-month period in 1983 and 400,000 of them were sent in. A marketing programme is operated on many college campuses in which paid student representatives give away free samples of snuff to students, and college tobacco-chewing clubs have been formed. At many sponsored events, such as rodeos, fishing tournaments and motor races, booths are set up for the distribution of samples of smokeless tobacco (113, 114).

In 1980 a prominent market analysis report described the average consumer of moist snuff as between 18 and 30 years of age, with a "substantial emphasis on the 18–24 group" (98). According to a 1983
report, "there is a general feeling that the younger generation may be going directly into this area rather than cigarettes, and the demographic make up is skewed toward the younger groups" (115). The prevalence data previously quoted indicate the accuracy of this assessment and testify to the success of the promotional campaigns in recruiting new users, especially among young people.

**Sweden.** In Sweden, oral use of moist snuff, or dipping, has been an established practice among a section of the population for over a century. Per capita snuff consumption fell by about 75% from 1920 to 1968 (116), but has since increased steadily. As in the USA, increased consumption has been accompanied by a marked shift in the age distribution of users. Data collected in 1955 indicated that use was most prevalent among the oldest age groups and that snuff was not used by those in the 15–19-year age group. By 1986, this pattern had been reversed and prevalence was highest among teenagers and young adult males (Table 10). Daily use was reported by 29% of young men (16–24 years), and by 12% of older ones (55–74 years). Use by women remained very low, the prevalence of daily use ranging between 1% and 2%. Overall use by males increased from 11% in 1968 to 24% in 1986 (117).

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>1955 a</th>
<th>Age group (years)</th>
<th>1986 a</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
<td>Males</td>
</tr>
<tr>
<td>15–19</td>
<td>0</td>
<td>0</td>
<td>16–24</td>
</tr>
<tr>
<td>20–29</td>
<td>8</td>
<td>0</td>
<td>25–34</td>
</tr>
<tr>
<td>30–39</td>
<td>6</td>
<td>0</td>
<td>35–44</td>
</tr>
<tr>
<td>40–49</td>
<td>12</td>
<td>0</td>
<td>55–74</td>
</tr>
<tr>
<td>50–64</td>
<td>21</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>65+</td>
<td>41</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

*Figures are for use of any type of snuff.

*Source: Swedish Gallup Institute.

*Source: Ramström (117).

As in the USA, there is an irregular pattern of regional variation, although prevalence tends to be higher in the north of the country. There is some indication that rates of use are greater in the more rural areas, but substantial rates of use are also found in some large cities (17).

Prevalence of use varies with socioeconomic factors. Use by adults is more common among skilled and unskilled workers, farmers, owners of small businesses, and low-level white-collar
workers than among intermediate and high-level white-collar workers. Among males, use is less common among the better educated. For females, however, this pattern is reversed, and educated women are more likely to be users of snuff (118).

The relationship between snuff dipping and cigarette smoking varies with age. Among adults aged 35–70 years, almost 78% of the daily snuff users were also daily smokers. Among daily dippers aged 18–34 years, however, 66% had never been daily smokers. Among the older age group, most dippers appeared to have replaced a former smoking habit with snuff use. Among the younger group of snuff users, however, dipping was the initial and primary tobacco use habit (117).

There is little direct information on motivations for snuff dipping by youth in Sweden but, as in the USA, snuff use is associated with athleticism. It is commonly and conspicuously used by prominent sports figures. Special educational and information materials have been developed for leaders, coaches, and key figures in amateur athletics, since this is viewed as an efficient way to reach young persons at special risk for taking up snuff dipping.

In Sweden, new products were introduced in 1984 similar to those promoted in the USA, which have special appeal for youth. Snuff is packaged in small sachets that can be used inconspicuously; and they are available in two sizes, normalprilla and miniprilla. The creation of a miniature product further facilitates experimentation by novice users. These products are packaged attractively in a youth-oriented style and resemble packages of sweets.

That smokeless tobacco products have been actively and successfully promoted is indicated by a recent advertisement from a manufacturer boasting that sales of smokeless tobacco had doubled between 1984 and 1986 and stating that “Increasing numbers of consumers discover and appreciate this product”. The advertisement appeared in the publication of the Association of Tobacco Retailers and announced the manufacturer’s intention to launch an intense advertising campaign both in newspapers and at points of sale.

Other industrialized countries. Smokeless tobacco is also used in Nordic countries other than Sweden, wet snuff being the preferred type (77, 119). In Finland, a survey of 441 military recruits aged 17–29 found that 11% used oral snuff (120).

Trade data indicate that snuff and chewing tobacco are produced in almost all other European and some North African countries, but
information on the prevalence of the habit among the population is not readily available.

Regional and local surveys of Canadian schoolchildren have indicated prevalences of tobacco use comparable to those in the USA. In one study, use was found to be more prevalent among Indian Metis and Inuit than among other young people (101, 102).

In the United Kingdom, oral use of tobacco is uncommon but is sometimes practised by miners as a substitute for smoking while working underground (121). There are currently estimated to be about one million snuff users in the country, and the product is almost always used nasally. Since the 1920s, snuff consumption in the United Kingdom has declined from about 400 tonnes to about 140 tonnes in the 1980s. Manufacture of packaged moist snuff for oral use began in 1985, but a market for the product has not so far been established.

4.3 International marketing of smokeless tobacco

As already pointed out, tobacco manufacturers have recently initiated marketing programmes to promote the use of their products throughout the world. Such programmes include many of the highly successful promotional and advertising measures that cigarette companies have previously used successfully to promote smoking internationally (114). In 1985, an American tobacco company opened a manufacturing plant in Scotland to produce moist snuff for sale in Europe, Africa and the Eastern Mediterranean (122). The same company established a regional office in Hong Kong in 1985 to promote sales in the Western Pacific and East Asia. The company targeted its promotional activities, inter alia, on Australia, China, France, the Federal Republic of Germany, Hong Kong, Israel, Italy, Japan, Switzerland, and the United Kingdom (123). It also formed a joint venture with a Swedish company to sell products in Sweden and an affiliate to market products throughout Canada. Other plans envisaged cooperation with another company in selling products in Latin America.

A Swedish company is reported to be intensifying its efforts to export snuff, particularly to Canada, the Federal Republic of Germany, and the USA (Ramström, personal communication).

The companies have cleverly tailored their products to appeal to local preferences. Smokeless tobacco has been marketed in small teabag-like sachets, which eliminates the inconvenience and messiness
of placing loose tobacco in the mouth. Flavouring is added to appeal to local tastes, such as liquorice for Italy, mint for the United Kingdom, aniseed for Denmark and citrus for Asian countries (124).

Faced with the possible introduction of this new form of oral tobacco, five governments (those of Hong Kong, Ireland, Israel, the Isle of Man and New Zealand) have enacted measures to prohibit its sale (see Annex 2). Thus, in Hong Kong, in 1986, the government introduced a law to ban the import, sale and manufacture of smokeless tobacco, viewing the matter as an internal public health issue. Government officials were contacted by American politicians, who urged them not to ban smokeless tobacco. However, considerable support and help were received from international health bodies and from smoking and health organizations in other countries, and the law was successfully enacted in January 1987. Transnational tobacco manufacturers will obviously continue and intensify their marketing efforts throughout the world. The actions required to counteract these efforts and to protect public health are discussed in section 5.

4.4 Other nicotine-delivery devices

A number of products which deliver nicotine to users but are not smoked have recently been developed and introduced. Thus an American subsidiary of a Swedish tobacco company has recently test-marketed in the USA a chewing gum containing about 20% tobacco and 1 mg of nicotine per piece. A total of US$ 10 million is being spent on advertising to promote this new product as a temporary alternative to cigarettes for use by both men and women smokers in settings where smoking is prohibited (125). The targeting of women in particular is a matter of major concern. In India, a toothpaste that contains tobacco has recently been introduced as a total replacement for smoking and as an aid to oral hygiene. An American manufacturer has developed a smokeless "cigarette" containing nicotine only and consisting of a plastic tube with a spongy plug impregnated with nicotine at one end. The user draws air through it and an aerosol of nicotine is delivered to the mouth. The device has proved to be inefficient in promoting mucosal absorption of nicotine and the US Food and Drug Administration has called for it to undergo safety testing (126). The same manufacturer has recently patented a snuff mixed with powdered salts of nicotine. The user inhales the snuff through the nose and the
nicotine should be rapidly absorbed across the thin nasal membranes (127). Another company has announced the development of a cigarette-like device that contains glycerol, nicotine, and flavouring agents but produces no tobacco smoke. Although consumption of these products is extremely small at present in comparison with that of smokeless tobacco products, their use may well increase as smoking becomes increasingly unacceptable for personal, social and legal reasons.

Nicotine chewing gum, although a type of nicotine-delivering device, is quite different in character. It is available in many countries as a therapeutic device to help smokers stop smoking, has been tested for safety and efficacy as a smoking cessation agent and is subject to appropriate controls. The same is not true for many of the products mentioned above. Their introduction into the market without proper safety testing and control measures poses a serious threat to public health, since they could cause young people to develop a nicotine dependence that might later result in a smoking habit. Their availability could also mean that many adults would remain dependent on smoking who would otherwise give it up. Given the powerful dependence-producing action of nicotine and its cardiovascular effects, free access to such products is inconsistent with the public health legislation governing other consumer products.

5. CONTROL STRATEGIES

5.1 Introduction

The use of smokeless tobacco is already a leading cause of disease in some countries, and may become so in others unless urgent preventive action is taken. Both the seriousness of the health hazards involved in smokeless tobacco use, and the urgency of the need for action have been conclusively demonstrated. In countries where smokeless tobacco use is already established, action is required to reduce consumption, while in those where there is currently no established use an opportunity exists to prevent a new epidemic of disease caused by tobacco.

Action to reduce or prevent disease caused by smokeless tobacco use must take its proper place within an overall tobacco control strategy. Most of the principles on which smoking control
programmes are based are also relevant to smokeless tobacco control strategies, and it is fortunate that the experience gained in over a quarter of a century of smoking control activity worldwide can be drawn upon in planning and implementing smokeless tobacco control programmes.

As already pointed out, levels of smokeless tobacco use, market penetration and health consequences of use vary from country to country. Control strategies will therefore also vary.

The Study Group has identified the overall strategies required to control smokeless tobacco use, but in some cases it may be necessary to implement only some parts of them. However, it is vitally important that all necessary action required to deal with the problem in any country should be undertaken. It cannot be too strongly emphasized that the problem will not be solved by a half-hearted approach; in each situation, an appropriate and comprehensive strategy must be developed, with the ultimate objective of eradicating the use of smokeless tobacco products.

There is now no doubt about the seriousness of the problem presented by smokeless tobacco or about the strategies required to control it; what is required is determination and a sense of urgency in developing and implementing control strategies.

In this context, it must be stressed that, while it is important that public health action should be evaluated on a long-term basis, governments should not wait until statistics about the dangers of smokeless tobacco use are available for their own countries, or until intervention measures in other countries have been evaluated, before taking action.

5.2 Objectives

WHO has set the goal of health for all by the year 2000. If this is to be achieved, national tobacco control programmes must be implemented rapidly to ensure that communities become free of the tobacco habit by the year 2000. This applies to the use of tobacco in all its forms. The goal is to reduce the mortality and morbidity caused by tobacco use, including the use of smokeless tobacco. It is important to demonstrate to governments, health authorities and other relevant groups the case for action to control the use of smokeless tobacco and to ensure that such control becomes an integral part of a coordinated tobacco control programme. Many of the principles and objectives of such programmes are common to
both cigarette control and to the control of other forms of tobacco use.

In line with previous recommendations on tobacco smoking, the major objectives of any programme to control smokeless tobacco are:

1. where smokeless tobacco is not used, to prevent its introduction, with special emphasis on preventing its use by children;
2. where smokeless tobacco is already used, to prevent any increase in, and reduce the prevalence of, use in the population;
3. to establish or maintain a social climate unfavourable to smokeless tobacco use.

Individual governments and health authorities will need to develop appropriate programmes to achieve these objectives, using some or all of the strategies outlined in the following sections.

5.3 Data collection

An adequate information base is a prerequisite for every tobacco control programme. As with smoking control, efforts to control smokeless tobacco use will have to be adapted to current national conditions. Data must therefore be collected for subgroups distinguished by sex, age, educational level, area of residence, etc. The data required for each of these subgroups will include:

— the extent of smokeless tobacco use;
— the types of smokeless tobacco used;
— users' perceptions of the product and its use (e.g., awareness of health risks);
— use of smokeless tobacco in relation to current smoking trends;
— information about manufacture, import, employment and other economic factors.

Most of the above data can be collected only by means of special surveys, but some supplementary information can be obtained from standard sources of national statistics.

Surveys can be tobacco-specific, or questions can be included in household or other multipurpose surveys. In any case, it is essential that the tobacco section of the survey should be carried out in
accordance with guidelines issued by WHO;¹ those relating specifically to smokeless tobacco use are quite brief but can easily be expanded by analogy with those for smoking. The guidelines apply not only to the design of the questionnaire but also to the processing and presentation of the data. If data are presented in the standardized categories recommended in these guidelines, comparison of the results obtained in different studies will be possible.

In the early stages of the development of a smokeless tobacco control programme, survey results can be used both as a basis for planning and as baseline data. They can be compared with post-intervention data in order to evaluate the effects of intervention. Early effects of intervention may consist of changes in attitudes and beliefs that precede changes in behaviour. In order to detect such early effects, the survey should contain specific items on such variables in addition to those relating to actual behaviour. While most data on tobacco use will have to be collected by means of specific surveys, data related to the effects of tobacco use will be available from the usual health statistics. In many countries it will be possible to combine the data from these two sources and thus to calculate the economic loss resulting from tobacco use. This kind of calculation will usually indicate a very favourable cost-effectiveness ratio for tobacco control and thereby encourage strong support for the programme.

5.4 Legislation, regulation and restrictive measures

The case for legislation to control smoking has been amply set out in various WHO publications (128, 129), and the same arguments apply to smokeless tobacco.

While it was not possible to prevent the introduction of cigarette smoking, the opportunity now exists in many countries to use legislative measures to prevent the introduction of smokeless tobacco products. Countries where the use of these products is already established can also use legislation as an important part of their overall strategy to reduce and ultimately to eliminate smokeless tobacco use.

The history of tobacco demonstrates very clearly that effective controls cannot be implemented without legislation. In many

¹ Unpublished WHO document, WHO SMO 83.4; available on request from Tobacco or Health, World Health Organization, 1211 Geneva 27, Switzerland.
countries, voluntary agreements have been reached between governments and tobacco manufacturers and advertisers. These are invariably unsatisfactory. The reality is that the tobacco industry will exploit any available means to circumvent such voluntary agreements; nicotine-containing products should therefore be permitted only for medical reasons and when their use is strictly controlled on the basis of advice from the health authorities. It is also clear that the most effective means of preventing the emergence of new tobacco-related health problems is to prevent the introduction of new products, rather than to allow them to be introduced and take action only after the resultant health problems have become apparent.

In summary, tobacco is so dangerous to health that no new form of use should be permitted anywhere and all possible means should be used to reduce and ultimately to eradicate existing forms of use.

Legislation will obviously vary from country to country depending on the current status of smokeless tobacco use and on existing public health legislation. Many countries already have legislation relating to hazards to health, drugs, the protection of children or related topics under which new tobacco products could be controlled. In some cases amendments to existing legislation or completely new legislation will be required. Where smoking control legislation exists or is being introduced, it should cover all forms of tobacco. Countries may also develop a strategy that combines some legislative measures with other forms of action.

5.4.1 Control of manufacture, import, promotion and sale

In countries where smokeless tobacco use does not exist, steps should be taken to prohibit by law the manufacture, import, promotion and sale of smokeless tobacco products. In these countries an opportunity which may never be repeated exists to prevent these products from coming on to the market.

The effect of the promotion of tobacco products is to encourage the use not just of specific brands but of the product in general. Promotion therefore encourages people to start using smokeless tobacco use and discourages them from stopping such use. The objectives of the promotion of smokeless tobacco are directly contrary to those of the health authorities.

In countries where smokeless tobacco use is already too well established for a comprehensive legal ban on manufacture, import,
and sales to be feasible in the short term, all forms of promotion should nevertheless be prohibited by law, including:

— direct advertising in all its forms, including point-of-sale advertising;
— indirect advertising;
— the beaming of advertising into neighbouring countries;
— the sponsorship of sporting, artistic and any other events;
— the sponsorship of television and other media programmes;
— the promotion of other products of the same or similar name, packaging and design;
— the free distribution or offer of cheap samples of the product;
— the use of sports personalities and other public figures likely to have popular appeal;
— the distribution of promotional products, e.g., T-shirts, toys, etc.;
— any other form of promotion.

It seems inevitable that tobacco manufacturers will seek to take advantage of current and future developments in communication technology to evade national bans on promotion. Care should therefore be taken to include all news media in the ban on promotion, as well as promotion from beyond national boundaries. In countries where promotion is still permitted, it should be restricted by law to ensure that:

— the impression is not given that a product is in any way beneficial to health, or free of harmful consequences;
— links are not established between the use of tobacco products and positive values, such as beauty, health, or social success;
— sports personalities or public figures who appeal to young people are not used in advertising material, and that other forms of promotion attractive to children are prohibited;
— controls can be imposed on the types of media used, the maximum size and layout of pictorial material, etc.;
— the health warnings used on packaging also appear prominently as part of any advertising or promotional material.

It must be stressed that the proposed restrictions set out above should always be seen as an unsatisfactory alternative to the total prohibition of all forms of sales promotion.
5.4.2 Taxation and other economic measures

Taxation. Previous WHO Expert Committee reports have recommended the use of taxation as part of a comprehensive smoking control programme. The WHO Expert Committee on Smoking Control Strategies in Developing Countries (130) noted that "some countries have very low taxes on tobacco: such countries should be encouraged to raise taxes to levels likely to influence smoking habits without causing social injustice."

There is good evidence that taxation can be used to discourage young people from starting to use tobacco and to encourage users to discontinue the habit, without decreasing government revenue. Taxation also demonstrates government concern about the issue whereas, if tobacco is not taxed or taxed only at a low level, this may be taken to indicate governmental approval of its use.

In countries where the use of smokeless tobacco has not been or cannot be prohibited, it is therefore necessary to ensure that it is treated for tax purposes in a similar way to cigarettes and other forms of tobacco. The tax levied on smokeless tobacco should therefore be:

—substantial, i.e., sufficient to act as a disincentive;
—increased annually so as to ensure that the price of the product at least keeps pace with the increase in the cost of living;
—sufficient to ensure that, in terms of cost to the user, it is at a level at least similar to that levied on cigarettes.

Where tax is levied on smokeless tobacco products, a proportion of the revenue from it should, if possible, be allocated to preventive health education programmes.

In countries where companies receive tax exemptions for advertising, such exemptions should specifically exclude all forms of advertising and promotion of tobacco products.

Import and export of smokeless tobacco products. All imports of smokeless tobacco products should be discouraged, e.g., by means of high import duties. Legislation should be introduced by both importing and exporting countries to ensure that, in all matters relating to tobacco (including marketing and labelling), the standards applying in the countries into which the product is being imported should at least be no lower than those applying in the countries from which the product is being exported.
· **Subsidies.** In some countries tobacco growing and manufacture are eligible for subsidies from public funds. Such subsidies not only encourage the production of harmful products, but can also counteract the effect of public education and information programmes by suggesting that the products have official approval. No government subsidies should therefore be provided for any form of tobacco growing, manufacture, sale or promotion. Even if it is difficult to end existing subsidies immediately, governments should take steps to ensure that no new or reintroduced form of tobacco is eligible for public funding.

· **Alternatives to tobacco production and manufacture.** In many countries tobacco growing and manufacture provide a livelihood for a substantial proportion of the population. In these countries priority must be given to identifying and promoting replacement crops and manufacturing industries that will provide both a profitable substitute for tobacco and employment on a similar or even increased scale. This may take the form of the encouragement of, and incentives for, profitable alternatives, e.g., other crops, non-agricultural use of land, or locally based manufacture of consumer or food products. Governments can approach appropriate international agencies for the necessary advice and support.

**Duty-free sales.** The sale of duty-free tobacco products to international travellers is in direct conflict with national tobacco control programmes. Steps should be taken, in consultation with the appropriate international authorities, to end duty-free sales of all tobacco products, including smokeless tobacco.

5.4.3 **Control of sales**

Where smokeless tobacco products are still permitted, the sale of such products to young people should be prohibited by law, and the responsibility for assessing the age of the purchaser should rest with the retailer. The sale of these products through vending machines should not be allowed. Where they are sold, governments should seek to restrict as far as possible the number of sales outlets, with special emphasis on those to which young people have access.

5.4.4 **Health warnings**

Mandatory health warnings on the packages in which smokeless tobacco products are sold to consumers are an essential means of
ensuring that such products are not seen as safer than, or acceptable alternatives to, cigarette smoking. Legislation should therefore be introduced to ensure that health warnings are placed on such packages and that they are changed at suitable intervals. Such legislation should include provisions governing the size and visibility of the health warnings so as to ensure that they are prominently placed. The warnings should appear not only on the products themselves but also on all sales promotion material, and should also be prominently displayed at the point of sale. Where appropriate, warnings should be both verbal and pictorial.

The warnings should cover the health aspects of smokeless tobacco use, and may include statements such as:

- Smokeless tobacco causes mouth cancer.
- Smokeless tobacco is addictive.
- Smokeless tobacco causes gum and mouth disease.
- Smokeless tobacco is not a safe alternative to cigarette smoking.
- Smokeless tobacco kills.
- For better health, stop using smokeless tobacco.

5.4.5 Restrictions on use in public places and places of work

In many countries, the past decade has seen a dramatic increase in public demand for, and imposition of, restrictions on smoking. People in the company of users of smokeless tobacco are clearly not likely to be subject to the same health risks as “passive smokers”. Nevertheless, the use of smokeless tobacco may be unpleasant and unattractive to many non-users. The problems associated both with spitting and with the disposal of smokeless tobacco products are sufficient to justify restrictions on the public use of these products, particularly in communities with a high prevalence of infectious diseases such as tuberculosis. Restrictions on use in public places are a means of informing the public in general and young people in particular that the use of these products is not socially acceptable.

There are obviously likely to be difficulties in implementing rules restricting the use of smokeless tobacco in public places. None the less, similar restrictions should apply to smokeless tobacco use as those recommended for cigarette smoking and particular emphasis should be placed on such restrictions in premises used for health or educational purposes.
5.4.6 Listing of constituents

Consumer protection and public information should form part of any tobacco control programme. It is therefore important that commercially marketed smokeless tobacco products should carry a list of the main constituents. This information should be provided in such a way as to be readily understood by the potential user.

5.4.7 Upper limits of harmful substances

It is possible, in principle, to reduce the levels of certain harmful substances in smokeless tobacco products. However, this will not be possible in countries where such products are made by the users themselves from the raw ingredients, and it will also be extremely difficult, if not impossible, in countries where smokeless tobacco manufacture is a "cottage" industry. The Study Group agreed with the conclusion of a previous WHO Expert Committee (128) that product modification may not yield the benefits that have been claimed for it. Consideration of upper limits of harmful substances should not be permitted to distract attention from the primary objective, which is to prohibit all forms of smokeless tobacco products. Governments should, however, undertake the analysis of such products and regulate their content where necessary.

5.5 Education and information

Education and information programmes are a key component of any national strategy to reduce or prevent the harmful health consequences of smokeless tobacco use. The two activities overlap, and there will often be no clear distinction between them.

5.5.1 Objectives

Within the context of the overall objectives of national tobacco control programmes as outlined in section 5.2, each country will have to define specific objectives for its information and education programmes in the light of current levels of smokeless tobacco use as well as of other factors, such as tobacco control legislation or other restrictions on tobacco, promotional activities by manufacturers, and other social and educational factors. Information and education programmes on smokeless tobacco should be integrated with those on smoking. Where appropriate,
countries where smokeless tobacco use is not established should be aware of the issue, and prepared to incorporate it within overall tobacco programmes if this becomes necessary. In this context, health and other authorities are now urged to redefine and rename smoking programmes as tobacco programmes.

5.5.2 Target groups

Within each country appropriate target groups must be selected, depending on local circumstances. The main target groups are:

- decision-makers and opinion leaders;
- professional groups; and
- the general public.

In countries with no established or recent use of smokeless tobacco, and where the introduction of the habit has been prevented by means of legislation, a public information and education programme could serve to create interest in the product, and would therefore be inadvisable. In this case, the target group may be only a few politicians and health professionals.

In countries where there is no established use, but modern smokeless tobacco products are being introduced, the target group will be decision-makers and key professionals, but as far as possible not the general public. Particular care must be taken to avoid informing children about the habit unnecessarily.

In countries with established use, the widest possible public information and education programmes are required, aimed at both current and potential users, together with a programme aimed at decision-makers and professionals.

5.5.3 Education and information programmes for decision-makers and opinion leaders

Tobacco use is an established habit in almost every country in the world. Tobacco is also a commercial product whose manufacture and consumption have an important effect not only on health, but also on national economies, international trade, and national and international policies. The eradication of tobacco-induced disease therefore requires political action and social change, and a key target for information about tobacco must be the people and groups in the community who have the power or influence to promote such action.
and to influence attitudes. They will include politicians, health authorities, local community leaders, voluntary and religious organizations, and commercial and industrial leaders. They may also include tobacco retailers and, in some cases, selected journalists. Careful analysis of the national situation will be required before such target groups are selected.

Content of information programmes for decision-makers and opinion leaders. It is difficult to persuade politicians or other decision-makers to take action on an issue about which they may know little. Information for key groups must therefore be accurate, up to date, authoritative and convincing. The content of such information will obviously vary, depending on national circumstances, but some general principles can be laid down. All programmes should be linked with the overall tobacco control strategy, and should include:

—information on the health effects of smokeless tobacco use;
—information on national trends in smokeless tobacco use;
—a clear statement of programme objectives;
—relevant information from other countries, e.g., on use by children and young adolescents in the USA, or about oral cancers in India;
—information about manufacture, imports, sales and promotion in the country;
—a comment on current government policy, and an indication of where change may be required;
—suggestions for action by the target groups. These should be as detailed as possible and should include examples of successful action by similar groups locally or in other countries;
—an explanation of why action is required and of the benefits of such action. In this context it will be valuable to stress the need to prevent children from acquiring the habit and, where relevant, to protect them from the promotion and sale of smokeless tobacco products.

Delivery of programmes to decision-makers. The aim of programmes directed at decision-makers is to convince them: (1) of the need for action; and (2) that they can take effective action in their own sphere of influence. Mass communication techniques are often not appropriate for this purpose. However, in some circumstances, a public information campaign may be required, as media interest in
the issue can help to influence decision-makers, especially if news and comments are carried in periodicals or electronic media relevant to them. Serious articles or programmes on the health problems involved, or analysis of the economic implications of smokeless tobacco use can be regarded as a method of informing decision-makers.

For politicians and others at national level, it may be necessary to produce more sophisticated materials than those prepared for mass use and to deliver them through authoritative channels. The information needs of decision-makers can be met in a variety of ways, e.g., through:

1. Information sent directly by health or education departments to doctors, education authorities, etc. (e.g., the letters sent by the chief medical officers in the United Kingdom to all doctors informing them of the health effects of smokeless tobacco use).
2. Leaders and informed articles in professional journals.
3. Professional channels, including newsletters, house journals, etc.
4. Direct approaches to key individuals and groups (e.g., politicians) by prestigious medical organizations.

The above techniques can also be used at the local level, but the number of people and groups involved may make it impossible to use some of them. Authoritative information leaflets or other written materials are invaluable in this context, and those preparing materials for public campaigns should bear in mind their possible use for local decision-makers and influential groups, including tobacco retailers. Distribution of written information materials should also be organized through professional channels. Other methods of distributing materials should also be explored, e.g., through consumer groups, parents’ organizations, etc.

5.5.4 Education and information programmes for health professionals

The final outcome of tobacco control programmes depends on the influence exerted on individuals at the grassroots level, as well as on political action. Professional groups of various kinds play a key role in this connection and particularly in establishing good communications between those responsible for the intervention process and the general public. The process will originate in health
ministries, research institutes and national organizations, and will involve professionals in various parts of the health care system, the school system, etc. (See the report of the WHO Expert Committee on Smoking Control Strategies in Developing Countries (130), p. 30). Health professionals are therefore themselves an important target for education and information programmes on smokeless tobacco. The various key groups of professionals are discussed below.

Dentists and auxiliary dental personnel. This is a particularly important group in relation to smokeless tobacco products since most of the products are used orally and exert their health effects initially in the buccal cavity.

Physicians, nurses and other auxiliary personnel in general health care. Such personnel in health services in general and particularly in primary health care services have an obvious role to play in health education about smokeless tobacco and in providing support for people who wish to stop using it.

Other professionals, such as teachers, social workers, youth workers, professional sport leaders and journalists. These key professionals can:

(1) Incorporate educational, therapeutic and other functions into their daily activities.
(2) Influence public opinion by publicly expressing their views on matters relating to tobacco.
(3) Influence public policies by informing decision-makers about matters relating to tobacco.

Content of education and information programmes for professionals. Professional groups require special training if they are to play their part in tobacco control programmes, and such training should be included in both their basic and continuing (in-service) training courses. In both cases training must include the following two components:

(1) “tobacco science”: i.e., the medical, physical, chemical, behavioural, cultural and economic factors, related to tobacco use;
(2) “methodology”: i.e., how to handle the tobacco issues that they will meet in the course of their work.

The content of the “tobacco science” component of training courses will vary with the requirements of the different professions and in different countries, depending on the pattern of smokeless
tobacco use. In countries where smokeless tobacco is not used, fewer professional groups will require training and the “methodology” component can be omitted entirely. In countries where population use patterns indicate a need for a comprehensive public education and information programme, the following suggestions as to the training of key professionals are presented.

All members of the *dental health care team*, including auxiliary personnel, should be familiar with the oral health effects of smokeless tobacco use and should look for early signs of such effects in their patients. Education and support for stopping use of smokeless tobacco should be incorporated into the daily routine at the dentist’s surgery. It is essential that these activities are not too time-consuming. Suitable educational materials for use by health professionals should be developed and distributed. The programme must be carefully planned so as to minimize the dentist’s workload and to make the best possible use of auxiliary staff.

Health services in general, and particularly the primary health care system, have a major role with respect to education and information about smokeless tobacco and the provision of support for people who wish to stop using it. Most of the comments relating to the dental health care team above also apply, therefore, to the *primary health care team*.

It is recommended that teaching about tobacco should be included in the school curriculum. Education about smokeless tobacco can, like smoking education, be incorporated at various stages of the educational process, and in a variety of subjects, such as biology, economics and social sciences.

In order to teach effectively, *teachers and educational professionals* need both knowledge and methodological skills. The latter require special attention in teacher training because of the delicacy of the subject and the need not only to communicate facts but also to create skills (e.g., how to resist pressures to start using tobacco) and to influence attitudes. The professional training of teachers should also include a component on the development of school policies on tobacco use.

*Organization and delivery of training and other support activities.* In the long run the main responsibility for providing training for health professionals will rest with the universities and similar institutions where such people receive their basic training. However, for the many professionals who have already completed their basic
training or who will do so before tobacco control is included in the curriculum, continued and in-service training will have to be given high priority. In many countries there are well established administrative systems for the continued training of the various professional groups, and instruction on tobacco-related matters should be made part of such training. Technical assistance can be provided by the specialized “smoking and health” body, recommended by a WHO Expert Committee as a focal point for tobacco control work (130). Another task for such a body or other responsible agency should be to develop and disseminate the educational materials required by professional groups.

5.5.5 Public information and education programmes

In countries where smokeless tobacco use has not been reported or is currently at a very low level public information and education programmes are not required and should not be undertaken. Where smokeless tobacco use is already widespread, however, such programmes are obviously necessary. In these countries, tobacco smoking is also likely to be prevalent and existing programmes for dealing with that problem should be taken into account in the smokeless tobacco programme.

Target groups should be identified before an education programme is undertaken and potential users probably constitute the most important of these. In most countries this group consists of schoolchildren and adolescents. It is believed that, in developing countries, work with this group is the most cost-effective educational strategy. The group can be reached comparatively easily, particularly through the school system, and in many cultures is eager to learn and impressionable. It is therefore an excellent target group to work with although, inevitably, success can only be evaluated on a long-term basis.

The next most important target group consists of those who are already regular users of smokeless tobacco products.

It is necessary to analyse the factors that promote smokeless tobacco use among children and young people before designing a programme for this group. Pressure to start using smokeless tobacco may be exerted through:

—advertising and promotional campaigns for smokeless tobacco products, e.g., following the distribution of free samples;
—peer groups or role models;
— specific situations, e.g., sports activities or social functions
where smokeless tobacco use is the norm;
— routine situations in countries where smokeless tobacco use is
widespread, e.g., tobacco and betel quid chewing in India;
— misconceptions in society, e.g., in many parts of India tobacco
is chewed as a remedy for physical ailments, such as stomach
ache and toothache. Toothpastes containing tobacco are
marketed in India to exploit such misconceptions.

These and similar factors must be taken into consideration in
designing programmes for children and young people, and an
appropriate approach developed for each community. The primary
requirement is for simple information clearly and directly presented
and backed up by the professionals with whom children and young
people come into contact. Teachers, in particular, can play a crucial
role in providing appropriate information for this target group, as
can popular sports people and other prominent figures who act as
role models.

In some countries, a public information campaign can be of value
in stimulating community action to prevent the spread of smokeless
tobacco use among children. Thus public awareness and concern can
persuade retailers not to stock the products and not to sell them to
children, and can lead to successful local campaigns to remove
promotional material likely to appeal to children. Media
involvement is invaluable in this type of public information
programme.

Children and young people can themselves act as agents of change
for adult users of smokeless tobacco. For example, in some countries
a schoolchild may be the only literate member of the family.

In order to design an appropriate educational programme for the
second target group, namely regular users, it is necessary to analyse
the factors that lead people to start and continue using smokeless
tobacco. For example, if smokeless tobacco use is continued because
of the misconceptions already mentioned then the correct
information must be provided, and access to adequate medical or
dental advice must be facilitated.

The first priority of an educational programme for this target
group is to raise the level of awareness of the health consequences of
smokeless tobacco use. In some communities, e.g., rural populations
in South Asia, people may not be aware of the possible health
consequences of smokeless tobacco use, and may even believe that
it can promote health. Public information campaigns must therefore be tailored to specific target populations. This is best done by using the most appropriate available mass media. Apart from traditional mass media, such as films, television, radio and print, the public can be informed by means of posters, exhibitions, cine slides, folk theatre, etc. All educational messages and items should be pretested on the target group for which they are intended.

It should not, however, be forgotten that news coverage of tobacco issues in the mass media can provide invaluable and inexpensive support for education and information programmes. It cannot, of course, be pretested, but its value should not be ignored, particularly as a means of providing public information.

Once information has been provided, the next step is to demonstrate to the individual the personal relevance of the relationship between smokeless tobacco use and adverse health effects. This is best done on a one-to-one basis or, if this is not possible, through more personalized messages transmitted through the mass media. When individuals are convinced of the significance of the relationship at the personal level, they will begin to think about their own tobacco habit.

At this stage, people should be encouraged to attempt to give up using smokeless tobacco. Attempt rates are likely to be high, but the likelihood of failure or relapse is substantial. Withdrawal symptoms must therefore not be dismissed as unimportant but at the same time it must be emphasized that they are not permanent and can be tolerated (see section 5.6). Additional benefits of giving up smokeless tobacco use, such as financial savings, improvement in the sense of taste, etc., should also be emphasized. Those who are able to give up should be complimented and encouraged to act as role models in the community.

5.6 Cessation

One of the major objectives of a programme to control the use of smokeless tobacco is the achievement of a high cessation rate among users, and education and information activities will undoubtedly be the most important factor in promoting cessation.

Some users of smokeless tobacco may be highly nicotine-dependent, and may therefore experience very serious difficulties when attempting to stop. Consequently, there is a case for more specific, treatment-oriented support to help them to do so. In the
case of smoking, certain behaviourally and pharmacologically based methodologies have proved to be effective. There is currently less experience specifically for smokeless tobacco cessation but similar methodologies will have to be developed.

Cessation methodologies should not be so complicated that they can be offered only to a few users attending specialized institutions. They must be simple and brief enough to be handled by any dentist or physician (and partly also by auxiliary staff) in such a way as to make cessation feasible as a component of daily routine at dentists’ and physicians’ surgeries.

5.7 Obstacles and problems

Programmes for the control of smokeless tobacco use are likely to encounter obstacles similar to those often faced by smoking control programmes, together with others specific to smokeless tobacco.

In countries such as India and Pakistan, for instance, where smokeless tobacco has been widely used for many years — even for many centuries — there are clearly likely to be difficulties in persuading communities that its use is a health hazard and should be avoided. In some of these countries, smokeless tobacco may be used for social reasons, to alleviate boredom, or for a variety of related reasons. Its use is often very widespread, and there is little, if any, appreciation of its dangers.

In industrialized countries where use of smokeless tobacco is not new, but where it has been only recently aggressively promoted, smokeless tobacco products are often associated in the public perception with manly behaviour and sporting success, and are mistakenly seen as a safe alternative to cigarettes.

The most important single obstacle to all forms of tobacco control, however, remains the tobacco industry. The companies marketing smokeless tobacco display as much cynicism and irresponsibility as those responsible for conventional tobacco products, and must be seen not only as opposing action on smokeless tobacco but also as endangering public health. These companies create obstacles to effective action by:

--- generating a demand for their products;
— creating new variants of smokeless tobacco for different target groups;
— aggressively marketing and promoting their products;
— taking action nationally and internationally to prevent educational and legislative action desirable in the public interest, or to reduce and mitigate the impact of such action as has been taken.

In some developing countries, smokeless tobacco is still primarily a “cottage” industry: smokeless tobacco products are generally made by their users, or by small local stores. In these countries it is of particular importance that a major manufacturing industry should not be permitted to develop.

In industrialized countries, and any other countries where major companies are engaged in the manufacture, sale and promotion of tobacco products, it can be safely assumed that these companies will seek to oppose any effective action to reduce smokeless tobacco use. In their absence, smokeless tobacco — with its concomitant health consequences — would not exist.

The Study Group therefore recommended as a matter of urgency that, whenever possible, governments should take action to prevent the establishment of smokeless tobacco use before the problem develops. In this context, a very real difficulty is that decision-makers and their advisers are often simply unaware of the nature of smokeless tobacco products and the variety of products available, their harmful health consequences, and the manner in which they are likely to be promoted. It is to be hoped that this report will succeed in drawing the attention of governments to this potential problem while there is still time to act. The opportunity exists now to take firm and decisive action to prevent the development of a practice which, if unchecked, could become a leading cause of avoidable death and disease. Such an opportunity did not exist with cigarettes and as a result the world is faced with an epidemic responsible for an estimated 2.5 million deaths annually. Firm action now can result in true prevention of a threatened worldwide epidemic of disease caused by smokeless tobacco.

Although this report is addressed primarily to governments, the Study Group was particularly concerned to ensure that health and other relevant professionals should also be made aware of the harmful health consequences of smokeless tobacco use and of the potential for prevention, since it is their responsibility to inform governments of this. If they are inadequately informed, they will be neither willing nor able to take the necessary action.
5.8 International action

Smokeless tobacco is an international problem as well as one for individual countries. Patterns of use vary greatly in different parts of the world, but the health risks have been shown to be similar wherever and however smokeless tobacco is used. As with smoking control, international action is required to control an international health hazard.

The fact that new forms of smokeless tobacco have recently been manufactured and promoted by the transnational tobacco companies has increased the need for urgent international action. If such action is not taken, smokeless tobacco will spread to areas where its use is currently unknown. Of particular concern is the fact that the new forms of smokeless tobacco are being marketed in ways that appeal to children and young people. As smoking begins to decline throughout the world, new tobacco products will be developed, promoted and marketed in order to create new markets for tobacco among young people. These developments threaten even those countries that have an established tradition of use of smokeless tobacco products made by small local manufacturers and where sales of manufactured cigarettes are still increasing at the expense of such products.

Some countries and territories have already benefited from the experience of others in dealing with smokeless tobacco. For example, the governments of Hong Kong, Ireland and New Zealand, having studied the growth of use of smokeless tobacco among young people in the USA, took prompt and effective action to prevent the establishment of the habit. Other countries can learn from their experience, while those where smokeless tobacco use is already established can prepare themselves to prevent the introduction of new forms of tobacco, while at the same time learning from the experience of health educators (e.g., in India) how to conduct an effective public education programme. Much informal international cooperation already exists between governments and health experts, and it is hoped that this report will provide further assistance in promoting such cooperation. More requires to be done, however, to ensure that the relevant information quickly becomes available to government health departments and medical authorities in countries currently facing attempts to introduce smokeless tobacco products or likely to do so in the near future.
5.8.1 Role of WHO

WHO has already played a leading role in collating information about the health effects of smokeless tobacco use, in disseminating information, and in seeking to draw together the experiences of Member States in this report. The Study Group expressed the hope that WHO could develop and extend this role by:

— drawing the attention of Member States to the health issues involved and to the means whereby smokeless tobacco use can be controlled in the interest of health;
— extending its current programmes on smoking to include all forms of tobacco;
— cooperating with other international bodies, both governmental and nongovernmental, in promoting further action;
— promoting appropriate action, both centrally and in the WHO regions, involving not only the smoking and health programme, but also programmes on cancer, cardiovascular diseases, oral health, information, and other relevant areas;
— cooperating with other agencies of the United Nations in promoting smokeless tobacco control.

5.8.2 Role of other organizations in the United Nations system

Certain United Nations organizations, such as UNICEF and UNESCO, have a potential interest in collaborating with WHO in protecting young people against the hazards of smokeless tobacco. The recent rise in the numbers of children and young people using smokeless tobacco products in some countries must be of concern to organizations whose duty is to protect and promote the welfare of the young. FAO also has an important role to play in assisting tobacco-growing countries in developing other crops as an alternative to tobacco.

5.8.3 Role of intergovernmental organizations

Several intergovernmental organizations are concerned with health issues. For example, the European Economic Community has recently launched a major programme entitled “Europe Against Cancer”. Such organizations should include the control of smokeless tobacco in all tobacco control programmes and seek to cooperate
with WHO and with national governments and agencies working to reduce the incidence of tobacco-induced disease.

5.8.4 Role of nongovernmental organizations

Several important international nongovernmental organizations have well established programmes on tobacco and health, and would appear to have a particular role in: (1) assisting national organizations in planning strategies against smokeless tobacco use; and (2) liaising with WHO to promote international action. These organizations include the International Union Against Cancer (UICC), the International Organization of Consumers’ Unions (IOCU), the International Union Against Tuberculosis and Lung Disease (IUATLD), the International Union for Health Education (IUHE), and the International Council on Alcohol and Addictions.

In this context, the valuable and rapidly developing role of organizations concerned with consumer protection should be noted, since they can be a source of support additional to that provided by international bodies concerned with health.

6. RECOMMENDATIONS

The Study Group endorsed the recommendations of previous WHO Expert Committees on tobacco smoking. It recommended that, nationally and internationally, control of smokeless tobacco should be an integral part of a coordinated programme for the control of all tobacco products since it is clear that many of the same principles, objectives and recommendations apply to both smoking control and control of other forms of tobacco use. It therefore recommended that programmes for the control of smoking should be renamed as tobacco control programmes.

6.1 Legislative, regulatory and restrictive measures

The Study Group recommended that governments should: (1) make use of existing legal instruments or existing regulatory powers to control smokeless tobacco; or (2) formulate an appropriate policy aimed at the enactment of relevant legislation. Voluntary measures to control tobacco are not recommended.

Countries with no established smokeless tobacco habit should, as a matter of urgency, ban the manufacture, importation, sale and
promotion of smokeless tobacco products before they are introduced into the market or become an established habit. The sole exception to this would be any product containing nicotine (or any commercially produced nicotine) used only for the purpose of helping people to stop smoking. This should be treated as a controlled substance and should be available on prescription only.

In countries where smokeless tobacco use is already too well established for prohibition of sales of the product to be feasible in the short term, a tobacco-free society should be the most important long-term objective of the programme, and the legislative and regulatory measures described below should not be seen as anything other than interim solutions.

6.1.1 Prohibition of promotion

Where sales are still permitted, all promotion of smokeless tobacco should be prohibited by law; the prohibition should include not only direct advertising, but all forms of promotion including point-of-sales advertising, sports sponsorship and other techniques. The ban should apply to all electronic, print and written media, including satellite television, video films, cinemas, aerial displays and any new media that may be developed in the future.

6.1.2 Restrictions on promotion

Where promotion is still permitted, the content, format, quantity and type of promotion should be restricted by law in the interests of public health.

6.1.3 Taxation and other economic measures

It is recommended that:

— Smokeless tobacco should be taxed at a level sufficient to act as a disincentive, and at least at the level at which cigarettes are taxed. Taxation should be increased annually by an amount sufficient to maintain or increase its price in relation to the cost of living. Where feasible, a proportion of the revenue obtained from taxation should be allocated to preventive health programmes.

— Exports of smokeless tobacco should not be permitted. Where such exports already exist, the exporting country should be
required to maintain standards of promotion, sales, etc., in the
importing country consistent with those in the country of
origin. Both imported products and those manufactured under
licence from a wholly or partially foreign-owned company
should conform with restrictions in the exporting country and
the country where the parent company is based.
— No subsidies should be given to smokeless tobacco production,
or to the production of any new product containing tobacco or
nicotine.
— Priority should be given to promoting substitute crops in place
of tobacco in consultation with FAO and other international
agencies.
— Duty-free sales of smokeless tobacco should not be permitted.

6.1.4 Control of sales

It is recommended that:
— All sales of smokeless tobacco to minors should be prohibited.
— All sales from vending machines should be banned.

6.1.5 Health warnings

Prominent health warnings, which should be changed
periodically, should be placed on all packages of smokeless tobacco
products, as well as on all forms of promotional material, including
such material at the point of sale. Health warnings should include
references to the specific health effects of smokeless tobacco use.
They should also be presented graphically.

6.1.6 Use of tobacco in public places

The use of smokeless tobacco in public places and workplaces,
and especially in premises used for educational purposes and for
health services, should be banned or restricted.

6.1.7 Harmful substances

The analysis of smokeless tobacco products and the regulation of
harmful substances should be subject to government control.
6.2 Information and education

Within the context of overall anti-tobacco programmes, governments and health authorities should develop health education and information programmes on smokeless tobacco aimed at:

—decision-makers and opinion leaders;
—professionals, and especially dentists, doctors, teachers and youth leaders;
—potential or current users.

Particular emphasis should be placed on children and young people, and information and education on tobacco and health should be included in the school curriculum.

6.3 Cessation

Cessation programmes should be developed to assist those already using smokeless tobacco and wishing to stop.

6.4 International action

6.4.1 The United Nations system

The Study Group recommended that:

—WHO should inform Member States about smokeless tobacco and about control strategies.
—WHO should develop appropriate programmes for smokeless tobacco control as a component of its overall tobacco programme. In particular, WHO should develop educational programmes and act as a resource centre for the dissemination of information to all tobacco control and education programmes, publications, etc.
—WHO should urge other United Nations agencies to take all possible action to support smokeless tobacco control.
—WHO should liaise with intergovernmental and non-governmental organizations in coordinating international smokeless tobacco control programmes.
—WHO should act as a coordinating agency for efforts to control and eradicate all forms of use of tobacco, including smokeless tobacco.
—Other relevant United Nations agencies should be invited to liaise with WHO to coordinate action on smokeless tobacco.
6.4.2 Intergovernmental and nongovernmental organizations

All relevant intergovernmental and nongovernmental agencies should be invited to liaise with WHO in efforts to control smokeless tobacco, disseminate information about it and promote action aimed at its control and ultimate eradication.

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Annex 1

GLOSSARY

Aging The gentle maturation of leaf tobacco during storage before and after manufacture of certain types of chewing tobacco.

Areca nut The fruit of *Areca catechu* L., a tree belonging to the family *Palmaceae* which is native to South Asia. The fruit is orange-yellow in colour when ripe and is the size of a small egg. The seed is separated from the fibrous pericarp and is used fresh or dried. It is chewed either alone or as a component of mixtures usually including betel leaf. Also known as betel nut and supari.

Betel leaf The leaf of the vine *Piper betle* L. (*Piperaceae*), cultivated in hot, humid climates in South Asia. Serves as the wrapping for the betel quid.

Betel nut See Areca nut.

Betel quid Prepared usually by smearing a betel leaf with slaked lime and catechu, to which small pieces of areca nut are added. Crushed leaves of cured tobacco may be added. The ingredients are folded in the betel leaf and chewed. Also known as pan.

Catechu In Burma and India, a substance extracted from the heart-wood of the tree *Acacia catechu* or *A. suma* (*Leguminosae*), by steeping in boiling water. On cooling, catechin crystallizes out, leaving the more soluble catechutannic acid in solution. In Malaysia, catechu is prepared as an aqueous extract of the twigs and leaves of the shrub *Uncaria gambir* (*Rubiaceae*). Also known as kattha.

Chewing tobacco A tobacco product that is placed in the gingivo-buccal area of the oral cavity. In developed countries, the four main types of chewing
tobacco that are manufactured are loose-leaf or scrap, plug or press-leaf tobacco, twist or roll tobacco, and fine-cut tobacco.

Chuna

See Lime.

Curing

The treatment of freshly harvested tobacco leaves to enable them to be used for manufacture or for further processing to chewing tobacco or smoking products.

*Air-curing:* The natural drying process used for most cigar and chewing tobaccos, especially burley and Maryland tobaccos.

*Flue-curing:* The curing, particularly of Virginia tobaccos, in heated barns; used primarily for cigarette tobaccos and loose-leaf chewing tobacco.

*Sun-curing:* The curing of suspended leaves in full sunlight; all oriental tobaccos are cured in this way, primarily for cigarette tobacco.

Dipping

(snuff dipping)

The method of using snuff in which the juices are extracted from a pinch of moist fine-cut chewing tobacco, placed between the cheek and the gum.

Fermentation

The treatment of dark, air-cured tobaccos after curing. Usually a severe process, generating higher temperatures in tobacco of high moisture content. Tobaccos used for snuff undergo a second fermentation to make the tobacco milder.

Fine-cut chewing tobacco

This type of chewing tobacco is primarily used as moist snuff.

Gudakhu

A paste consisting of powdered tobacco, molasses and other ingredients; used for cleaning teeth in certain states of India. Since 1986, machine-manufactured and exported in toothpaste-like tubes.

Kattha

See Catechu.
Khaini  A mixture of tobacco and lime prepared in the hand, formed into a ball and placed in the mouth, usually along the mandibular groove.

Kiwam  A paste prepared from processed tobacco leaves (from which the stalks and stems have been removed) that have been soaked and boiled in water with flavourings and spices, and then macerated and strained. The paste is chewed.

Lime  A powder prepared from sea shells ("shell lime") or from quarried limestone; when mixed with water, slaked lime (calcium hydroxide) is produced. Also known in India as chuna or chunam.

Loose-leaf tobacco  A scrap American chewing tobacco usually made of strips of Pennsylvania and Wisconsin cured cigar leaf; recently, flue-cured tobacco has also been used.

Mainpuri tobacco  A mixture of tobacco with slaked lime, areca nut, camphor and cloves, chewed in India.

Masher  See Mishri.

Mawa  A mixture of small pieces of raw areca nut, tobacco and lime water, wrapped in a piece of cellophane paper.

Mishri  Roasted or half-burnt tobacco prepared by baking on a hot metal plate, powdered, and used primarily for cleaning teeth; also sometimes placed in the mouth as a substitute for chewing tobacco. Also known as masheri or misheri.

Nass  A mixture of tobacco, lime, wood-ash and cottonseed oil, chewed in the Islamic Republic of Iran and the Central Asian Republics of the USSR.

Naswar  A mixture of sun- and heat-dried tobacco leaves, slaked lime, ashes of tree barks, some flavouring agents and sometimes colouring agents such as indigo. Small quantities of water are added before use and the material is rolled into balls.
which are placed in the labial groove behind the lower lip. The material is spat out after it has been chewed for 10–15 minutes. It is popular in Afghanistan and Pakistan.

**Pan**  
See Betel quid.

**Pati**  
Finely crushed dried tobacco leaves, usually taken with betel quid.

**Plug tobacco**  
Stripped burley tobacco leaves which have been cured and fermented as cakes, flat bars or rolls (firm plug, less than 15% moisture; moist plug, more than 15% moisture).

**Shammah**  
A mixture of powdered tobacco leaves with calcium or sodium carbonate and other substances, including ash, placed in the buccal or lower labial vestibule of the mouth; used in southern Saudi Arabia.

**Sniffing**  
Insertion of finely powdered snuff into the nostrils.

**Snuff**  
Tobacco of variable composition for oral or nasal use. Moist snuff (up to 50% moisture) consists of finely cut tobacco, mostly cured and fermented burley tobacco, which is often treated with flavouring agents and used for dipping. Dry snuff (moisture <10%) is powdered tobacco with or without flavouring agents and is used either for sniffing or dipping.

**Supari**  
See Areca nut.

**Twist or roll tobacco**  
Stripped tobacco leaves rolled or twisted into the form of a rope.

**Zarda**  
See Kiwam.
Annex 2

RECENT LEGISLATION ON THE CONTROL OF SMOKELESS TOBACCO

Recent legislation on smokeless tobacco in selected countries and territories is briefly summarized here.

Australia

The states of Tasmania and South Australia have prohibited the manufacture, sale and promotion of oral smokeless tobacco products and the Commonwealth Government is considering a national ban on such products. (Tasmania: Statutory Rules 1986, No. 270, Poisons List Amendment Order (No. 2); South Australia: Tobacco Products Control Bill No. 33 of 1986).

Canada

At the time of the Study Group meeting, legislation was pending in Canada which would prohibit all forms of tobacco advertising and promotion, and health warnings similar to those required in the USA on packages of smokeless tobacco were being considered (Tobacco Products Control Act, House of Commons No. C-51).

Hong Kong

In January 1987, the Hong Kong Government prohibited the import, manufacture, sale and possession of oral smokeless tobacco (Public Health and Municipal Services Ordinance (Chapter 132); Smokeless Tobacco Products (Prohibition) Regulation 1987).

Iceland

All tobacco advertising is banned and a pictorial warning is required on packages of snuff and chewing tobacco that states: “Snuff and chewing tobacco may damage the mucous membranes” (Act on Prevention of the Use of Tobacco, 1984).

India

In India, only a very small proportion of smokeless tobacco products are manufactured and commercially marketed. Advertising
of these products is prohibited on the government-controlled media. Warning labels are required on cigarette packages but not on those of smokeless tobacco products.

**Ireland**

In November 1985, the Irish Health Ministry declared tobacco in the form of finely cut, moist tobacco contained in packets or pouches and intended for oral use to be a restricted article in accordance with section 44 of the 1947 Health Act. As such, its import and sale are banned (Statutory Instruments S.E. No. 429 of 1985).

**Isle of Man**

In April 1986, the Tynwald (the parliament of the Isle of Man) prohibited the importation of finely cut tobacco contained in sachets or pouches and intended for use by being placed in the mouth (Manx Treasury, under the Custom and Excise Acts (Application) (Amendment) (No. 2) Order 1986 — GC103/86).

**Israel**

In 1986, the Ministry of Health of Israel requested the Ministry of Trade and Industry to prohibit the import, sale and manufacture of smokeless tobacco. An order to that effect was made by the Ministry of Trade and Industry in May of the same year.

**Japan**

In April 1985, a Japanese company applied for a permit to import into Japan smokeless tobacco produced by a transnational company. The Japanese Ministry of Finance requested the Ministry of Health and Welfare to examine the health effects of the product. It did so and issued a report in November 1985 that concluded that the product could harm health and that its introduction into Japan was not appropriate. The report's findings led the company to withdraw its application for an import permit.

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1 **EDITORIAL NOTE:** While this report was being prepared for publication, it was learned that legislation had been enacted in Ireland to prohibit the import, manufacture and sale of all oral smokeless tobacco products (Tobacco (Health Promotion and Protection) Act, 1988).
New Zealand

In April 1985, the Toxic Substances Act of 1979 was amended to include oral snuff and a regulation was passed by the Ministry of Health in January 1987 to ban its import, manufacture and sale.

Sweden

All packages of moist snuff, as well as advertisements, are required to display a warning label that reads as follows: "Warning. Snuff and chewing tobacco contain nicotine. Therefore, snuff produces just as strong a dependence as tobacco smoking. The buccal cavity, mucous membranes and gums can be damaged and may require treatment." In Sweden, advertising in the electronic media, all outdoor tobacco advertising, and free samples of tobacco are prohibited. Newspaper and magazine advertisements are not permitted to include any pictures other than those showing packages of tobacco, and no pictures of people can be used. There are also restrictions on the size and shape of the advertisements and the health warning must occupy at least 20% of the advertisement area. Advertising in sports magazines is prohibited.

United Kingdom

In 1985, the United Kingdom Department of Health and Social Security concluded a voluntary agreement with a transnational manufacturer of oral snuff whereby the company agreed not to promote the product to those under 18 years or to make health claims for it. The Independent Broadcasting Authority prohibited advertising on independent television and radio in November 1985. Legislation was passed in 1986 to amend previous legislation and redefining tobacco to include any product containing tobacco and intended for oral or nasal use and prohibiting sale to persons under 16 years of age (Protection of Children (Tobacco) Act 1986).¹

United States of America

In February 1986, the United States Congress enacted legislation which made the inclusion of health warnings on packages and in

¹EDITORIAL NOTE: While this report was being prepared for publication, it was learned that the UK Government had proposed banning some oral tobacco products for snuff dipping, under the authority of the Consumer Protection Act of 1987.
printed advertisements compulsory and required them to be changed at regular intervals; prohibited electronic advertising; and instituted an educational programme. The warnings used in the USA are:

"Warning: This product may cause mouth cancer."
"Warning: This product may cause gum disease and tooth loss."
"Warning: This product is not a safe alternative to cigarettes."

The warnings on packages and in advertisements must be changed every three months and, in printed advertisements, must be placed inside a circle with an arrow pointing towards it. The Congress also reinstated the federal excise tax on smokeless tobacco in 1985. As of 1987, 31 states had prohibited the sale of smokeless tobacco products (Comprehensive Smokeless Tobacco Health Education Act of 1986, Public Law 99–252).
EXAMPLE OF AN INTERVENTION PROGRAMME

As already pointed out, it is estimated that, in India and Pakistan alone, there are at least 100 million users of smokeless tobacco. It is thus an existing rather than a potential health problem, as in most other parts of the world. Before the risk of serious health consequences among smokeless tobacco users can be reduced, it must first be determined: (1) whether it is possible to educate smokeless tobacco users to discontinue its use; and (2) whether there would be a reduction in the risk if smokeless tobacco use were discontinued. The first attempt made to investigate these questions provided some excellent information which is relevant to all smokeless tobacco control programmes.

A comprehensive education programme was undertaken among 36 000 tobacco users aged 15 years and over, including both those using smokeless tobacco and those who smoked, in three areas of India. Personal communication was used as well as the mass media, including films, radio broadcasts, newspaper articles, posters, slides, mobile exhibitions, folk art, theatre, etc.

The major emphasis was on the use of two documentary films which demonstrated the relationship between tobacco use and oral cancer, and also covered behavioural aspects and cessation. Materials and methodologies were pretested, and the programme was continuously monitored and modified. For example, when it was found that many individuals continued to use tobacco because of dental problems, free treatment in the form of advice and dental extractions was provided.

At the end of the first year, a small percentage of the target population had stopped using tobacco and a slightly larger percentage had substantially reduced the amount used.\(^1\) The regression rates of oral precancerous lesions were significantly higher among those who had stopped using tobacco or reduced their consumption.

At the end of 5 years, 10–24% of smokeless tobacco users (among non-smokers) had completely stopped using tobacco and 17–31% had reduced their usage substantially. The figures were significantly higher in intervention groups than in control groups and, as a result,

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the incidence of oral precancerous lesions was 40–80% lower in intervention groups in two of the three areas.\textsuperscript{1} The educational intervention programme was of significant help to all individuals and particularly so to smokeless tobacco users.\textsuperscript{2,3}

\textsuperscript{1} \textsc{Gupta, P. C. et al.} \textit{Lancet}, 1: 1235 (1986).
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