

Health Damage Caused by the Smoking Habit in Chile¹

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The authors review available literature on tobacco use in Chile, devoting particular attention to smoking prevalences, smoking-related health problems, risk factors that tend to encourage smoking, and appropriate control measures.

Overall, the available data indicate that roughly 40% of Chile's adult population smokes, that smoking among women is on the rise, that some 11% of both infant and general mortality can be linked to tobacco use, that smoking during pregnancy poses serious health risks, and that the attitudes of physicians and other health workers can have a crucial impact upon the smoking behavior of their patients.

Concern over the effects of tobacco in the developed countries has tended to coincide with increased life expectancy and relatively high percentages of the population reaching those older age groups typically afflicted by conditions resulting from cigarette use—including a wide range of respiratory diseases, circulatory problems, and tumors. On the other hand, the view that tobacco use constitutes a public health problem has been reinforced more recently—since the 1950s—by epidemiologic evidence demonstrating a clear link between tobacco and illness (1), evidence that provides solid grounds for establishing smoking control programs.

Various countries of the Americas are at an intermediate stage—where a growing population of older people with smoking-related illness has generated concern, but where conclusive epidemiologic evidence has not yet been developed (2). In these countries children typically constitute less than a third of the

population, people 65 and over account for more than 5%, and life expectancy at birth exceeds 70 years. On the other hand, epidemiology has demonstrated that the relative risk of smoking varies in different countries, as do the motivations for smoking or for quitting, and national data relating to these matters are lacking or incomplete.

One of the countries at this intermediate stage is Chile, where despite relatively low per capita cigarette consumption (less than 1,000 cigarettes per inhabitant per year) the negative effects of smoking are being felt. This article, which is based on a thorough review of the Chilean literature, seeks to define the extent of the smoking habit in Chile and the magnitude of the health problems generated by tobacco use.

MATERIALS AND METHODS

We have reviewed all national literature dealing with the smoking problem in Chile that was published between 1980 and June 1990, including both contributions to scientific journals and conference presentations summarized in conference proceedings. Using this material, we

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have examined the extent of tobacco use and related health problems.

PREVALENCE OF THE SMOKING HABIT

Tobacco Consumption

Official data indicate that annual cigarette consumption in Chile is close to 1,000 cigarettes per inhabitant (3), or about one-quarter of that found in the United States and in Latin American countries such as Cuba with high consumption levels. This figure agrees with consumption data reported for Santiago residents indicating that the average adult smoker in Santiago consumes between 8.5 and 10 cigarettes per day (4, 5), without significant variations in this consumption rate by sex or age group. These data were obtained through a study of random samples of the general population selected to produce results diverging by no more than 1% from the true values for the universe, with a 95% confidence

level. The study employed direct household surveys of people 15 years of age or older who were living in the selected homes.

Another way of assessing smoking's importance is to find the percentage of households with smokers, something which we explored in a random sample of 12 cities in Chile. Our results indicated that slightly over half the study households (53.7%) contained smokers. In 30.4% of the households there was one smoker, in 15.5% there were two, and in the remaining 7.8% there were three or more (6).

Prevalence of Smokers

Table 1 shows data derived from various studies (4-11) that provide insight into the prevalence of smokers in Chile. As can be seen, the frequency of smokers in the general Chilean population, which was studied in a random sample using the American Cancer Society's basic survey (12), was found to range from 18.4%

Table 1. Smoking prevalences in Chile among general city populations and specific population groups, by sex.

Population studied	% smokers among:			Ref.
	Males	Females	Total	
<i>City populations (adults only):</i>				
Random sample of the city of Santiago	43.9	39.9	41.2	(4)
Random sample of two sectors of Santiago (daily smokers only)	34.9	32.2	33.6	(5)
Random sample of 12 Chilean cities:				(6)
<i>Lowest prevalence</i>	18.4	13.7	15.5	
<i>Average prevalence</i>	42.3	18.9	30.4	
<i>Highest prevalence</i>	51.3	33.9	42.9	
<i>Health professionals and students:</i>				
Physicians	35.3	46.2	36.5	(7)
Obstetricians			31.6	(7)
University-trained midwives		53.0-56.0		(8)
Medical students:				(7)
<i>First year</i>	34.7	39.0		
<i>Seventh year</i>	48.8	43.1		
Students in other fields			48.8	(9)
<i>Other population groups:</i>				
Total for Catholic University	33.5	40.3		(10)
Students in Santiago secondary schools (13 to 20 years of age)	58.8	53.0	56.5	(11)

Table 2. Prevalences of smoking, by age and sex, in 12 Chilean cities.

Age group (in years)	Smoking prevalence (%) among:	
	Males	Females
10-19	22	14
20-29	53	31
30-39	52	30
40-49	42	21
50-59	30	13
60-69	23	8
≥ 70	22	2

Source: Medina et al. (6).

to 51.3% in adults (6). This study found that cities with low prevalences of smokers (where smokers averaged 15.5% of the inhabitants) were the exception rather than the rule.

As the Table 2 data show, our systematic population studies reported in reference (6) indicate that more males are smokers; however, a number of other studies dealing with specific population groups (7-10) suggest a very high prevalence of smoking among women.

Also, data from the 12-city study (see Table 2 for average values) indicate that age is very important, the maximum prevalence of smoking in the 12 cities being found among subjects in the third and fourth decades of life (6). Of course, the finding that there was a smaller percentage of smokers in older age groups does not necessarily mean that people tended to give up the habit with advancing age. It seems at least equally likely that those in the older groups had experienced a lower smoking prevalence throughout their lives. For example, it is known that, historically, the cohort of women over 60 at the time of the study had always contained a relatively small percentage of smokers. When a closer examination was made of the frequency of the habit, it could be seen that, in the case of women, the prevalence was reaching a maximum between the ages of

20 and 24, and then progressively declining with increasing age (13).

Smoking Trends

No data from Chilean population studies are available preceding Joly's research on Latin American cities (14), which included 1971 work carried out in the capital city of Santiago. This study indicated that the 1971 prevalences of adult smokers by sex were 47% among men (a prevalence similar to the average found for the other cities studied) and 26% among women (the highest prevalence found in Latin America). The 1984 Santiago study that we conducted using a technique similar to Joly's indicated that the prevalence of smoking among men had declined slightly to 44%, while that among women had risen from 26% to 39%, a relative increase of 50% in 13 years (4). Overall, these data indicate that the prevalence of smoking among adults rose from 36% to 41% in 1971-1984, representing a 14% increase during that period, or roughly a 1% annual increase.

HEALTH PROBLEMS OF TOBACCO USE

General Adult Health

A well-known way to study tobacco's eventual impact on the health of an adult population is to compare the frequency of tobacco use among hospital patients with that found in the general population. Our work making such a comparison for Santiago residents (4, 15) found that the prevalence of tobacco use among those under 30 years old was similar among hospital patients (49%) and the general public (50%). However, in older age groups the observed smoking prevalences were higher in the hospital patients. Specifically, 53% of the hospital patients 30-49 years old were smokers as

Table 3. Adult deaths attributable to smoking in Chile, 1986.

Type of pathology	No. of deaths recorded	Attributable risk in Chile	No. of deaths attributed to smoking
Cerebrovascular accidents	6,707	.32	2,146
Coronary heart disease	7,286	.25	1,822
Chronic obstructive bronchial disease	1,869	.50	935
Bronchopulmonary cancer	1,261	.69	870
Cancer of the esophagus	562	.63	354
Arterial hypertension	1,063	.23	244
Pulmonary tuberculosis	678	.25	170
Chronic gastritis and peptic ulcer	248	.50	124
Buccopharyngeal cancer	127	.70	89
Cancer of the larynx	97	.81	79
Total	19,898		6,833

Source: American Cancer Society (12).

compared to 45% of the general population (yielding a risk index of 1.18); and 31% of the hospital patients 50 or over were smokers as compared to 25% of the general population (yielding a risk index of 1.24).

With regard to mortality, tobacco use appears to have been responsible for some 11% of the deaths occurring nationwide in 1986 among people 15 years of age and older. This figure was derived by applying estimates of the risks attributable to tobacco use in Chile (15) to observed Chilean mortality in 1986, thereby deducing the number of deaths directly attributable to smoking (see Table 3). The data shown indicate that slightly over half the smoking-attributable deaths resulted from vascular problems.

With regard to these data, it should be mentioned that the relative risks and attributable risks found in Chile differ from those observed in other places. This situation is presumably the result of differences in such things as the amount of daily consumption, inhalation habits, the average size of cigarette butts, the type of tobacco used, and the nicotine/tar content of that tobacco. No information indicating how much relative weight should be ascribed to these six factors is currently available in Chile.

One study of ours that dealt with 713 inpatients at the University of Chile's Clinical Hospital (15) found the relative risk of bronchopulmonary cancer in smokers to be only 3.1, while other data we reviewed showed this relative risk to be as high as 4.4. Despite the fact that the relative risk of such cancer appears lower in Chile than in Anglo-Saxon countries, lung cancer is Chile's second leading cause of death from tumors, and its role is growing. A similar situation is seen with respect to buccopharyngeal and laryngeal cancers.

Maternal and Child Health

In countries that are demographically young, the impact of tobacco upon maternal and child health assumes special importance. Our work on smoking during pregnancy sought to compare mothers who smoked with those who did not smoke in terms of effects on estrogen metabolism (including those relating to use of oral contraceptives), the birth weights of their newborns, and the incidence of acute respiratory illness in children under 15 years of age (18).

We found that smoking mothers had newborns with birth weights significantly lower than the birth weights of

those born to nonsmoking mothers. Specifically, it appeared that children born to smoking mothers who had maintained the same smoking habits they had before pregnancy weighed 220 grams less at birth, on the average, than those born to nonsmoking mothers—a difference that was even more marked among women suffering from some pathology of pregnancy or from obesity (8). In striking contrast, no significant differences were found between the birth weights of children born to nonsmoking mothers and those born to mothers who had stopped smoking before pregnancy or had given up smoking because of pregnancy.

Since Simpson's report (16) it has been recognized that premature delivery occurs roughly twice as often among women who smoke, a situation that we have confirmed in Chile (8). That is, we found the percentage of premature deliveries to be 4.7% among nonsmoking women, 7.6% among women who cut down on their smoking during pregnancy, and 9.6% among smoking mothers whose smoking habits during pregnancy remained unchanged. It was estimated that this weight loss accounted for some 11% of all infant mortality in Chile (17) during 1983, the year of the study.

Table 4 shows the distribution according to weight of newborns delivered by smoking and nonsmoking mothers in 1983, together with the infant mortality recorded for each weight group in that year. This information made it possible to estimate infant mortality among children of smoking and nonsmoking mothers (29.4 deaths per thousand versus 20.2, respectively), indicating a relative risk of 1.45.

As the prevalence of smokers among pregnant women is 26.4% (8), it is possible to state that the percentage of attributable risk in the population is approximately 10.6%. In other words, if all pregnant women stopped smoking, infant mortality in Chile would be 10.6% lower.

Our studies have shown that the presence of one or more smokers in a dwelling generates approximately 30% more episodes of acute respiratory illness among the occupants. This risk of acute respiratory illness increases 4.5 times in the case of a nursing baby and 7 times if the smoker is the baby's mother (18).

We have also found that tobacco use by Chilean women increases their risk of a cerebrovascular accident 18 times when arterial hypertension is present and 2.8 times when oral contraceptives are being

Table 4. The influence of maternal smoking on birth weight and infant mortality in 1983, as indicated by the birth weights of infants delivered by smoking and nonsmoking mothers. The table shows 1983 infant mortality in each of five birth weight groups and the percentages of infants delivered into each group by smoking and nonsmoking mothers.

Birth weight (kg)	Infant mortality observed in 1983	Percentage distribution of newborns according to birth weight	
		Smokers	Nonsmokers
<2.5	164	10	5
2.5–2.9	27	33	17
3.0–3.4	13	37	40
3.5–3.9	9	16	30
≥4.0	11	4	8
Total	224	100	100

Source: Medina et al. (8).

Table 5. Prior and current smoking practices of the Santiago population in 1985.

Smoking experience	% of the population in each category		
	Total	Males	Females
Have smoked at some time in life	66.2	71.5	61.2
Have smoked for 6 months or more	46.1	51.0	42.4
Currently smoke	41.2	43.9	39.9
Smoke daily	30.5	33.5	27.7

Source: Medina et al. (4).

taken (19). Furthermore, on the average those Chilean women who smoke have double the number of spontaneous abortions, experience the onset of menopause five years earlier, exhibit 17 times as many cases of deepened voice, and have seven times as many cases of excess facial hair than do their nonsmoking counterparts (20). All of these conditions derive from the serious damage to estrogen metabolism observed in women who smoke (18, 19), damage fundamentally linked to increased hydroxylation of estradiol being used by the body to produce estrone and estriol (21, 22).

SMOKING PATTERNS

As of 1985, some two-thirds of the adults in Santiago had used tobacco, with the proportion being somewhat higher among males. Close to half the population had used tobacco for six months or more, and 30% were using it on a daily basis (Table 5).

Various studies have found that the average age for taking up the smoking habit in Chile is around 17 years, which would seem to imply that roughly half the smokers first use tobacco in early adolescence (10, 15).

However, other evidence points to initiation of smoking considerably earlier. Research in southern Chile indicates that cigarettes are first tried mainly between the ages of 9 and 12, and that the preva-

lence reaches some 32.8% among schoolchildren 10 to 19 years old. Also, observations in the northern area of Santiago found a smoking prevalence of 40.7% among children in the fifth to eighth years of primary school, which is to say between 10 and 12 years of age; this prevalence was significantly lower among schoolchildren in the rural sections of the area, where some 20.2% of those 12 to 14 years of age were smokers (11, 23).

Adolescence is a crucial time for acquiring the smoking habit and becoming dependent on tobacco. During the mid-1980s, some 58.3% of Chilean adolescents in the third year of secondary school³ were smokers (4). For the most part consumption was low, on the order of 1-4 cigarettes per day, although 14% of the students smoked 5 cigarettes or more. This limited consumption related to the small proportion of students—not over a third—actually purchasing cigarettes.

Of the motivations for smoking that have been studied, the ones that stood out have been to experience pleasure, identify with peers, forget problems, and find peace of mind. The family's authorization to smoke was associated with a significant increase ($p < 0.01$) in the prevalence of smoking (10). The tendency of an adolescent to be a smoker has also been associated with the behavior of five

³Average age 17-18 years.

key people: the adolescent's father, mother, elder sibling, best friend, and boyfriend or girlfriend (23). In addition, a negative association has been found between the tendency to smoke and the subject's degree of knowledge about tobacco's health effects. Finally, and of equal importance, an inverse association has been found between smoking and progress in school; that is, among adolescents attending the Catholic University the smoking prevalence was twice as high (46%) among those who had done poorly on the university selection examinations⁴ than among those who had done well (10).

RISK FACTORS FOR TOBACCO USE

Research carried out to date has shown that the prevalence of tobacco use in Chile, besides being linked to biological factors such as age and sex, is associated with diverse social and personal factors. For instance, the smoking habit among Chilean women is influenced by civil status, there being a higher prevalence of smokers among single women and women with live-in partners. There is also a significantly lower smoking prevalence among those with a university education, as well as an association between unwanted pregnancy and continuation of the smoking habit during pregnancy (24).

Regarding socioeconomic factors, a relatively high smoking prevalence has been found among females in Santiago and Viña del Mar, two relatively developed areas (4, 6). It has also been found that population groups living in extreme poverty had an average frequency of tobacco use strikingly lower than that of

people living in the upper socioeconomic strata (6). In addition, family tobacco use appears to play an important role as a risk factor (10).

While it is certainly true that one important motivation for continuing to smoke is tobacco's calming effect, we have not found any association in the study populations of 12 cities between general anxiety and the prevalence of tobacco use (6). It is possible that the factor of poverty acts as a confounding variable here, on the one hand raising the level of a population's anxiety, while on the other reducing consumption by limiting the capacity to buy tobacco.

As of the early 1980s, a high proportion of pregnant Chilean women continued to smoke during pregnancy (24, 25). Of 845 young women who had just given birth, we found that 58% had been smokers before they became pregnant. Of the latter, 10.6% had continued to smoke during pregnancy as they had before, 34.9% had reduced their smoking somewhat, and 54.5% had stopped smoking. Factors significantly associated with giving up smoking due to pregnancy (24) were a high level of education, a small number of previous children, the fact that the pregnancy was wanted, and a high level of concern about tobacco's harmful effects (particularly upon the fetus during gestation). The influence of these factors has been confirmed by other studies (7, 8). Overall, it appears that the high proportion of women who continue to smoke during pregnancy (45-55%) is linked to inadequate educational efforts by obstetricians and university-trained midwives.

PERSPECTIVE AND RECOMMENDATIONS

The Chilean tobacco industry is powerful. As of 1988, national cigarette production was up to 12.5 billion units a year,

⁴Examinations designed to help select students for admission to the university.

and tobacco exports to the United States and Japan had grown from 109 tons valued at US\$366,000 in 1981 to 2,100 tons valued at US\$7,261,000. Even so, and even in the absence of any national cost-benefit studies relating to tobacco use, the findings reviewed here justify limiting tobacco consumption by various means that have proven themselves useful (26–28).

One important matter indicating tobacco's degree of social acceptability is the acceptability of cigarette advertising. In Chile, cigarette advertising on television is permitted only during the late evening hours (9:30 p.m. or later), and all cigarette advertising must contain a parallel notice or warning about the risks of tobacco use. It has been observed, however, that many scenes aired during regular television programs show people smoking—indeed, someone appears in association with tobacco every 10 minutes—and that this contributes to social acceptance of the habit.

Obviously, a key way of controlling smoking that goes beyond advertising is to curtail community acceptance of tobacco use. It is thus essential that physicians, health professionals, and opinion-makers oppose smoking.

In the case of physicians, their responsibilities include refraining from smoking, reminding people not to smoke, and helping their patients to quit smoking (29). A study published in 1985 (7) that examined a random sample of 430 Santiago physicians revealed that 61.6% had smoked daily for six months or more at some point in their lives, but that only 28.3% were daily smokers at the time of the study. An additional 8.2% were occasional smokers. A relatively high percentage of smokers (46.2%) was found among female physicians, especially those under age 30 (52.2% of whom were smokers). In contrast, the prevalence of smoking among male physicians was

somewhat lower (35.3%), and the prevalence among those under age 30 was even less (27.5%). The prevalence of smoking among other health professionals was found to be as high as the prevalence among physicians (9).

A fundamental element in smoking control is education about the habit's harmful effects. For groups of men with longstanding smoking habits, such education should focus upon pathologic respiratory, circulatory, and tumor-related effects. For women, however, who typically have taken up the habit more recently, it should home in on smoking's impact upon the course of pregnancy, the newborn, and the nursing infant, as well as upon female disorders linked to alteration of estrogen metabolism. In general, we have found that the prevalence of smoking is inversely proportional to concern over the effects of smoking, in both the general population (4) and specific groups (7, 8, 24).

Chile has already launched organized activities against smoking. These include (a) prohibitions against smoking in public places (such as educational and health establishments) as well as on public transport vehicles; (b) the above-mentioned limitation of tobacco-related television advertisements to late night programming and inclusion of a warning about the harmful effects of tobacco in all tobacco advertisements; (c) a requirement that cigarette companies publish the tar and nicotine content of their products; and (d) a variety of educational efforts.

Of course, much remains to be done—despite the efforts of the Health Ministry (30), whose 1986–1988 smoking control program (see Annex) pointed out critical areas where control is needed. Among other things, there is justification in Chile for a policy that would raise cigarette prices (still less than US\$1 for 20 cigarettes) by raising cigarette taxes. Low-income groups smoke significantly less

than high-income groups (6), and it is worth noting that in recent years a 50% increase in the selling price—due to increased taxes—has caused a 25% decline in cigarette sales.

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ANNEX: Principal Components of the Ministry of Health's 1986–1988 Smoking Control Program.

1. Education project:

- Workshops for mid-level managers in health, education, and other sectors.
- Training workshops for health and education personnel.
- Program of prevention, through antitobacco education for schoolchildren, achieving 15% coverage of primary and secondary level public schools.
- Program for termination of smoking through educational activities among:
 - pregnant and nursing women;
 - patients suffering from tobacco-related pathologies;
 - workers in high-risk work settings.

2. Provision and dissemination of information to the community through television, other mass media, voluntary organizations, and scientific associations—considering as priority groups smokers, parents, pregnant and nursing women, and adolescents.

3. Legal measures:

- Activities of the National Commission on Control of Tobacco Use, an organization formed by the ministries involved with tobacco.
- Warning messages about health risks in merchandising and advertising.
- Prohibition of sales within health and educational establishments.
- Restrictions on smoking in public places as well as within health and educational establishments.
- Restrictions on smoking in high-risk work settings (such as those involving exposure to asbestos, silica, etc.).