

THE HEALTH CONSEQUENCES OF SMOKING FOR WOMEN

A Report of the Surgeon General

1980

INTRODUCTION AND SUMMARY

The 1980 Report on the Health Consequences of Smoking focuses upon the evidence relating cigarette smoking to health effects in women. It is not presented as a detailed discussion of the entire range of effects of smoking on health. Such a detailed review of all existing evidence can be found in the 1979 Report of the Surgeon General on Smoking and Health. Instead, this volume on smoking and women's health is offered as a review and reappraisal of smoking and major health relationships specifically in women. It is intended to serve the medical community as a unified source of existing scientific evidence about health effects of smoking cigarettes for women. As an examination of current knowledge, it will logically lend itself to application in both the personal and public health arenas.

Its content is the work of numerous scientists within the Department of Health, Education, and Welfare, as well as scientific experts outside that organization.

This volume examines the major issues relating tobacco use to women's health including trends in consumption, the biomedical evidence of the health effects of cigarette usage by women, and determinants of smoking initiation, maintenance, and cessation.

This section summarizes the principal findings of this report. It is hoped that the entire volume will serve to highlight the established risks of smoking for women and their children, as well as to define the areas in need of further investigation.

Patterns of Cigarette Smoking

1. Women have differed from men in their historical onset of widespread cigarette use, in the rate of diffusion of smoking among each new birth cohort, in their intensity of cigarette smoking and their use of various types of cigarettes.
2. Men took up cigarette smoking rapidly at the beginning of the twentieth century, especially during World War I. Cigarettes rapidly replaced other forms of tobacco.

By 1925, approximately 50 percent of adult males were cigarette smokers. Smoking among men accelerated rapidly during World War II. By 1950, the prevalence of cigarette use among men approached 70 percent in some urban areas.

3. The onset of widespread cigarette use among women lagged behind that of men by 25 to 30 years. The proportion of adult

women smoking cigarettes did not exceed one-quarter until the onset of World War II.

4. Between 1951 and 1963, increasing proportions of women and men smokers converted to filtertip cigarettes. By 1964, 79 percent of adult women smokers and 54 percent of adult men smokers used filter cigarettes.
5. After reaching a peak value of 4,336 in 1963, annual per-capita consumption of cigarettes declined in 1964, 1968-70, and in the period since 1975. The most recent estimate of 3,900 cigarettes per capita in 1979 is approximately equal to that observed in 1952.
6. From 1965 to 1978, the proportion of adult men cigarette smokers declined from 51 to 37 percent. The preliminary estimate of adult men's smoking prevalence for 1979 is 36.9 percent. From 1965 to 1976, the proportion of adult women smokers remained virtually unchanged at 32 to 33 percent. Since 1976, the proportion of women smokers has declined to below 30 percent. For 1979, the preliminary estimate of adult women's smoking prevalence is 28.2 percent. The overall smoking prevalence of 32.3 percent for both sexes in 1979 represents the lowest recorded value in at least 45 years.
7. The proportion of adult smokers attempting to quit smoking declined from 1970 to 1975, but increased in 1978-1979. In contrast to past years, the proportions of women and men now attempting to quit smoking, and their reported quitting rates, are indistinguishable. Approximately one in three adult smokers now makes a serious attempt to quit smoking during the course of a year. Approximately one in five of those who attempt to quit subsequently succeed.
8. The proportion of adult smokers using lower "tar" and nicotine brands has increased substantially. In 1979, 39 percent of adult women smokers and 28 percent of adult men smokers reported primary brands with F.T.C. "tar" delivery less than 15.0 milligrams. It is not known whether smokers of the lowest "tar" cigarettes are more or less likely to attempt to quit smoking, or to succeed in quitting, than smokers of conventional filtertip or non-filter cigarettes.
9. The average number of cigarettes smoked by women and men current smokers has increased. The relationship of this finding to recent declines in the average F.T.C. "tar" and nicotine deliveries of cigarettes is not well understood.
10. With each successive generation, the smoking characteristics of women and men have become increasingly similar.
11. Among women, the average age of onset of regular smoking progressively declined with each successive birth cohort -- from 35 years of age for those born before 1900, to 16 years of age among those born 1951 to 1960. The average age

of onset of regular smoking among young women is now virtually identical to that of young men.

12. Maximum smoking prevalence rates have declined substantially in recent birth cohorts of men. Men born 1931 to 1940 reached a peak smoking proportion of 61 percent during 1960-62, while men born 1941 to 1950 reached a peak smoking proportion of 58 percent in 1968-69. Men born 1951 to 1960 reached a peak smoking proportion of 40 percent in 1976. Among recent cohorts of women, peak smoking prevalence rates have declined to a much smaller extent. Women born 1931 to 1940 reached a peak smoking proportion of 45 percent in 1966-68, while women born 1941 to 1950 reached a peak smoking proportion of 41 percent in 1970-73. Women born 1951 to 1960 reached a peak smoking proportion of 38 percent in 1976. Among the generation born 1951 to 1960, the proportions of women and men smoking cigarettes are now virtually identical.

13. The proportions of women and men smokers in each age group have declined. Among those born before 1951, this decline in smoking prevalence resulted mainly from smoking cessation. By contrast, the observed decline in smoking prevalence among younger men born 1951 to 1960 has resulted from both smoking cessation and a lower rate of smoking initiation. This decline in the rate of onset of smoking among young men has not been observed for young women.

14. Recent survey data on adolescent smoking habits reveal that by ages 17 to 19, smoking prevalence among women exceeds that of men. This finding supports the conclusion that the rate of initiation of smoking among young men — but not that of young women — is declining. The future cigarette use of the youngest generations of women is uncertain.

15. With each successive birth cohort, the accumulated years of cigarette smoking per woman has progressively approached the accumulated years of cigarette smoking per man. Each successive birth cohort has also experienced progressively smaller sex differences in the fraction of lifetime years of smoking that represents filtertip cigarette use.

16. Among men born during this century, each successive birth cohort has thus far experienced fewer cumulative years of cigarette smoking, higher proportionate exposure to filtertip cigarettes, and lower smoking prevalence rates. This relationship between birth date and cigarette smoke exposure does not hold for women. Women born 1921 to 1940 have experienced substantially higher smoking prevalence rates than earlier generations. Unless they quit smoking in substantial

numbers, these women, currently aged 40 to 59, will surpass older women in total years of cigarette smoking per capita, the total years of nonfilter cigarette smoking per capita, and in the total number of cigarettes smoked. The health consequences of this enhanced exposure to cigarette smoke among women are likely to be more prominent in the coming decades.

Mortality

1. The mortality ratio for women who smoke cigarettes is about 1.2 or 1.3.
2. Mortality ratios for women increase with the amount smoked. In the largest prospective study the mortality ratio was 1.63 for the two-pack-a-day smoker as compared to nonsmokers.
3. Mortality ratios are generally proportional to the duration of cigarette smoking; the longer a woman smokes, the greater the excess risk of dying.
4. Mortality ratios tend to be higher for those women who begin smoking at a young age as compared to those who begin smoking later.
5. Mortality ratios are higher for those women who report they inhale smoke than for those who do not inhale.
6. Mortality ratios for women tend to increase with the tar and nicotine content of the cigarette.
7. Mortality ratios for female smokers are somewhat less than for male smokers. This may reflect differences in exposure to cigarette smoke, such as starting smoking later, smoking cigarettes with lower "tar" and nicotine content, and smoking fewer cigarettes per day than men.
8. Women demonstrate the same dose-response relationships with cigarette smoking as men. An increase in mortality occurs with an increase in number of cigarettes smoked per day, an earlier age of beginning cigarette smoking, a longer duration of smoking, inhalation of cigarette smoke, and a higher tar and nicotine content of the cigarette. Women who have smoking characteristics similar to men may experience mortality rates similar to men.

Morbidity

The 1979 Report of the Surgeon General summarized the information on smoking and morbidity as follows:

1. In general, female current cigarette smokers report more acute and chronic conditions including chronic bronchitis and/or emphysema, chronic sinusitis, peptic ulcer disease, and arteriosclerotic heart disease, than women who never smoked.
2. There is a dose-response relationship between the number of cigarettes smoked per day and the frequency of reporting for most of the chronic conditions.
3. The age-adjusted incidence of acute conditions (e.g., influenza) for women smokers is 20 percent higher for women who had ever smoked than for nonsmokers.

Additional data from the Health Interview Survey (HIS) is presented:

1. Currently employed women who smoke cigarettes report more days lost from work due to illness and injury than working women who do not smoke.
2. Limitation of activity is reported more commonly among women under the age of 65 who have ever smoked than among those who never smoked

Cardiovascular Diseases

Coronary heart disease is the major cause of death among both males and females in the U.S. population. The 1979 Surgeon General's Report clearly demonstrated the close association of cigarette smoking and increased coronary heart disease among males. This report reviews the evidence associating cigarette smoking and cardiovascular disease in women:

1. Coronary heart disease, including acute myocardial infarction and chronic ischemic heart disease, occurs more frequently in women who smoke. In general, cigarette smoking increases the risk by a factor of about two, and in younger women cigarette smoking may increase the risk several fold.
2. Cigarette smoking is a major independent risk factor for coronary heart disease in women; it also acts synergistically with other coronary heart disease risk factors producing a risk greater than the sum of the individual risks.
3. The use of oral contraceptives by women cigarette smokers increases the risk of a myocardial infarction by a factor of approximately ten.
4. Women who smoke low "tar" and nicotine cigarettes experience less risk for coronary heart disease than women who

smoke high "tar" and nicotine cigarettes, but their risk is still considerably greater than that of nonsmokers.

5. Increased levels of high-density lipoprotein (HDL) are correlated with a reduced risk for an acute myocardial infarction; women cigarette smokers have decreased levels of HDL.

6. Cigarette smoking is a major, independent risk factor for the development of arteriosclerotic peripheral vascular disease in women. Smoking cessation improves the prognosis of the disorder and has a favorable impact on vascular patency following reconstructive surgery.

7. Women cigarette smokers experience an increased risk for subarachnoid hemorrhage; the use of both cigarettes and oral contraceptives appears to synergistically increase the risk subarachnoid hemorrhage.

8. Women who smoke cigarettes may be more likely to develop severe or malignant hypertension than nonsmoking women.

Cancer

1. Cigarette smoking is causally associated with cancer of lung, larynx, oral cavity, and esophagus in women as well as men; it is also associated with kidney cancer in women.

2. Cigarette smoking accounts for 18 percent of all cancer newly diagnosed and 25 percent of all cancer deaths in women. In 1980, 26,500 of the estimated 101,000 deaths, or over one-quarter of the deaths expected from lung cancer, will occur in women.

3. Women cigarette smokers have been reported to have between 2.5 and 5 times greater likelihood of developing lung cancer than nonsmoking women.

4. Among women the risk of developing lung cancer increases with increasing number of cigarettes smoked per day, duration of the smoking habit, depth of inhalation, and tar and nicotine content of the cigarette smoked. The risk is inversely related to the age at which smoking began.

5. A dose-response relationship has been demonstrated between cigarette smoking and cancer of the lung, larynx, oral cavity, and urinary bladder in women.

6. The rise in lung cancer death rates is currently much steeper in women than in men. It is projected that the age adjusted lung cancer death rate will surpass that of breast cancer in the early 1980s.

7. The rapid increase in lung cancer rates in women is similar to but steeper than the rise seen in men approximately 25 years earlier. This probably reflects the fact that women first began to smoke in large numbers 25-30 years after the increase in cigarette smoking among men. Thus, neither men nor women are protected from developing lung cancer caused by cigarette smoking.

8. Cigarette smoking has been causally related to all four of the major histologic types of lung cancer in both women and men, including epidermoid, small cell, large cell and adenocarcinoma.

9. The use of filter cigarettes and cigarettes with lower levels of "tar" and nicotine by women is correlated with a lower risk of cancer of the lung and larynx compared to the use of high-"tar"-and-nicotine or unfiltered cigarettes. The risk posed by smoking low-"tar" cigarettes, however, is clearly greater than that among females who never smoked.

10. After cessation of cigarette smoking, a woman's risk of developing lung and laryngeal cancer has been shown to drop slowly, equalling that of nonsmokers after 10-15 years.

11. Excessive ingestion of alcohol acts synergistically with cigarette smoking to increase the incidence of oral and laryngeal cancer in women.

Non-Neoplastic Bronchopulmonary Diseases

1. Recent statistics indicate a rising death rate due to chronic obstructive lung disease (COLD) among women. The data available demonstrate an excess risk of death from COLD among smoking women over that of nonsmoking women. This excess risk is much greater for heavy smokers than for light smokers.

2. Women's total risk of COLD appears to be somewhat lower than men's, a difference which may be due to differences in prior smoking habits.

3. The prevalence of chronic bronchitis varies directly with cigarette smoking, increasing with the number of cigarettes smoked per day.
4. There is conflicting evidence regarding differences in the prevalence of chronic bronchitis in women and men. Several recent studies suggest that there is no significant difference in the prevalence of chronic bronchitis between male and female smokers. This may be the result, however, of increasingly similar smoking behavior of women and men.
5. The presence of emphysema at autopsy exhibits a dose-response relationship with cigarette smoking during life.
6. There is a close relationship between cigarette smoking and chronic cough or chronic sputum production in women, which increases with total pack-years smoked.
7. Women current smokers have poorer pulmonary function by spirometric testing than do female ex-smokers or nonsmokers, a relationship which is dose-related to the number of cigarettes smoked.

Interaction Between Smoking and Occupational Exposures

1. The 1979 Surgeon General's Report identified the ways in which smoking cigarettes may interact with the occupational environment. They include:
 - a. Facilitation of absorption of physical contamination of cigarettes,
 - b. Transformation of workplace chemicals into more toxic substances,
 - c. Addition of the exposure to a toxic constituent of tobacco smoke to a concurrent exposure to the same constituent present in the workplace,
 - d. Addition of a health effect due to environmental exposure to a similar health effect due to smoking,
 - e. Synergy of exposures, and
 - f. Causation of accidents.
2. Women are entering occupational environments with greater frequency, and thus may be experiencing greater exposures to physical and chemical agents.
3. Cohorts of women with a greater prevalence of smoking are currently reaching the ages of maximal disease occurrence, replacing earlier cohorts with lower cigarette exposures.
4. Physiologic differences in hormonal status between males and females constitute a potential source of differing responses.

5. In the workplace women who are pregnant present a nine-month exposure opportunity, including potential teratogenic and perinatal mortality effects.
6. Concurrent exposure of women to smoking and asbestos resulted in a clear excess of cancer of the lung.
7. Women smokers exposed to cotton dust run a higher risk of developing byssinosis, bronchitic syndromes, and abnormal pulmonary function tests than nonsmoking women.

Pregnancy and Infant Health

1. Babies born to women who smoke during pregnancy are, on the average, 200 grams lighter than babies born to comparable nonsmoking women.
2. The relationship between maternal smoking and reduced birth weight is independent of all other factors that influence birth weight including race, parity, maternal size, socioeconomic status, and sex of child; it is also independent of gestational age.
3. There is a dose-response relationship between maternal smoking and reduced birth weight; the more the woman smokes during pregnancy, the greater the reduction in birth weight.
4. If a woman gives up smoking early during pregnancy, her risk of delivering a low-birth-weight baby approaches that of a nonsmoker.
5. The ratio of placental weight to birth weight increases with increasing levels of maternal smoking, reflecting a considerable decrease in mean birth weight and a slight increase in mean placental mass; this may represent an adaptation to relative fetal hypoxia.
6. The pattern of fetal growth retardation that occurs with maternal smoking is a decrease in all dimensions including body length, chest circumference, and head circumference.
7. Maternal smoking during pregnancy may adversely affect the child's long-term growth, intellectual development, and behavioral characteristics.
8. Maternal smoking during pregnancy exerts a direct growth-retarding effect on the fetus; this effect does not appear to be mediated by reduced maternal appetite, eating or weight gain.
9. The risk of spontaneous abortion, fetal death, and neonatal death increases directly with increasing levels of maternal smoking during pregnancy; interaction of maternal smoking with other factors which increase perinatal mortality may result in an even greater risk.
10. Excess deaths of smokers' infants are found mainly in the coded cause categories of "unknown" and "anoxia" for fetal deaths, and the categories of "prematurity alone" and "respiratory difficulty" for neonatal deaths; this suggests that

the excess deaths are due to problems of the pregnancy, rather than to abnormalities of the fetus or neonate.

11. Increasing levels of maternal smoking result in a highly significant increase in the risk of abruptio placentae, placenta previa, bleeding early or late in pregnancy, premature and prolonged rupture of membranes, and preterm delivery — all of which carry high risks of perinatal loss.
12. Although there is little effect of maternal smoking on mean gestation, the proportion of fetal deaths and live births that occur before term increases directly with maternal smoking level. Up to 14 percent of all preterm deliveries in the United States may be attributable to maternal smoking.
13. The incidence of preeclampsia is decreased among women who smoke during pregnancy; however, if preeclampsia develops in a smoking woman, the risk of perinatal mortality is markedly increased compared to preeclamptic nonsmokers.
14. An infant's risk of developing the "sudden infant death syndrome" is increased by maternal smoking during pregnancy.
15. There are insufficient data to support a judgement on whether maternal and/or paternal cigarette smoking increases the risk of congenital malformations.
16. Infants and children born to smoking mothers may experience more long-term morbidity than those born to non-smoking mothers; however, studies usually cannot distinguish between the effects of smoking during pregnancy and the effects of the infant's or child's passive exposure to cigarette smoke after birth.
17. Studies in women and men suggest that cigarette smoking may impair fertility.
18. Experimental studies on tobacco smoke, nicotine, carbon monoxide, polynuclear aromatic hydrocarbons, and other constituents of smoke help define pathways by which maternal smoking during pregnancy may exert its aforementioned effects.

Peptic Ulcer Disease

The 1979 Surgeon General's Report included evidence that cigarette smoking in males was significantly associated with the incidence of peptic ulcer disease and increased the risk of dying from peptic ulcer disease by approximately twofold. The effect of smoking on pancreatic secretion and pyloric reflux demonstrated among men may provide a mechanism by which peptic ulcers develop.

1. Female smokers show a prevalence of peptic ulcer higher than that of nonsmokers by approximately two-fold.
2. The effect of cessation on healing is not known.

Interactions of Smoking with Drugs, Food Constituents and Responses to Diagnostic Tests

Most published studies investigating the effects of cigarette smoking on drug use have been performed on mixed populations; factors specific for women have not been demonstrated to date. It has, however, been clearly demonstrated that women are prescribed and consume more prescription drugs than men.

1. Studies of selected drugs indicate that smoking may affect clinical responses and alter the dose required for an effective therapeutic result.
2. Smoking interacts with oral contraceptive use to increase the risk of myocardial infarction and subarachnoid hemorrhage.
3. Common clinical laboratory parameters are altered in smokers compared to nonsmokers; the health significance of these changes is unknown.
4. Insufficient information exists for assessment of the impact of smoking on the nutritional needs of women.

Psychosocial and Behavioral Aspects of Smoking in Women

1. The percentage of 17-18 year old women who smoke has shown a steady rise between 1968 and 1979. It now appears, however, that the increase in smoking prevalence among all 12-18 year old females has leveled off and begun to decline. Young women born after 1962 show a substantially reduced initiation of smoking and will probably have a much lower prevalence of smoking as adults.
2. Those young women who do begin to smoke are starting to smoke regularly at a younger age, with more than half of the male and female adolescents who begin to smoke starting before the 10th grade.
3. The earlier tobacco is used and the greater the number of cigarettes smoked per day, the less likely an attempt to quit will be successful.
4. The percentage of women smokers who smoke more than one pack per day is increasing.
5. Adolescent and adult women are more likely to use low -tar-and-nicotine cigarettes, smoke fewer cigarettes per day and inhale less deeply than do men, but the difference between the sexes in these patterns of smoking is decreasing. Adolescent and adult black women are more likely to be smokers than their white peers, but they smoke fewer cigarettes per day.
6. Adolescents from low income families, single parent families, and families with lower parental educational levels are more likely to become smokers.
7. Female and male adolescents are more likely to begin smoking if a parent or older sibling also smokes.
8. Adolescent smokers associate with peers who smoke and nonsmokers associate with nonsmoking peers.

9. Adolescent girls overestimate the percentage of their peers who smoke and they have a very positive image of the people in cigarette advertisements, but they are less likely than adolescent boys to see smoking as a social asset.

10. Adolescent girls who smoke tend to be more outgoing but feel less able to influence their future.

11. Adolescents experience stress due to feelings of unattractiveness, incompetency in school achievement and personal relations, limited opportunity for personal growth and concern over future social and economic roles. This stress may be the common mechanism producing the increased rates of smoking in some groups.

12. The factors associated with successful quitting by adolescents of either sex are lower number of cigarettes smoked per day, higher educational aspirations and achievement, greater acceptance of the health risk of smoking, and having more nonsmokers among their friends.

13. It is possible that women and men modify their smoking in order to maintain a constant nicotine level.

14. Women are more likely than men to smoke in order to reduce stress.

15. Women at higher education and income levels are more likely to succeed in quitting. Additional factors associated with successful quitting are a strong commitment to change, the use of behavioral techniques and reliable social support for quitting. Women have been reported to show lower rates than men of successful cessation following organized cessation programs, a difference which is less apparent in those programs that include social support.