TABLE 7.—Estimated relative risks for current and former cigarette smokers, females aged 35 years or more, 4-year (1982–86) followup of American Cancer Society 50-State study (CPS-II)

Underlying cause of death	Current smokers[a]	Former smokers[a]
All causes	1.90 (1.82–1.98)[b]	1.32 (1.27–1.37)[b]
CHD, age ≥35 (410–414)[c]	1.78 (1.62–1.97)	1.31 (1.19–1.44)
CHD, age 35–64[d] (410–414)	3.00 (2.50–3.59)	1.43 (1.15–1.77)
CHD, age ≥65 (410–414)	1.60 (1.42–1.80)	1.29 (1.16–1.43)
Other Heart Disease[e] (390–398, 401–405, 415–417, 420–429)	1.69 (1.44–1.99)	1.16 (1.00–1.34)
Cerebrosvascular Lesions, age ≥35 (430–438)	1.84 (1.56–2.16)	1.06 (0.88–1.27)
Cerebrovascular Lesions, age 35–64 (430–438)	4.80 (3.52–6.54)	1.41 (0.94–2.13)
Cerebrovascular Lesions, age ≥65 (430–438)	1.47 (1.19–1.81)	1.01 (0.83–1.24)
Other Circulatory Disease[f] (440–448)	3.00 (2.20–4.08)	1.34 (0.95–1.90)
COPD (490–492,496)	10.47 (7.78–14.09)	7.04 (5.33–9.30)
Other Respiratory Disease[g] (010–012,480–489,493)	2.18 (1.60–2.97)	1.38 (1.04–1.84)
Cancer, Lip, Oral Cavity, Pharynx (140–149)	5.59 (3.15–9.91)	2.88 (1.57–5.26)
Cancer, Esophagus (150)	10.25 (4.94–21.27)	3.16 (1.45–6.85)
Cancer, Pancreas (157)	2.33 (1.77–3.08)	1.78 (1.37–2.30)
Cancer, Larynx (161)	17.78 (3.45–91.74)	11.88 (2.46–57.34)
Cancer, Lung (162)	11.94 (9.99–14.26)	4.69 (3.86–5.70)
Cancer, Cervix Uteri (180)	2.14 (1.06–4.30)	1.94 (0.97–3.87)
Cancer, Kidney (189)	1.41 (0.86–2.30)	1.16 (0.72–1.87)
Cancer, Bladder, Other Urinary Organs (188)	2.58 (1.31–5.08)	1.85 (1.00–3.42)

NOTE: Preliminary estimates, based upon 2,418,909 woman-years of exposure among female subjects who never smoked regularly, or who smoked only cigarettes, present or past. Relative risks, estimated with respect to women who never smoked regularly, have been directly standardized to the age distribution of all woman-years of exposure.
[a]Refers to cigarette smoking status at enrollment (September 1982).
[b]Numbers in parentheses are 95-percent confidence intervals, computed on the assumption that the logarithm of relative risk was normally distributed.
[c]All disease codes refer to International Classification of Diseases, Ninth Revision.
[d]When an age range is given, it refers to the age at enrollment in 1982.
[e]Includes Hypertensive Heart Disease (401–404).
[f]Includes Aortic Aneurysm, Non-Syphilitic, and General Arteriosclerosis (440–441).
[g]Includes Influenza and Pneumonia (480–487).
SOURCE: Unpublished tabulations, American Cancer Society.

tween cigarette use and risk of stroke. They also noted a slight increase in risk among former cigarette smokers, especially for the first 2 years after cessation. The preliminary results from CPS-II, reported in Tables 6 and 7, further support a causal role for cigarette smoking in stroke.

The preliminary results of CPS-II also show significantly higher relative risks for cancers of the lip, oral cavity and pharynx, esophagus, and lung, as compared with CPS-I. The computed relative risk for lung cancer death has increased to 22 in men and 12 in women. While the relative risks for COPD death have not changed significantly among men, there is a trend toward increasing risk among women. The available data from CPS-II do not permit identification of specific mortality risks for hypertensive heart disease, aortic aneurysm, and influenza and pneumonia, as in CPS-I. However, among broader categories of cardiovascular and nonneoplastic respiratory disease, increased risks are likewise found in CPS-II.

Endocrine and Sex-Related Cancers in Women

A protective effect of smoking on cancer of the endometrium has been suggested in a recent case–control study (Lesko et al. 1985). For CPS-I, the relative risk for cancers of the uterine corpus (ICD-7 Codes 172-174) among current smokers was 0.94 (95-percent confidence interval, 0.57 to 1.53). Preliminary results for CPS-II suggest a reduced relative risk for endometrial cancer (ICD-9 Code 182).

Recent data on a possible protective effect of smoking for breast cancer have been contradictory (See Chapter 2; Rosenberg et al. 1984). For CPS-I, the relative risk for breast cancer (ICD-7 Code 170) among current smokers was 0.88 (95-percent confidence interval, 0.77 to 1.01), while the relative risk among former smokers was 1.20 (95-percent confidence interval, 1.15 to 1.35). Preliminary data from CPS-II have likewise been contradictory.

An increased risk of cervical cancer among cigarette smokers has been reported in case–control studies (LaVecchia et al. 1986; Nischan, Ebeling, Schindler 1988). For CPS-I, the relative risk for cervical cancer (ICD-7 Code 171) was 1.10 (95-percent confidence interval, 0.83 to 1.47). Data from CPS-II show a twofold increase in cervical cancer mortality among current smokers (relative risk 2.14, 95-percent confidence interval 1.06 to 4.30).

Summary

The relative risks for current smokers for selected comparable disease categories causally related to smoking in CPS-I and CPS-II are summarized and listed side by side in Table 8. These comparisons show substantial increases in the risk of death due to smoking for most of the disease categories listed between the years 1959 and 1965 and 1982 and 1986. Statistically significant increases in relative risks occurred in those disease categories for which 95-percent confidence limits around the estimated relative risks do not overlap between CPS-I and CPS-II. Compared with men during this period, women experienced greater increases in the relative risks of cerebrovascular lesions (ages 35 to 64 years), COPD, laryngeal cancer, and lung cancer.

TABLE 8.—Summary of estimated relative risks for current cigarette smokers, major disease categories causally related to cigarettes, males and females aged 35 years and older, CPS-I (1959–65) and CPS-II (1982–86)

Underlying cause of death[a]	Males		Females	
	CPS-I	CPS-II	CPS-I	CPS-II
CHD, age ≥35	1.83	1.94	1.40	1.78[b]
CHD, age 35–64	2.25	2.81[b]	1.81	3.00[b]
Cerebrovascular Lesions, age ≥35	1.37	2.24[b]	1.19	1.84[b]
Cerebrovascular Lesions, age 35–64	1.79	3.67[b]	1.92	4.80[b]
COPD	8.81	9.65	5.89	10.47
Cancer, Lip, Oral Cavity, and Pharynx	6.33	27.48	1.96	5.59
Cancer, Esophagus	3.62	7.60	1.94	10.25[b]
Cancer, Pancreas	2.34	2.14	1.39	2.33
Cancer, Larynx	10.00	10.48	3.81	17.78
Cancer, Lung	11.35	22.36[b]	2.69	11.94[b]

[a]See Tables 4–7 for International Classification of Disease codes.
[b]95-percent confidence intervals do not overlap between CPS-I and CPS-II.
SOURCE: Tables 4–7.

Smoking-Attributable Mortality in the United States, 1965 and 1985

Table 9 reports the attributable risks *a* from cigarette smoking during the year 1965. Ten causes of death are considered: CHD, COPD, cerebrovascular disease, and cancers of seven sites. The computations are based upon the age-adjusted relative risks reported in CPS-I and the prevalence rates reported in the 1965 NHIS. For men, the age-adjusted relative risks among present and past cigarette smokers with a history of pipe or cigar use were slightly lower than those for present and past smokers of cigarettes exclusively. While the latter are reported for comparison in Table 4, the former were used in the attributable risk computations. In 1965, as shown in Figure 2, about two-thirds of men with a history of regular cigarette smoking were also exposed to pipe or cigar smoke. (As noted in Note b of Table 10 below, the use of relative risks derived from the death rates of men who smoked cigarettes exclusively resulted in about a 5-percent increase in attributable deaths for 1965.) For women, the computation of attributable risks in 1965 did not distinguish between current and former smokers.

TABLE 9.—Estimated attributable risks for 10 selected causes of death from cigarette smoking, males and females, United States, 1965

Cause of death	Males[a] (%)	Females[b] (%)
CHD, age 35–64	42 (40–45)[c]	26 (23–30)
CHD, age ≥65	11 (9–14)	3.3 (2.1–5.1)
COPD	84 (79–88)	67 (57–76)
Cancer of lip, oral cavity, and pharynx	74 (59–85)	27 (12–51)
Cancer of larynx	84 (61–94)	47 (8–90)
Cancer of esophagus	57 (36–76)	14 (6–29)
Cancer of lung	86 (82–88)	40 (31–50)
Cancer of pancreas	41 (30–53)	14 (6–30)
Cancer of bladder	53 (39–66)	36 (20–56)
Cancer of kidney	36 (19–56)	17 (5–42)
Cerebrovascular disease, age 35–64	28 (21–36)	28 (22–33)
Cerebrovascular disease, age ≥65	2.0 (0.6–6.6)	1.3 (0.2–6.5)

[a]For males, computations based on prevalence rates in Table 2 and relative risks for male current and former cigarette smokers, with or without a history of pipe and cigar smoking, derived from CPS-I.
[b]For females, attributable risks computed from prevalence rates in Table 2 and relative risks for all female smokers, past and present, in Table 5.
[c]Numbers in parentheses are 95-percent confidence intervals.

In 1965, as Table 9 reveals, cigarette smoking was responsible for 42 percent of CHD deaths among younger men and 26 percent of deaths among younger women. For COPD deaths at all ages, the smoking-attributable risks were 84 percent for men and 67 percent for women. For lung cancer, the respective attributable risks were 86 percent and 40 percent for men and women. With the exception of deaths from stroke among younger persons, attributable risks were markedly higher for men.

Table 10 reports the corresponding smoking-attributable deaths, *A*, during the year 1965. Attributable deaths were computed by multiplying the attributable risk percentages in Table 9 by the corresponding cause-specific death rates among persons aged 20

TABLE 10.—Estimated deaths (in thousands) attributable to cigarette smoking, 10 selected causes, males and females, United States, 1965

Cause of death	Males	Females
CHD, age <65	51 (48–54)[a]	9.5 (8.2–10.8)
CHD, age ≥65	25 (20–30)	6.0 (3.9–9.4)
COPD	16 (15–17)	2.3 (2.0–2.7)
Cancer of lip, oral cavity, and pharynx	3.6 (2.9–4.2)	0.4 (0.2–0.8)
Cancer of larynx	1.9 (1.4–2.2)	0.1 (0.02–0.3)
Cancer of esophagus	2.4 (1.5–3.2)	0.1 (0.2–0.8)
Cancer of lung	35 (34–36)	3.1 (2.4–3.8)
Cancer of pancreas	3.8 (2.8–4.9)	0.9 (0.4–2.0)
Cancer of bladder	3.0 (2.2–3.7)	1.0 (0.5–1.5)
Cancer of kidney	1.2 (0.7–1.9)	0.3 (0.1–1.8)
Cerebrovascular disease, age <65	5.5 (4.2–7.2)	4.7 (3.8–5.6)
Cerebrovascular disease, age ≥65	1.5 (0.4–4.8)	1.0 (0.2–5.9)
Ten causes	150[b] (143–157)	30 (26–34)

NOTE: Computed from Table 9 and tabulations of deaths at ages 20 years or more by cause for 1965 (NCHS 1967). Sums may not equal totals because of rounding.

[a]Numbers in parentheses are 95-percent confidence intervals.

[b]When the attributable risk estimates given in Note a of Table 9 were used, the total attributable deaths for males were 158,000 (95-percent confidence interval, 151,000 to 166,000). Approximately two-thirds of the 8,000 additional deaths were from CHD.

years or more. For the 10 causes combined, cigarette smoking was responsible for 150,000 deaths among men and 30,000 deaths among women in 1965.

Among men, CHD deaths made up 51 percent of smoking-attributable mortality for the 10 causes combined. This proportion is consistent with the estimate of 45 percent reported by the 1964 Advisory Committee to the Surgeon General for excess mortality from all causes (US PHS 1964). Similarly, lung cancer accounted for 23 percent of the smoking-attributable mortality for the 10 causes combined—again consistent with the

1964 Report's estimate of 16 percent of deaths from all causes. Among women, CHD deaths made up 52 percent and lung cancer 10 percent of the smoking-attributable mortality from the 10 causes combined.

Table 11 shows the estimated attributable risks *a* from cigarette smoking for the year 1985. For comparability with the 1965 calculations, the same 10 causes of death are considered. The computations are based upon the relative risks reported in CPS-II and the prevalence rates reported in the 1985 NHIS. For men, the computations employed the relative risks for past and present smokers of cigarettes exclusively, as shown in Table 6. As Figure 2 indicates, the proportion of male smokers who used other forms

TABLE 11.—Estimated attributable risks for 10 selected causes of death from cigarette smoking, males and females, United States, 1985

Cause of death	Males (%)	Females (%)
CHD, age <65	45 (40–50)[a]	41 (34–48)
CHD, age ≥65	21 (17–26)	12 (9–15)
COPD	84 (78–88)	79 (73–83)
Cancer of lip, oral cavity, and pharynx	92 (79–97)	61 (45–76)
Cancer of larynx	81 (57–93)	87 (56–97)
Cancer of esophagus	78 (62–89)	75 (57–87)
Cancer of lung	90 (88–92)	79 (75–82)
Cancer of pancreas	29 (18–43)	34 (25–44)
Cancer of bladder	47 (31–63)	37 (18–61)
Cancer of kidney	48 (32–64)	12 (3–43)
Cerebrovascular disease, age <65	51 (36–65)	55 (45–65)
Cerebrovascular disease, age ≥65	24 (16–35)	6 (2–14)

NOTE: Computed from Tables 2, 6, and 7. For adult men under 65, the proportions of current and former cigarette smokers in 1985 were, respectively, 34.7 and 25.8 percent. For men 65 or older, the prevalences of current and former cigarette smoking were, respectively, 19.4 and 51.1 percent. For adult women under 65, the corresponding proportions were 30.1 and 16.5 percent; for adult women 65 or older, 12.6 and 19.6 percent.

[a]Numbers in parentheses are 95-percent confidence intervals.

of tobacco was too small to affect significantly the results for 1985. For women, relative risks for current and former cigarette smokers were employed (Table 7).

Comparison of Tables 9 and 11 reveals significant increases in attributable risk from 1965–85. In 1985, smoking accounted for 21 percent of CHD deaths in older men, compared with 11 percent in 1965. The attributable risks for cancers of the lip, oral cavity and pharynx, esophagus, and lung increased significantly.

Changes in the attributable risk estimates for women are even more striking. Among younger women, smoking now accounts for an estimated 41 percent of CHD deaths and an estimated 55 percent of lethal strokes, compared with 26 and 28 percent, respectively, in 1965. Among women of all ages, 79 percent of lung cancers are attributable to cigarette use (see Table 11).

Overall, smoking accounted for 86.7 percent of all lung cancer deaths (95-percent confidence interval 84.9 to 88.4), 81.8 percent of all COPD deaths (95-percent confidence interval 78.3 to 85.3), and 21.5 percent of all CHD deaths (95-percent confidence interval 19.4 to 23.4). In addition, smoking accounted for 18.0 percent of all stroke deaths (95-percent confidence interval 14.2 to 22.9).

Table 12 reports estimated smoking-attributable deaths for the 10 causes during 1985. Total deaths have increased to 231,000 for men and 106,000 for women. As opposed to 1965, CHD in men now accounts for only one-third of the smoking-attributable mortality from the 10 causes combined. The proportion of these attributable deaths due to lung cancer has increased to one-third. Likewise, among women, smoking-attributable CHD fatalities now account for one-third of the 10-cause total; the relative importance of smoking-induced cancer fatalities has also increased.

The total 10-cause smoking-attributable mortality for 1985 was 337,000 deaths, compared with 183,000 in 1965. A portion of the observed 1965–85 increase, however, was the result of population growth. In addition, there were increases in the proportion of elderly persons who would be more at risk for smoking-induced death. For men and women, respectively, Figures 10 and 11 show the results of a correction for population increase and population aging. In each figure, three quantities are shown for each of four categories of smoking-attributable mortality: CHD deaths under age 65; CHD deaths age 65 years or more; COPD deaths; and lung cancer deaths. The first quantity is the estimated smoking-attributable deaths for 1965. The second bar shows smoking-attributable deaths for 1985. The third bar shows the estimated 1985 smoking-attributable deaths if the U.S. populations at each age had remained at 1965 levels. The latter quantities were computed as aD^*, where a is the attributable risk given in Table 11 and D^* is a population-corrected estimate of 1985 U.S. deaths. The latter quantity was computed by multiplying 1985 age-specific death rates by the populations at risk in 1965.

Figures 10 and 11 show that population growth and aging cannot explain the changes in smoking-attributable mortality between 1965 and 1985. In particular, the marked increases in smoking-attributable deaths from lung cancer and COPD in women are systematic consequences of the American woman's adoption of lifelong cigarette smoking, from teenage years onward.

For men, population-corrected deaths due to smoking in 1985 were 165,000, compared with 150,000 in 1965. For women, population-corrected deaths due to smoking

TABLE 12.—Estimated deaths (in thousands) attributable to cigarette smoking, 10 selected causes, males and females, United States, 1985

Cause of death	Males	Females
CHD, age <65	34 (30–38)[a]	11 (9–12)
CHD, age ≥65	44 (36–54)	26 (20–34)
COPD	37 (35–39)	20 (18–21)
Cancer of lip, oral cavity, and pharynx	5.1 (4.4–5.4)	1.6 (1.2–2.0)
Cancer of larynx	2.3 (1.6–2.7)	0.6 (0.4–0.7)
Cancer of esophagus	5.0 (4.0–5.7)	1.6 (1.3–1.9)
Cancer of lung	76 (74–77)	30 (29–32)
Cancer of pancreas	3.3 (2.1–5.0)	3.4 (2.8–5.1)
Cancer of bladder	3.1 (2.1–4.2)	1.1 (0.6–1.9)
Cancer of kidney	2.6 (1.8–3.5)	0.4 (0.1–1.5)
Cerebrovascular disease, age <65	5.5 (3.9–7.0)	5.2 (4.3–6.2)
Cerebrovascular disease, age ≥65	12 (8–17)	4.8 (1.9–11.4)
Ten causes	231 (220–242)	106 (98–115)

NOTE: Computed from Table 11 and unpublished tabulations of deaths at ages 20 years or more by cause from NCHS, 1985. Sum of individual causes may not equal totals because of rounding.
[a]Numbers in parentheses are 95-percent confidence intervals.

in 1985 were 67,000, compared with 30,000 in 1965. Even if the population had remained entirely stable during 1965 through 1985, the lethality of cigarette use in American women would have doubled.

Among men, the total of 231,000 smoking-induced deaths in 1985 represented 41 percent of total deaths from the 10 causes combined and 22 percent of all deaths among persons aged 20 years or more. Among women, the total of 106,000 smoking-induced deaths represented 25 percent of deaths from the 10 causes combined and 11 percent of deaths from all deaths among persons aged 20 years or more.

The computations in Tables 10 and 12 have omitted other causes of death that are likely to be attributable to cigarette use. If the relative risks given in Tables 6 and 7 for

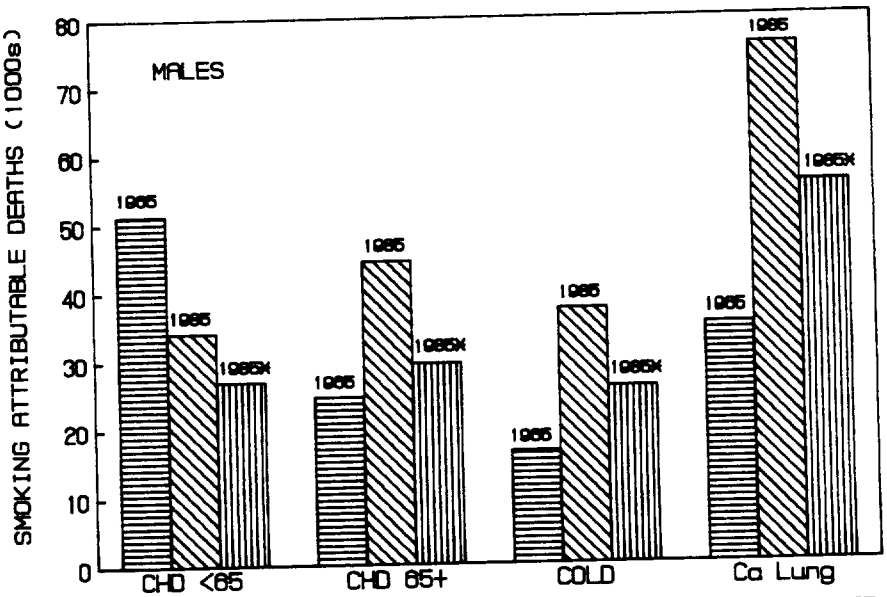

FIGURE 10.—Estimated cigarette-smoking-attributable deaths from CHD, COPD, and lung cancer, males aged 20 years or more, United States, 1965 and 1985

NOTE: For the bars marked 1985*, the estimated smoking-attributable deaths in 1985 have been corrected for population increases during 1965–85.

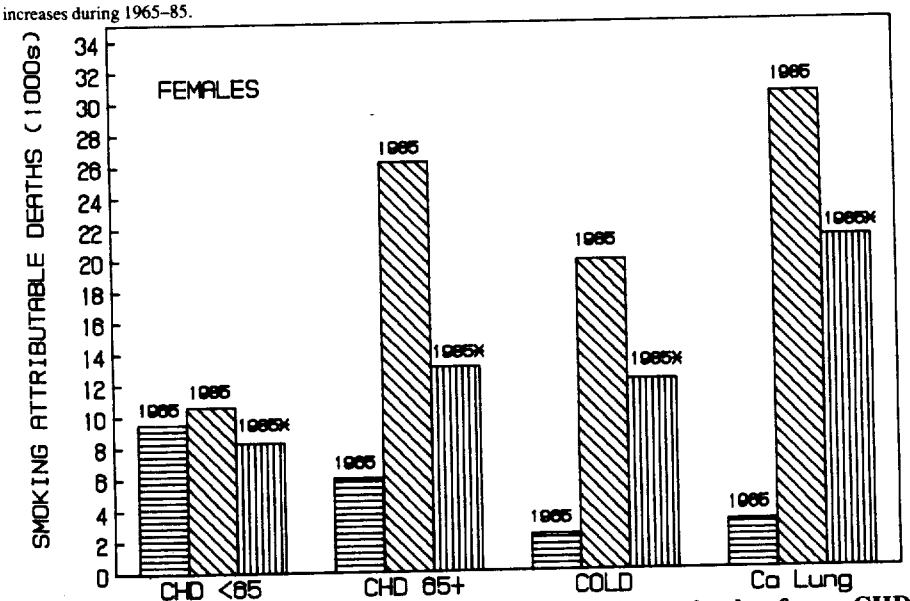

FIGURE 11.—Estimated cigarette-smoking-attributable deaths from CHD, COPD, and lung cancer, females aged 20 years or more, United States, 1965 and 1985

NOTE: For the bars marked 1985*, the estimated smoking-attributable deaths in 1985 have been corrected for population increases during 1965–85.

the broader categories of cardiovascular and nonneoplastic respiratory disease are applied to deaths from hypertensive heart disease, arteriosclerosis, aortic aneurysm, and influenza and pneumonia, then smoking-attributable deaths would increase to 256,000 among men and 126,000 among women. Inclusion of deaths among newborns and infants due to smoking during pregnancy would add an additional 2,500 to the total (CDC 1987b; McIntosh 1984; Kleinman et al. 1988); this does not include fetal loss due to smoking (Stein et al. 1981). Inclusion of lung cancer deaths among nonsmokers due to environmental tobacco smoke (NRC 1986) would add 3,800 and inclusion of deaths from cigarette-caused fires (Hall 1987) would add 1,700 to total attributable deaths. Inclusion of deaths due to cervical cancer caused by smoking would add 1,500. Including these additional causes of death, the smoking-attributable mortality in 1985 is then estimated to be approximately 390,000. Recent studies have also noted increased risks among smokers for hepatic cancer (Trichopoulos et al. 1987), penile cancer (Hellberg et al. 1987), leukemia (Kinlen and Rogot 1988), and anal cancer (Daling et al. 1987).

Among all persons at risk during 1985, an estimated 52 million were also cigarette smokers in 1965. The remaining 42 million were new cigarette smokers. In 1985, only about 4,400 deaths occurred among the latter group, which consists of persons in their teens, twenties, and thirties. Thus, 99 percent of deaths attributable to cigarette use in 1985 occurred among people who started smoking in 1965 or earlier. The vast majority of these people started smoking before the release of the 1964 Surgeon General's Report

TABLE 13.—Estimated risks of various activities

Activity or cause	Annual fatalities per 1 million exposed persons
Active smoking	7,000[a]
Alcohol	541
Accident	275
Disease	266
Motor vehicles	187
Alcohol-involved	95
Non-alcohol-involved	92
Work	113
Swimming	22
Passive smoking[b]	19
All other air pollutants[b]	6
Football	6
Electrocution	2
Lightning	0.5
DES in cattlefeed	0.3
Bee sting	0.2
Basketball	0.02

NOTE: Activities are not mutually exclusive; there are overlaps between categories. Differences in fatalities do not imply proportionate differences in years of life lost.

[a]Number of deaths per million smokers who began smoking before 1965.

[b]Cancer deaths only.

SOURCE: Active smoking, CPS-II; NHISs 1965, 1985; U.S. Bureau of the Census (1974, 1986). Other activities or causes, U.S. President (1987).

and before the 1965 Federal Cigarette Labeling and Advertising Act. For this group, the annual smoking-attributable fatality rate is about 7 deaths per 1,000 at risk, or about 7,000 deaths per 1 million persons. As shown in the Economic Report of the President (U.S. President 1987), this rate far exceeds the rates for other risks of death (Table 13).

Conclusions

1. Lung cancer death rates increased two- to fourfold among older male smokers over the two decades between the American Cancer Society's two Cancer Prevention Studies (CPS-I, 1959–65, and CPS-II, 1982–86). Lung cancer death rates for younger male smokers fell about 30 to 40 percent during this period.
2. Lung cancer death rates increased four- to sevenfold among female smokers aged 45 years or older in CPS-II compared with CPS-I, while lung cancer death rates among younger women declined 35 to 55 percent.
3. The two-decade interval witnessed a two- to threefold increase in death rates from chronic obstructive pulmonary disease (COPD) in female smokers aged 55 years or older.
4. There was no change in the age-adjusted death rates for lung cancer and COPD between CPS-I and CPS-II among men and women who never smoked regularly.
5. Overall death rates from coronary heart disease (CHD) declined substantially between CPS-I and CPS-II. The decline in CHD mortality among nonsmokers, however, was notably greater than among current cigarette smokers.
6. In CPS-II, the relative risks of death from cerebrovascular lesions were 3.7 and 4.8 for men and women smokers under age 65. Increased risks of stroke were also observed among older smokers and former smokers. Along with the recently reported results of other studies, these findings strongly support a causal role for cigarette smoking in thromboembolic and hemorrhagic stroke.
7. In 1985, smoking accounted for 87 percent of lung cancer deaths, 82 percent of COPD deaths, 21 percent of CHD deaths, and 18 percent of stroke deaths. Among men and women less than 65 years of age, smoking accounted for more than 40 percent of CHD deaths.
8. The large increase in smoking-attributable mortality among American women between 1965 and 1985 was a direct consequence of their adoption of lifelong cigarette smoking, especially from their teenage years onward.
9. In 1985, 99 percent of smoking-attributable deaths occurred among people who started smoking before the 1964 Surgeon General's Report. For this group, the annual smoking-attributable fatality rate is about 7,000 deaths per 1 million persons at risk.
10. For 10 causes of death, a total of 337,000 deaths were attributable to smoking in 1985. These represented 22 percent of all deaths among men and 11 percent among women. If other cardiovascular, neoplastic, and respiratory causes of death were included—as well as deaths among newborns and infants resulting from maternal smoking, deaths from cigarette-caused residential fires, and lung cancer deaths among nonsmokers due to environmental tobacco smoke—the total smoking-attributable mortality was about 390,000 in 1985.

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CHAPTER 4

TRENDS IN PUBLIC BELIEFS, ATTITUDES, AND OPINIONS ABOUT SMOKING

CONTENTS

Introduction

This Chapter analyzes trends in public beliefs, attitudes, and opinions about smoking. It is divided into three sections. The first describes trends in public beliefs regarding the health effects of smoking, the second describes trends in public attitudes about smokers and smoking, and the third describes trends in public opinion about smoking policies.

At the outset, it is important to define and clarify the important terms used in this Chapter. Terms such as knowledge, awareness, opinions, beliefs, and attitudes have commonsense meanings to the lay person, but more complex meanings to the social scientist. For example, Allport (1935) reviewed many definitions of attitude and constructed his own comprehensive definition: "An attitude is a mental or neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related." Entire books have been devoted to the science of defining and measuring public attitudes, opinions, and beliefs (e.g., Oskamp 1977).

For sections two and three of this Chapter, which deal with attitudes and opinions, the commonplace understanding of these terms will suffice. For the first section, however, which covers beliefs about health effects, a more careful approach is warranted. This Section generally follows the construct described by Fishbein (1977), which embraces three levels of belief:

1. Level 1 (awareness): A person may believe that "the Surgeon General has determined that cigarette smoking is dangerous to health."
2. Level 2 (general acceptance): A person may believe that "cigarette smoking is dangerous to health."
3. Level 3 (personalized acceptance): A person may believe that "my cigarette smoking is dangerous to *my* health."

Most of the survey data presented in the first section address Level 2 beliefs. At times, the term public knowledge is used to refer to public beliefs (Level 2 beliefs at the population level). There are few data regarding Level 1 beliefs; consequently, use of the terms awareness and public awareness is generally avoided. Data pertinent to Level 3 beliefs are available from a few surveys in three forms: (1) questions asking whether smoking "is harmful to *your* health"; (2) questions asking whether respondents are "concerned" about the effects of smoking on *their* health; and (3) questions asking whether respondents believe that they are less likely, as likely, or more likely than other people to be adversely affected by smoking. These levels of beliefs are discussed in more depth later in this Chapter.

Data Sources

The information presented in this Chapter is derived from three principal sources:

1. Nationally representative surveys conducted by the U.S. Public Health Service from 1964–87, including the Adult Use of Tobacco Surveys (AUTSs) (1964, 1966, 1970, 1975, 1986) and the National Health Interview Surveys (NHISs) (1985, 1987). The NHIS questions were part of the Health Promotion and Dis-