

# Smoking and Mortality: The Kaiser Permanente Experience

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**INTRODUCTION** The Kaiser Permanente Medical Care Program cohort study described here obtained detailed baseline information about smoking habits from more than 60,000 subjects, age 35 and older, who entered the cohort between 1979 and 1986 and were followed up for mortality through 1987. This study population is ethnically and socioeconomically diverse, permitting interracial comparisons of the effects of cigarette smoking.

**STUDY POPULATION AND METHODS** In 1979 the Division of Research (then called the Department of Medical Methods Research), Kaiser Permanente Medical Care Program, Northern California Region, began a prospective cohort study aimed at assessing the risks associated with various aspects of tobacco smoking. The program provides comprehensive prepaid medical care to its subscribers, who number about 30 percent of the population in the areas served. The subscribers, most of whom join through employment groups, are ethnically, racially, and socioeconomically heterogeneous and are reflective of the local population except for being somewhat more educated, on average, and underrepresentative of the extremes of wealth and poverty (Hiatt and Friedman, 1982; Krieger, 1992). The program offered multiphasic health checkups (Collen and Davis, 1969) at its Oakland and San Francisco Medical Centers as a routine health appraisal, and starting in July 1979, persons receiving these checkups were asked to complete a detailed questionnaire about their smoking habits for a followup study. Altogether, 83 percent complied on at least one checkup. The multiphasic checkup program was discontinued in San Francisco in mid-1980 but is still operated in a modified form in Oakland. Administration of these smoking questionnaires continued in Oakland until late October 1986. About 2,000 persons who received another form of preventive health examination in San Francisco in 1981 also completed these questionnaires and are included in the total cohort of more than 100,000 persons.

The questions used to classify persons into the various smoking and racial categories are listed in Appendix A. Persons who did not specify a race were included in the "Other" category. Never-smokers were persons who responded that they had never used any tobacco product, without contradiction in their response to the questions about ever smoking cigarettes regularly for at least 1 year and still smoking cigarettes. If they did not affirm never using any tobacco product, never-smokers had to deny ever smoking cigarettes regularly for at least 1 year and either answer negatively or not at all to the question about their still smoking cigarettes. Former smokers were persons who responded "yes" to ever smoking cigarettes

regularly for at least 1 year and who reported having quit smoking cigarettes at least 2 years before completing the questionnaire. Current smokers were persons who responded "yes" to the question about ever smoking cigarettes regularly for at least 1 year and "yes" or "occasionally" to the question about still smoking cigarettes regularly. Only those reporting never using cigars or pipes regularly were included in any of these categories.

Followup for mortality used the California Automated Mortality Linkage System (CAMLIS) (Arellano et al., 1984) program for linkage with deaths within the State of California. If linkages were questionable, additional information was obtained from program membership data and medical records to rule in or out the match. In a test subset consisting of 4,696 members of this study cohort, this method was found to produce more false negatives (11 percent vs. 6 percent of known dead classified as alive) and fewer false positives (0.07 percent vs. 1.2 percent of known alive classified as dead) when compared with utilization of the National Death Index (Stampfer et al., 1984) in ascertainment of mortality (Arellano et al., 1984). In a previous study, similar mortality followup resulted in death ascertainment that was estimated to be 82 to 92 percent complete (Freidman et al., 1979). Causes of death and their coding by State vital statistics personnel were accepted as recorded. Another test revealed 97 percent agreement between these codes and the judgment of a physician in our department (Sidney et al., 1987). During the followup period, all deaths were coded by the *International Classification of Diseases: 9th Revision. Clinical Modification (ICD-9-CM)* (U.S. Department of Health and Human Services, 1991).

Followup of each subject started with his or her first health checkup, in which the tobacco questionnaire was completed, and ended at death or December 31, 1987.

**Cigarette Smoking and Mortality** Person-years of followup were allocated to age categories using attained age for each subject. Deaths were summarized for age categories by age at death, and age-specific rates were reported as deaths per 1,000 person-years. Age-specific relative risks for former and current smokers compared with nonsmokers were simple rate ratios. Relative risks adjusted for age were obtained using the Mantel-Haenszel (MH) method as applied to cohort studies (Breslow and Day, 1988). Tests of homogeneity over age also were performed.

The data from smaller subgroups were initially examined and frequently found to contain small numbers of events. It was decided to combine subgroups for age, number of cigarettes smoked per day, number of years of smoking, and number of years of cessation into the larger categories. These were as follows: number of cigarettes smoked per day (<20, ≥20), years of smoking (<20, 20-39, ≥40), years of cessation (2-10, 11-20, >20), and age (35-49, 50-64, 65-74, ≥75 years). Years of smoking in current smokers, years of cessation in former smokers, and age were incremented throughout followup under the assumption that smoking habits remained as initially reported.

Mortality rates and relative risk estimates (rate ratios) were calculated for all-cause, lung cancer, coronary heart disease (CHD), stroke, and chronic obstructive pulmonary disease (COPD) mortality. In addition to these 5 categories, analyses were performed for major cause-of-death groupings and causes of death with at least 10 deaths among current smokers and nonsmokers in both sexes combined. Smokers vs. nonsmokers in Asians, blacks, and whites were compared for the five cause-of-death categories listed above.

Relative risks are described as statistically significant if the 95-percent confidence interval, before rounding, did not include 1.0. The results of most of our analyses are presented in a descriptive fashion, and statements concerning differences among subgroups or trends do not necessarily imply that these were statistically significant.

## RESULTS

**Study Population** The 60,838 study subjects, age 35 and older, had a mean age at entry to the study of 50.9 years and comprised 36,035 (59 percent) women and 24,803 (41 percent) men. More than half, 58 percent, of the subjects were white, 25 percent were black, 11 percent were Asian, and 6 percent were of other or unknown race. Overall, there were 16,279 (27 percent) current smokers, 11,935 (20 percent) former smokers, and 32,624 (54 percent) never-smokers (percentages are rounded). The percentage of current smokers among blacks was 36 percent, among whites was 25 percent, among Asians was 15 percent, and among those of other or unknown race was 25 percent. The distributions of study subjects and person-years of followup by sex, race, and smoking status are shown in Table 1. The mean length of followup was 6.1 years for all subjects.

### **Current Smoker/ Never-Smoker Mortality Risks by Sex and Race for All and Selected Causes of Death**

All Causes

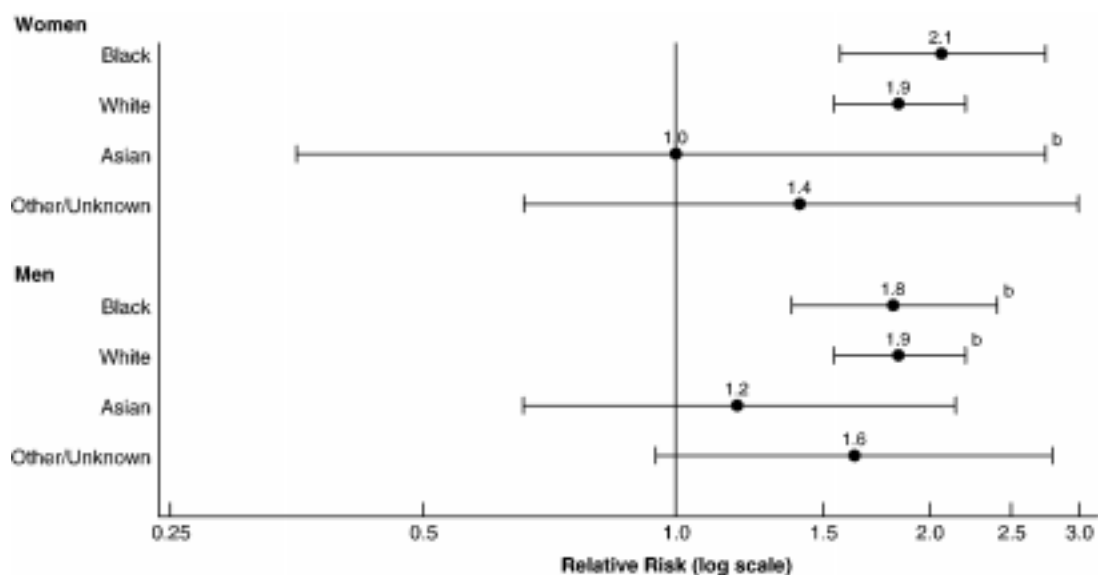
There was approximately a doubling in all-cause mortality rates in current smokers as compared with never-smokers in both black and white women. In women who were Asian or of other or unknown race, relative risks were lower, but confidence intervals were wide because of few deaths and were compatible with a twofold increase (Figure 1).

In black and white men the overall current smoker/never-smoker relative risk for all-cause mortality was slightly less than two. However, these combined relative risks do not reflect the significant heterogeneity among the age subgroups (Table 2). In blacks this heterogeneity was expressed as a progressive downward trend in elevated risk starting with the youngest men, ages 35 to 49 years. In whites smokers in the 50- to 64-year-old age range had the highest relative risk. The overall current smoker/never-smoker relative risk was lower in Asian men and men of other or unknown race, but confidence intervals were wide. There were too few men in these racial groups for the apparent substantial variation among age subgroups to be statistically significant.

Table 1  
Study subjects and person-years of followup by sex, race, and cigarette smoking status

Subjects	Cigarette Smoking Status							
	Never		Former		Current		Total	
	N	Person-Years	N	Person-Years	N	Person-Years	N	Person-Years
Women—Total	21,080	131,955	5,871	35,261	9,084	55,166	36,035	222,382
Black	5,213	32,316	1,092	6,624	3,123	18,678	9,428	57,618
White	11,111	69,590	4,321	25,782	5,133	31,315	20,565	126,687
Asian	3,355	21,004	223	1,395	355	2,209	3,933	24,608
Other/unknown	1,401	9,045	235	1,460	473	2,964	2,109	13,469
Men—Total	11,544	69,887	6,064	36,927	7,195	43,718	24,803	150,532
Black	2,159	12,953	1,228	7,589	2,315	13,948	5,702	34,490
White	6,931	41,739	4,024	24,392	3,804	23,084	14,759	89,215
Asian	1,714	10,586	501	3,017	650	4,063	2,865	17,666
Other/unknown	740	4,609	311	1,929	426	2,623	1,477	9,161
Total	32,624	201,842	11,935	72,188	16,279	98,884	60,838	372,914

Figure 1  
Age-adjusted relative risks (with 95-percent confidence intervals)<sup>a</sup> of death due to all causes in current smokers as compared with never-smokers



<sup>a</sup>By Mantel-Haenszel method.

<sup>b</sup>Chi-squared test for heterogeneity showed significant ( $p < 0.05$ ) variation in relative risks by age.

Table 2  
**Age-specific relative risks of death due to all causes by sex and race in current smokers as compared with never-smokers—  
 mortality rates per 1,000 person-years**

Race-Sex	Cigarette Smoking Status	Ages 35-49 Years			Ages 50-64 Years			Ages 65-74 Years			Ages 75+ Years		
		No. of Deaths	Mort. Rate	Rel. Risk	No. of Deaths	Mort. Rate	Rel. Risk	No. of Deaths	Mort. Rate	Rel. Risk	No. of Deaths	Mort. Rate	Rel. Risk
Black Women	Never	17	1.3	—	34	2.7	—	44	8.5	—	32	19.6	—
	Current	18	1.8	1.4	42	6.0	2.2	33	23.6	2.8	5	28.3	1.4
White Women	Never	12	0.6	—	56	2.3	—	107	6.9	—	245	25.0	—
	Current	16	1.3	2.2	63	5.1	2.2	77	14.3	2.1	41	34.0	1.4
Asian Women	Never	6	0.7	—	20	2.1	—	14	6.6	—	4	13.5	—
	Current	1	1.0	1.5	2	2.0	1.0	0	0.0	0.0	1	85.7	13.7
Other Women	Never	2	0.5	—	8	2.3	—	6	4.7	—	18	33.4	—
	Current	2	1.3	2.4	2	1.9	0.9	5	16.0	3.4	0	0.0	0.0
Black Men	Never	4	0.7	—	21	4.8	—	37	19.2	—	33	48.0	—
	Current	25	3.6	5.3	57	10.5	2.2	34	25.4	1.3	12	59.2	1.2
White Men	Never	37	2.2	—	54	3.9	—	97	12.5	—	144	44.1	—
	Current	36	3.3	1.5	95	11.0	2.8	72	24.5	2.0	41	56.1	1.3
Asian Men	Never	2	0.4	—	12	2.8	—	20	15.7	—	18	49.0	—
	Current	1	0.5	1.1	8	5.0	1.8	4	13.5	0.9	2	42.0	0.9
Other Men	Never	6	2.6	—	10	6.3	—	7	13.3	—	8	48.2	—
	Current	4	2.9	1.1	9	9.1	1.5	6	31.0	2.3	5	89.5	1.9

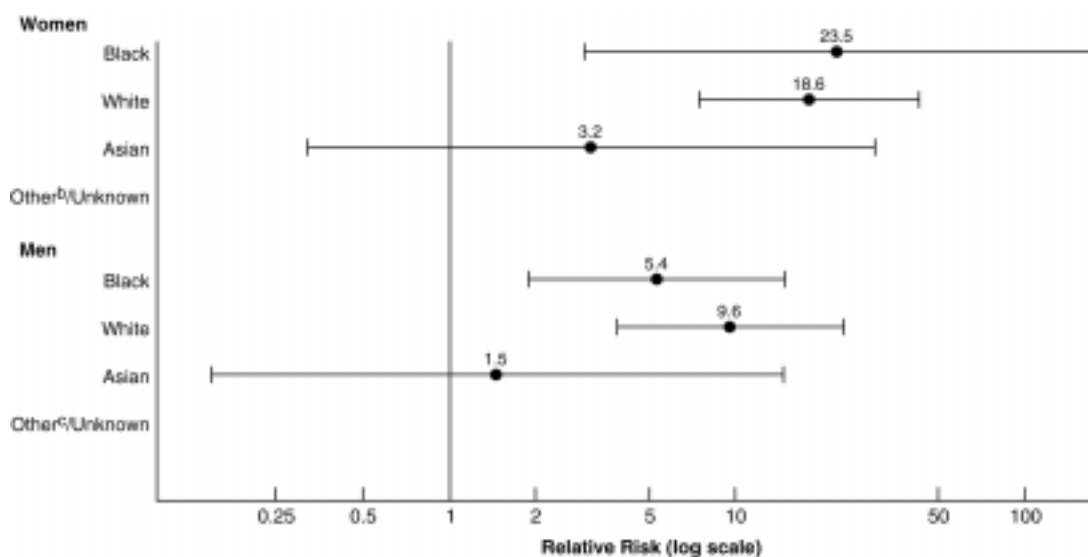
**Lung Cancer** Current smoker/never-smoker age-adjusted relative risks of dying of lung cancer were high in black women and white women and were only moderately high in Asian women, but confidence limits were wide in all three racial groups due to small numbers of deaths. There were no lung cancer deaths among women of other or unknown race. Among men these age-adjusted relative risks were highest in whites, next highest in blacks, and lowest in Asians and were indeterminate in those of other or unknown race. The confidence intervals in Asian women and men were compatible with either large or absent risk elevation in the current smokers (Figure 2).

**Chronic Obstructive Pulmonary Disease** Current smoker/never-smoker age-adjusted relative risks of dying of COPD were high in both black and white women and were indeterminate in the other two female racial groups. They were high in white men, fairly high in Asian men, and indeterminate in black men and those men of other or unknown race. Statistically significant elevation above a relative risk of 1.0 was seen in white women and men (Figure 3).

**Coronary Heart Disease** The risk of dying from CHD was elevated in current-smoking as compared with never-smoking women of all racial groups. Relative risk was highest and about equal in black and Asian women and was next highest in white women but was only slightly increased in women of other or unknown race. White men showed an elevated current smoker/never-smoker relative risk similar to that in black and Asian women, but they also

Figure 2

**Age-adjusted relative risks (with 95-percent confidence intervals)<sup>a</sup> of death due to lung cancer in current smokers as compared with never-smokers**

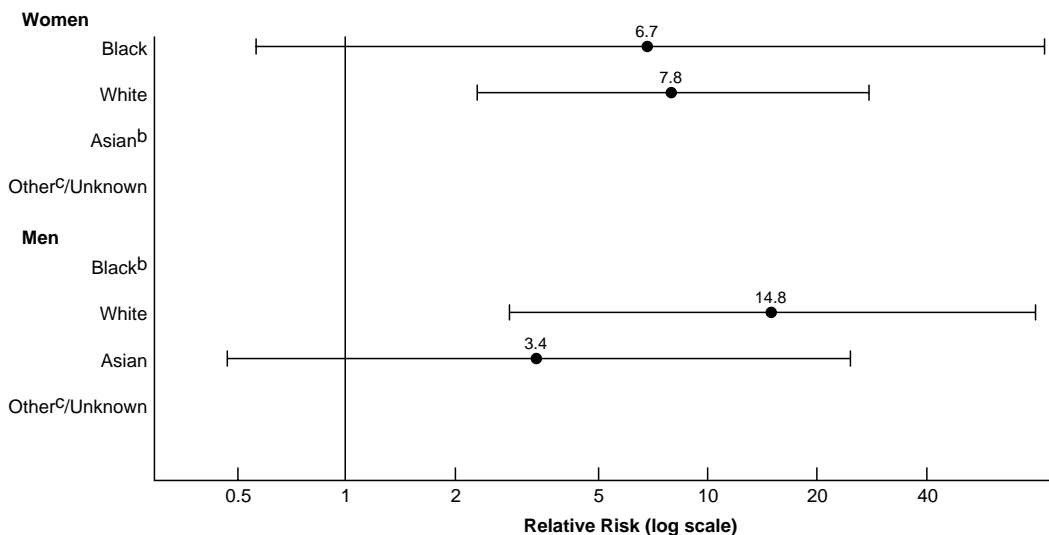


<sup>a</sup> By Mantel-Haenszel method.

<sup>b</sup> Indeterminate relative risk due to absence of deaths among both never-smokers and current smokers.

<sup>c</sup> Indeterminate relative risk due to absence of deaths among never-smokers.

Figure 3  
**Age-adjusted relative risks (with 95-percent confidence intervals)<sup>a</sup> of death due to COPD in current smokers as compared with never-smokers**



<sup>a</sup> By Mantel-Haenszel method.

<sup>b</sup> Indeterminate relative risk due to absence of deaths among never-smokers.

<sup>c</sup> Indeterminate relative risk due to absence of deaths among both never-smokers and current smokers.

McChesney et al. Figure 3

showed significant heterogeneity of relative risk among the age subgroups. Relative risk elevation was fairly small in Asian men, virtually absent in black men, and reversed, with nonsmokers higher, in men of other or unknown race. Risk elevations were statistically significant in black and white women and white men (Figure 4).

**Stroke**

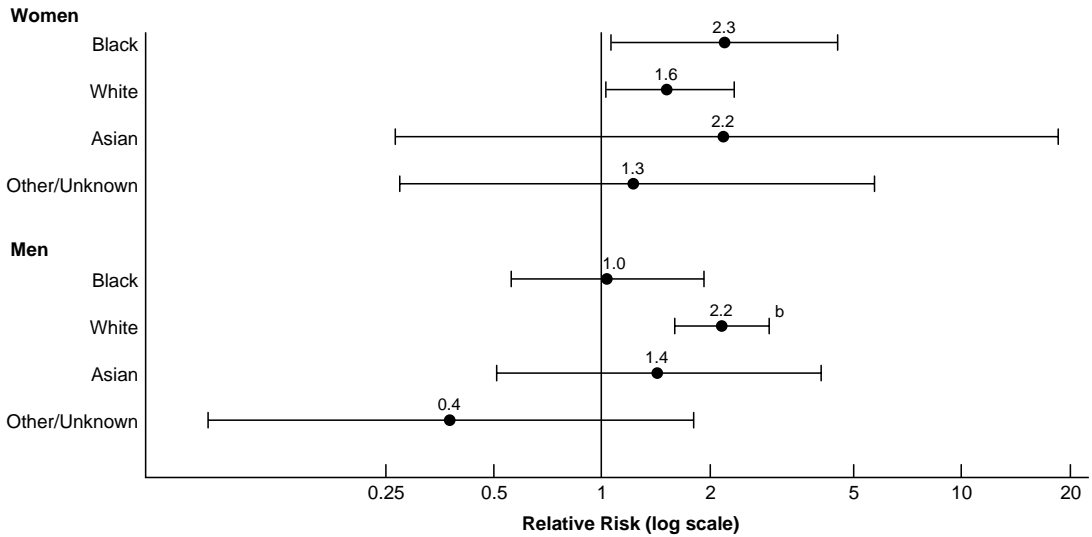
Age-adjusted current smoker/never-smoker relative risks for stroke death were moderately elevated in black women and mildly elevated in women of other or unknown race (neither statistically significant), were not elevated in white women, and were indeterminate in Asian women. Among men relative risk was not elevated in blacks or whites and was indeterminate in Asians and those of other or unknown race (Figure 5).

**Age-Specific Relative Risks for Mortality**

**Quantity Smoked**

Women in each age group showed an increase in risk of dying from any cause according to the number of cigarettes smoked (Table 3). This trend was most marked in the two intermediate age groups, 50 to 64 years and 65 to 74 years, and was least marked among those 75 years or older. Lung cancer showed striking increases in relative risk among female smokers, with greater than twentyfold elevations over the nonsmoker mortality rate noted for female smokers of 20 or more cigarettes per day in those ages 35 to 49 years, 65 to 74 years, and 75 years and older and for female smokers of fewer than 20 cigarettes per day in the 65- to 74-year age group. There were

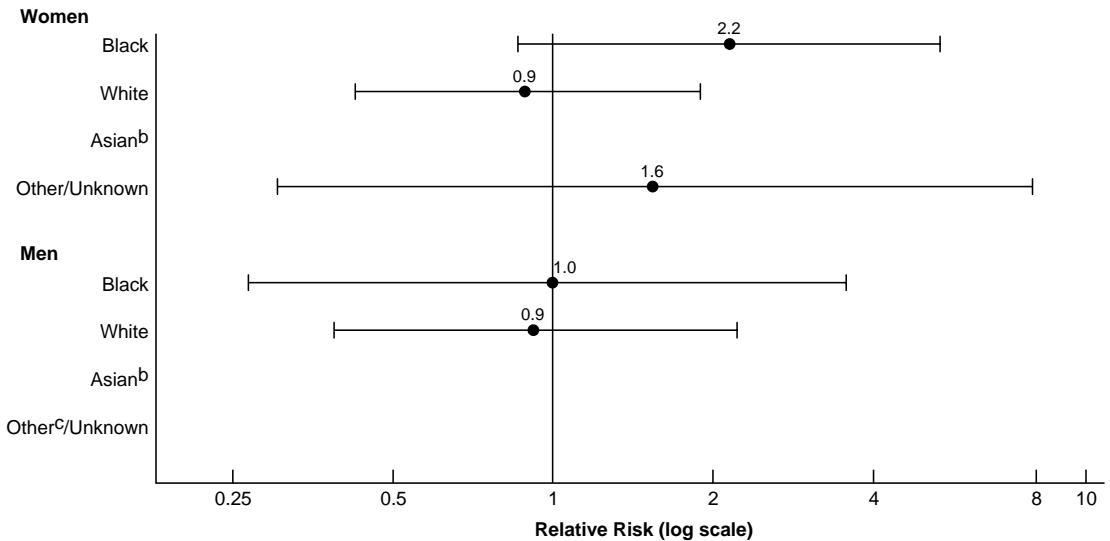
Figure 4  
**Age-adjusted relative risks (with 95-percent confidence intervals)<sup>a</sup> of death due to CHD in current smokers as compared with never-smokers**



<sup>a</sup> By Mantel-Haenszel method.

<sup>b</sup> Chi-squared test for heterogeneity showed significant ( $p < 0.05$ ) variation in relative risks by age.

Figure 5  
**Age-adjusted relative risks (with 95-percent confidence intervals)<sup>a</sup> of death due to stroke in current smokers as compared with never-smokers**



<sup>a</sup> By Mantel-Haenszel method.

<sup>b</sup> Indeterminate relative risk due to absence of deaths among current smokers.

<sup>c</sup> Indeterminate relative risk due to absence of deaths among both never-smokers and current smokers.



Table 3

**Age-specific relative risks of death due to all causes, lung cancer, COPD, CHD, and stroke in never-smokers and current smokers by quantity of cigarettes smoked—women**

Age (Years)	Cigarette Smoking Status	Quantity (Cigarettes Per Day)	Person-Years	Number of Deaths					Relative Risk <sup>a</sup>				
				All Causes	Lung Cancer	COPD	CHD	Stroke	All Causes	Lung Cancer	COPD	CHD	Stroke
35-49	Never	–	45,768	37	1	0	2	1	1.0	1.0	1.0	1.0	1.0
	Current	≤19	12,086	12	1	0	0	1	1.2	3.8	<sup>b</sup>	0.0	3.8
	Current	20+	12,851	25	7	0	3	3	2.4	24.9	–	5.3	10.7
50-64	Never	–	49,744	118	5	0	17	10	1.0	1.0	1.0	1.0	1.0
	Current	≤19	10,205	40	5	1	5	2	1.7	4.9	–	1.4	1.0
	Current	20+	10,950	69	16	1	12	5	2.7	14.5	–	3.2	2.3
65-74	Never	–	24,159	171	2	2	33	16	1.0	1.0	1.0	1.0	1.0
	Current	≤19	3,582	45	8	0	8	3	1.8	27.0	0.0	1.6	1.3
	Current	20+	3,583	70	11	5	11	4	2.8	37.1	16.9	2.2	1.7
75+	Never	–	12,285	299	3	4	82	38	1.0	1.0	1.0	1.0	1.0
	Current	≤19	806	23	1	2	7	1	1.2	5.1	7.6	1.3	0.4
	Current	20+	588	24	5	1	4	1	1.7	34.8	5.2	1.0	0.5
All ages <sup>a</sup>	Never	–	131,956	625	11	6	134	65	1.0	1.0	1.0	1.0	1.0
	Current	≤19	26,680	120	15	3	20	7	1.5	8.5	5.4	1.4	0.9
	Current	20+	27,973	188	39	7	30	13	2.5	21.7	13.9	2.2	1.9

<sup>a</sup> Relative risk for all ages is age-adjusted by the MH method using the four age strata shown.

<sup>b</sup> Indicates indeterminate relative risk due to absence of deaths among never-smokers.

Key: COPD = chronic obstructive pulmonary disease; CHD = coronary heart disease; MH = Mantel-Haenszel.

few deaths from COPD among women, yielding unstable rates and relative risks. Female smokers age 75 years or older and those ages 65 to 74 years who smoked 20 or more cigarettes all showed markedly elevated risks. CHD death was increased in a graded fashion in women ages 50 to 64 and 65 to 74 years, but there was virtually no increase in smokers age 75 and older. The few CHD deaths in women ages 35 to 49 years showed an uneven trend, with smokers of 20 or more cigarettes per day showing the highest risk and smokers of fewer than 20 cigarettes per day having the lowest risk. Smoking-associated relative risks of stroke tended to decrease with age; the risks were highest in women smokers ages 35 to 49 years and were lower in current smokers compared with never-smokers in women age 75 or older.

Among men there was a clear moderate dose-response trend in all-cause mortality according to quantity smoked in the 35- to 49- and 50- to 64-year age group (Table 4). Findings became less clear-cut in the older groups, with both smoking-quantity groups having about equal risk elevations in men ages 65 to 74 years and a mildly elevated risk found only in the 20-or-more cigarettes per day smokers among men age 75 and older. For lung cancer, zero cases in never-smokers made relative risk not determinable in the 35- to 49-year-olds, but large elevations in risk with a dose-response trend were noted in all the other age groups. Interestingly, these risk elevations were less marked than in women (differences not statistically significant). Large increases in risk also were noted in most of the male smoking groups for COPD, but small numbers of deaths limit the interpretability of the finding. CHD deaths were relatively elevated in all the male smoking groups except those age 75 or older who smoked fewer than 20 cigarettes per day. Dose-response was not apparent in 35- to 49-year-old men. Stroke mortality risk was elevated in all the fewer-than-20 cigarettes per day smokers except those ages 35 to 49 years. Smokers of at least 20 cigarettes per day showed no risk elevation except for men ages 35 to 49 years, but numbers of deaths were small.

**Duration of Smoking** Although there were some irregularities and inconsistencies, age-specific relative risks for all-cause mortality generally increased with duration of smoking in women (Table 5). This was even more apparent for lung cancer, where there were no deaths among those who smoked less than 20 years. Death due to COPD occurred in a few never-smoking women, but among smokers, it occurred only in those who had smoked at least 40 years. CHD showed positive trends in risk, with increasing duration in the two younger groups of women but with negative trends in the two older groups. Somewhat similar age-related diversity in risk trends by duration of smoking was seen for stroke.

Among men all-cause mortality was associated with increasing duration of smoking in 35- to 49- and 50- to 64-year-olds (Table 6). Excluding the relatively few less-than-20-year smokers in the older groups, with respect to all-cause mortality risk, duration was not associated in those ages 65 to 74 years and was inversely associated in those age 75 or older. Lacking relative risk estimates for lung cancer in 35- to 49-year-old men because

Table 4  
**Age-specific relative risks of death due to all causes, lung cancer, COPD, CHD, and stroke in never-smokers and current smokers by quantity of cigarettes smoked—men**

Age (Years)	Cigarette Smoking Status	Quantity (Cigarettes Per Day)	Person-Years	Number of Deaths					Relative Risk <sup>a</sup>				
				All Causes	Lung Cancer	COPD	CHD	Stroke	All Causes	Lung Cancer	COPD	CHD	Stroke
35-49	Never	–	29,916	49	0	0	5	3	1.0	1.0	1.0	1.0	1.0
	Current	≤19	7,895	17	0	0	3	0	1.3	<sup>b</sup>	–	2.3	0.0
	Current	20+	13,304	49	6	2	4	2	2.2	–	–	1.8	1.5
50-64	Never	–	24,020	97	5	1	29	3	1.0	1.0	1.0	1.0	1.0
	Current	≤19	5,575	49	6	3	14	2	2.2	5.2	12.9	2.1	2.9
	Current	20+	10,838	116	18	3	39	1	2.7	8.0	6.6	3.0	0.7
65-74	Never	–	11,466	161	5	2	52	10	1.0	1.0	1.0	1.0	1.0
	Current	≤19	1,740	44	3	3	11	2	1.8	4.0	9.9	1.4	1.3
	Current	20+	2,995	71	13	6	23	0	1.7	10.0	11.5	1.7	0.0
75+	Never	–	4,486	203	4	1	66	19	1.0	1.0	1.0	1.0	1.0
	Current	≤19	490	22	2	0	4	3	1.0	4.6	0.0	0.6	1.4
	Current	20+	545	37	5	1	9	1	1.5	10.3	8.2	1.1	0.4
All ages <sup>a</sup>	Never	–	69,887	510	14	4	152	35	1.0	1.0	1.0	1.0	1.0
	Current	≤19	15,700	132	11	6	32	7	1.6	4.7	9.2	1.4	1.4
	Current	20+	27,682	273	42	12	75	4	2.0	10.4	10.9	2.0	0.5

<sup>a</sup> Relative risk for all ages is age-adjusted by the MH method using the four age strata shown.

<sup>b</sup> Indicates indeterminate relative risk due to absence of deaths among never-smokers.

Key: COPD = chronic obstructive pulmonary disease; CHD = coronary heart disease; MH = Mantel-Haenszel.

Table 5  
**Age-specific relative risks of death due to all causes, lung cancer, COPD, CHD, and stroke in never-smokers and current smokers by duration of smoking—women**

Age (Years)	Cigarette Smoking Status	Duration (Years Smoked)	Person-Years	Number of Deaths					Relative Risk <sup>a</sup>				
				All Causes	Lung Cancer	COPD	CHD	Stroke	All Causes	Lung Cancer	COPD	CHD	Stroke
35-49	Never	—	45,768	37	1	0	2	1	1.0	1.0	1.0	1.0	1.0
	Current	<20	8,962	8	0	0	1	0	1.1	0.0 <sup>b</sup>	—	2.6	0.0
	Current	20-39	15,162	28	8	0	2	4	2.3	24.1	—	3.0	12.1
50-64	Never	—	49,744	118	5	0	17	10	1.0	1.0	1.0	1.0	1.0
	Current	<20	2,454	5	0	0	1	0	0.9	0.0	—	1.2	0.0
	Current	20-39	14,115	56	11	0	7	4	1.7	7.8	—	1.5	1.4
	Current	40+	3,761	40	7	2	7	3	4.5	18.5	—	5.4	4.0
65-74	Never	—	24,159	171	2	2	33	16	1.0	1.0	1.0	1.0	1.0
	Current	<20	502	6	0	0	2	0	1.7	0.0	0.0	2.9	0.0
	Current	20-39	2,125	39	4	0	8	4	2.6	22.7	0.0	2.8	2.8
	Current	40+	4,236	64	14	5	7	3	2.1	39.9	14.3	1.2	1.1
75+	Never	—	12,285	299	3	4	82	38	1.0	1.0	1.0	1.0	1.0
	Current	<20	100	3	0	0	1	0	1.2	0.0	0.0	1.5	0.0
	Current	20-39	366	10	1	0	3	2	1.1	11.2	0.0	1.2	1.8
	Current	40+	830	30	5	3	5	0	1.5	24.7	11.1	0.9	0.0
All ages <sup>a</sup>	Never	—	131,956	625	11	6	134	65	1.0	1.0	1.0	1.0	1.0
	Current	<20	12,018	22	0	0	5	0	1.2	0.0	0.0	1.9	0.0
	Current	20-39	31,768	133	24	0	20	14	1.9	12.0	0.0	1.9	2.4
	Current	40+	8,827	134	26	10	19	6	2.3	27.5	16.2	1.5	1.0

<sup>a</sup> Relative risk for all ages is age-adjusted by the MH method using the four age strata shown.

<sup>b</sup> Indicates indeterminate relative risk due to absence of deaths among never-smokers.

Key: COPD = chronic obstructive pulmonary disease; CHD = coronary heart disease; MH = Mantel-Haenszel.

Table 6  
**Age-specific relative risks of death due to all causes, lung cancer, COPD, CHD, and stroke in never-smokers and current smokers by duration of smoking—men**

Age (Years)	Cigarette Smoking Status	Duration (Years Smoked)	Person-Years	Number of Deaths					Relative Risk <sup>a</sup>				
				All Causes	Lung Cancer	COPD	CHD	Stroke	All Causes	Lung Cancer	COPD	CHD	Stroke
35-49 <sup>b</sup>	Never	–	29,916	49	0	0	5	3	1.0	1.0	1.0	1.0	1.0
	Current	<20	5,940	16	1	0	1	1	1.6	<sup>c</sup>	–	1.0	1.7
	Current	20-39	14,563	48	5	2	5	1	2.0	–	–	2.1	0.7
50-64	Never	–	24,020	97	5	1	29	3	1.0	1.0	1.0	1.0	1.0
	Current	<20	1,174	7	0	0	3	0	1.5	0.0	0.0	2.1	0.0
	Current	20-39	10,205	80	7	2	28	2	1.9	3.3	4.7	2.3	1.6
	Current	40+	4,367	74	17	4	21	1	4.2	18.7	22.0	4.0	1.8
65-74	Never	–	11,466	161	5	2	52	10	1.0	1.0	1.0	1.0	1.0
	Current	<20	212	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	Current	20-39	963	23	3	1	7	0	1.7	7.1	6.0	1.6	0.0
	Current	40+	3,285	80	12	7	22	1	1.7	8.4	12.2	1.5	0.3
75+	Never	–	4,486	203	4	1	66	19	1.0	1.0	1.0	1.0	1.0
	Current	<20	90	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	Current	20-39	138	12	1	0	4	0	1.9	8.1	0.0	2.0	0.0
	Current	40+	740	42	5	1	8	3	1.3	7.6	6.1	0.7	1.0
All ages <sup>a</sup>	Never	–	69,887	510	14	4	152	35	1.0	1.0	1.0	1.0	1.0
	Current	<20	7,416	23	1	0	4	1	1.0	2.1	0.0	0.8	0.7
	Current	20-39	25,868	163	16	5	44	3	1.9	6.0	7.6	2.0	0.6
	Current	40+	8,401	196	34	12	51	5	2.0	11.4	13.1	1.6	0.8

<sup>a</sup> Relative risk for all ages age-adjusted by the MH method using the four age strata shown.

<sup>b</sup> One man who reported smoking 40+ years was excluded.

<sup>c</sup> Indicates indeterminate relative risk due to absence of deaths among never-smokers.

Key: COPD = chronic obstructive pulmonary disease; CHD = coronary heart disease; MH = Mantel-Haenszel.

of an absence of cases in never-smokers, one may still conclude from inspection of the number of cases and person-years that duration of smoking was associated with risk in that group. There were no lung cancer deaths in the less-than-20-year smokers in the three older age groups, but judging from smokers of longer duration, duration was strongly related to risk in 50- to 64-year-olds but not in 65- to 74-year-olds or those 75 years or older. Although inconclusive due to small numbers of cases, men's risk of death from COPD was related to duration, being highest in those who had smoked for at least 40 years. Risk of dying from CHD was related to increasing duration of smoking in a positive fashion among the 35- to 49- and 50- to 64-year-olds and, ignoring the few smokers of less than 20 years duration, in a slightly negative and markedly negative fashion in those ages 65 to 74 years and 75+ years or older, respectively. Little can be said about the relation of stroke to duration of smoking in men because of the paucity of deaths.

**Duration of Quitting** Among the women in the 50- to 64- and 65- to 74-year age group, all-cause mortality showed an inverse relationship to duration of quitting, with those who had quit for more than 20 years among the 50- to 64-year-olds having a lower risk than never-smokers (Table 7). In persons at least 75 years of age, those who had quit for 11 to 20 years and those who had quit for more than 20 years had virtually the same all-cause mortality risks. In the youngest group, the 35- to 49-year-olds, all-cause mortality was highest in those who had quit smoking for more than 20 years, but this was based on only two deaths. Lung cancer deaths among women were also few in number, and the expected decline in risk with increasing duration of quitting smoking was observed in the 50- to 64- and 75+-year age groups. Deaths due to COPD and stroke among the female ex-smokers were too few for meaningful observation of trends. A clearly declining trend in risk of death from CHD with increasing duration of quitting was seen only in women ages 65 to 74 years.

All-cause deaths among men showed decreasing risks with increased duration of quitting only in the 50- to 64- and 75+-year age groups (Table 8). This was also true for lung cancer but only in men ages 50 to 64 years. In the 65- to 74-year-olds who had quit for at least 20 years and those 75 years or older who had quit for 11 to 19 years, the risk of dying from lung cancer was lower than that of never-smokers. Based on small numbers of deaths, risk of dying from COPD was inversely related to duration of quitting smoking in the 65- to 74- and 75+-age groups, with large relative risks seen in men who had quit for less than 20 years. Declining risks of death due to CHD were associated with increased duration of quitting in men ages 50 to 64 and 75+ years. Former smokers in the 65- to 74-year age group had relative risks that were the same or lower than that of nonsmokers. A progressively declining trend of stroke deaths with increasing duration of quitting was seen only in the 65- to 74-year age group of men. Numbers of stroke deaths were very small, thereby hampering inference.

Table 7

Age-specific relative risks of death due to all causes, lung cancer, COPD, CHD, and stroke in never-smokers and former smokers by duration of quitting—women

Age (Years)	Cigarette Smoking Status	Duration (Years Smoked)	Person-Years	Number of Deaths					Relative Risk <sup>a</sup>				
				All Causes	Lung Cancer	COPD	CHD	Stroke	All Causes	Lung Cancer	COPD	CHD	Stroke
35-49	Never	–	45,768	37	1	0	2	1	1.0	1.0	1.0	1.0	1.0
	Former	2-10	5,493	0	0	0	0	0	0.0	0.0	<sup>b</sup>	0.0	0.0
	Former	11-20	6,027	4	0	0	0	1	0.8	0.0	–	0.0	7.6
	Former	>20	1,279	2	0	0	0	0	1.9	0.0	–	0.0	0.0
	Never	–	49,744	118	5	0	17	10	1.0	1.0	1.0	1.0	1.0
	Former	2-10	3,750	15	3	1	0	0	1.7	8.0	–	0.0	0.0
	Former	11-20	5,467	16	1	0	2	2	1.2	1.8	–	1.1	1.8
	Former	>20	4,405	7	0	0	0	1	0.7	0.0	–	0.0	1.1
65-74	Never	–	24,159	171	2	2	33	16	1.0	1.0	1.0	1.0	1.0
	Former	2-10	1,572	15	2	0	4	0	1.3	15.4	0.0	1.9	0.0
	Former	11-20	2,505	21	2	1	5	1	1.2	9.6	4.8	1.5	0.6
	Former	>20	2,641	20	3	1	2	2	1.1	13.7	4.6	0.6	1.1
75+	Never	–	12,285	299	3	4	82	38	1.0	1.0	1.0	1.0	1.0
	Former	2-10	394	15	1	0	5	1	1.6	10.4	0.0	1.9	0.8
	Former	11-20	722	23	1	0	7	2	1.3	5.7	0.0	1.5	0.9
	Former	>20	852	27	1	1	10	2	1.3	4.8	3.6	1.8	0.8
All ages <sup>a</sup>	Never	–	131,956	625	11	6	134	65	1.0	1.0	1.0	1.0	1.0
	Former	2-10	11,209	45	6	1	9	1	1.3	8.4	3.8	1.4	0.3
	Former	11-20	14,722	64	4	1	14	6	1.2	3.8	2.2	1.4	1.2
	Former	>20	9,178	56	4	2	12	5	1.1	4.4	4.0	1.1	0.9

<sup>a</sup> Relative risk for all ages is age-adjusted by the MH method using the four age strata shown.

<sup>b</sup> Indicates indeterminate relative risk due to absence of deaths among never-smokers.

Key: COPD = chronic obstructive pulmonary disease; CHD = coronary heart disease; MH = Mantel-Haenszel.

Table 8  
**Age-specific relative risks of death due to all causes, lung cancer, COPD, CHD, and stroke in never-smokers and former smokers by duration of quitting—men**

Age (Years)	Cigarette Smoking Status	Duration (Years Smoked)	Person-Years	Number of Deaths					Relative Risk <sup>a</sup>				
				All Causes	Lung Cancer	COPD	CHD	Stroke	All Causes	Lung Cancer	COPD	CHD	Stroke
35-49	Never	–	29,916	49	0	0	5	3	1.0	1.0	1.0	1.0	1.0
	Former	2-10	5,571	12	1	0	1	1	1.3	<sup>b</sup>	–	1.1	1.8
	Former	11-20	6,210	5	0	1	1	0	0.5	–	–	1.0	0.0
	Former	>20	1,149	3	0	0	2	0	1.6	–	–	10.4	0.0
50-64	Never	–	24,020	97	5	1	29	3	1.0	1.0	1.0	1.0	1.0
	Former	2-10	3,625	26	6	0	9	0	1.8	8.0	0.0	2.1	0.0
	Former	11-20	6,107	29	2	0	11	2	1.2	1.6	0.0	1.5	2.6
	Former	>20	4,670	19	1	0	6	1	1.0	1.0	0.0	1.1	1.7
65-74	Never	–	11,466	161	5	2	52	10	1.0	1.0	1.0	1.0	1.0
	Former	2-10	977	14	2	2	1	2	1.0	4.7	11.7	0.2	2.3
	Former	11-20	2,548	52	6	3	11	2	1.5	5.4	6.8	1.0	0.9
	Former	>20	3,507	43	1	1	12	0	0.9	0.7	1.6	0.8	0.0
75+	Never	–	4,486	203	4	1	66	19	1.0	1.0	1.0	1.0	1.0
	Former	2-10	253	16	3	2	7	1	1.4	13.3	35.5	1.9	0.9
	Former	11-20	671	40	0	2	16	4	1.3	0.0	13.4	1.6	1.4
	Former	>20	1,442	67	4	0	22	8	1.0	3.1	0.0	1.0	1.3
All ages <sup>a</sup>	Never	–	69,887	510	14	4	152	35	1.0	1.0	1.0	1.0	1.0
	Former	2-10	10,424	68	12	4	18	4	1.4	8.5	10.9	1.3	1.4
	Former	11-20	15,536	126	8	6	39	8	1.2	2.7	7.2	1.3	1.2
	Former	>20	10,767	132	6	1	42	9	1.0	1.6	0.9	1.0	0.9

<sup>a</sup> Relative risk for all ages is age-adjusted by the MH method using the four age strata shown.

<sup>b</sup> Indicates indeterminate relative risk due to absence of deaths among never-smokers.

Key: COPD = chronic obstructive pulmonary disease; CHD = coronary heart disease; MH = Mantel-Haenszel.



**Current Smoker/Never-Smoker Relative Risks for Other Causes of Death**

A survey of current smoker/never-smoker relative risk for a broad range of causes of death is provided in Tables 9 and 10. Shown are the numbers of deaths and age-adjusted relative risks for all the major cause-of-death groupings in the ICD-9-CM classification (U.S. Department of Health and Human Services, 1991) plus selected individual causes. Although all major groupings of causes are shown regardless of numbers of deaths, individual causes with fewer than 10 deaths in the total of female and male current smokers and never-smokers are not shown. Thus, certain causes that were of interest because of findings in previous studies are not shown here because of small numbers of deaths (e.g., cancer of the cervix in women, one death among current smokers and one death among never-smokers, respectively, and cancer of the urinary bladder, three and two deaths among male current smokers and never-smokers, respectively, and zero and four deaths among female current smokers and never-smokers, respectively).

Among women (Table 9) and men (Table 10) statistically significant elevations of relative risk in the current smokers were found for all causes of death combined, all neoplasms combined, cancer of the lung, all circulatory diseases combined, coronary (ischemic) heart disease, "other" heart and circulatory disease, all diseases of the respiratory system combined, COPD, and other (nonmotor vehicle) accidents.

Other statistically significant elevations were found for cancer of the pancreas and cirrhosis of the liver in women and for cancer of the stomach and all diseases of the digestive system combined in men.

**COMMENT** These data generally confirm the association of cigarette smoking with elevated risks of mortality from all causes combined, lung cancer, COPD, and CHD. This study cohort provided relatively short followup; the maximum was 81/2 years after completion of the questionnaire.

Racial diversity is an important feature of this cohort, but the relatively few decedents in the Asian and other or unknown race subgroups made their findings uncertain. Although they often differed from blacks and whites in the direction of lower risks associated with cigarette smoking, the confidence intervals for these findings were usually wide and overlapped the risk estimates for blacks and whites. Blacks were fairly similar to whites in their risk estimates for the major causes of death studied, except that black men and white women did not show the elevated risks for CHD and stroke, respectively, that were present in white men and black women.

Although there were some inconsistencies in the data, risk of total mortality and mortality from some of the major causes studied generally increased with both amount and duration of smoking. An inverse relationship of risk with duration of quitting was often but not consistently seen.

Findings for other specific causes of death in relation to cigarette smoking were often inconclusive due to small numbers. Thus, considerably more followup time is needed before this study cohort can provide substantial

Table 9

**Age-adjusted relative risks of death due to other selected causes in current smokers as compared with never-smokers—women**

Cause of Death	Current	Never	Relative Risk (95-percent CI)
All Causes	308	625	1.9 (1.7 - 2.2)
Infectious and Parasitic Diseases ( <i>ICD-9-CM 001-139</i> )	0	11	0
Neoplasms ( <i>ICD-9-CM 140-239</i> )	133	192	2.3 (1.9 - 2.9)
Cancer: Esophagus ( <i>ICD-9-CM 150</i> )	1	2	3.7 (0.3 - 41.1)
Cancer: Stomach ( <i>ICD-9-CM 151</i> )	3	14	0.8 (0.2 - 2.8)
Cancer: Colon ( <i>ICD-9-CM 153</i> )	7	28	0.9 (0.4 - 2.1)
Cancer: Liver and biliary tract ( <i>ICD-9-CM 155-156</i> )	5	4	3.5 (0.9 - 13.6)
Cancer: Pancreas ( <i>ICD-9-CM 157</i> )	12	11	3.9 (1.7 - 9.3)
Cancer: Trachea, bronchus, lung ( <i>ICD-9-CM 162</i> )	54	11	15.1 (7.7 - 29.7)
Cancer: Breast ( <i>ICD-9-CM 174-175</i> )	15	35	1.2 (0.6 - 2.2)
Cancer: Corpus uteri ( <i>ICD-9-CM 182</i> )	3	11	1.1 (0.3 - 4.2)
Cancer: Ovary ( <i>ICD-9-CM 183-183.0</i> )	7	11	2.2 (0.8 - 5.9)
Cancer: Kidney ( <i>ICD-9-CM 189-189.1</i> )	1	4	0.8 (0.1 - 7.5)
Cancer: Brain tumors ( <i>ICD-9-CM 191-192</i> )	1	2	1.1 (0.1 - 11.9)
Cancer: Leukemias ( <i>ICD-9-CM 204-208</i> )	2	5	1.3 (0.2 - 6.9)
Cancer: Other hematopoietic/lymphatic ( <i>ICD-9-CM 202-203</i> )	2	5	1.7 (0.3 - 8.9)
Endocrine, Nutritional, and Metabolic Diseases and			
Immunity Disorders ( <i>ICD-9-CM 240-279</i> )	4	16	0.9 (0.3 - 2.8)
Diabetes ( <i>ICD-9-CM 250</i> )	3	14	0.7 (0.2 - 2.6)
Diseases of Blood and Blood-Forming Organs ( <i>ICD-9-CM 280-289</i> )	3	4	2.8 (0.6 - 13.9)
Mental Disorders ( <i>ICD-9-CM 290-319</i> )	1	4	1.5 (0.1 - 14.4)
Diseases of the Nervous System ( <i>ICD-9-CM 320-389</i> )	4	11	1.6 (0.5 - 5.3)
Diseases of the Circulatory System ( <i>ICD-9-CM 390-459</i> )	109	283	1.7 (1.4 - 2.2)
Ischemic heart disease ( <i>ICD-9-CM 410-414</i> )	50	134	1.7 (1.2 - 2.4)
Hypertensive heart disease ( <i>ICD-9-CM 402, 404</i> )	5	10	2.2 (0.7 - 6.5)
Cerebrovascular disease ( <i>ICD-9-CM 430-438</i> )	20	65	1.3 (0.8 - 2.2)
Other heart and circulatory disease ( <i>ICD-9-CM 390-459</i> )	33	68	2.1 (1.4 - 3.2)
Diseases of the Respiratory System ( <i>ICD-9-CM 460-519</i> )	18	31	2.7 (1.5 - 4.9)
Asthma ( <i>ICD-9-CM 493</i> )	2	6	1.5 (0.3 - 7.8)
Pneumonia ( <i>ICD-9-CM 480-486</i> )	3	12	1.3 (0.4 - 4.7)
COPD, including chronic bronchitis ( <i>ICD-9-CM 491</i> ), emphysema ( <i>ICD-9-CM 492</i> ), and other chronic airway obstruction ( <i>ICD-9-CM 496</i> )	10	6	9.0 (3.0 - 26.6)
Other respiratory disease ( <i>ICD-9-CM 460-519</i> )	3	7	1.6 (0.4 - 6.3)
Diseases of the Digestive System ( <i>ICD-9-CM 520-579</i> )	11	22	1.9 (0.9 - 3.9)
Cirrhosis of the liver ( <i>ICD-9-CM 571</i> )	7	7	2.9 (1.0 - 8.4)
Diseases of the Genitourinary System ( <i>ICD-9-CM 580-629</i> )	2	9	1.3 (0.3 - 6.6)
Complications of Pregnancy, Childbirth, and the Puerperium ( <i>ICD-9-CM 630-676</i> )	0	0	<sup>a</sup>
Diseases of Skin and Subcutaneous Tissue ( <i>ICD-9-CM 680-709</i> )	0	1	0

Table 9 (continued)

Cause of Death	Current	Never	Relative Risk (95-percent CI)
Diseases of the Musculoskeletal System and Connective Tissue ( <i>ICD-9-CM 710-739</i> )	1	3	2.9 (0.3 - 27.5)
Congenital Anomalies ( <i>ICD-9-CM 740-759</i> )	1	1	2.2 (0.1 - 36.1)
Certain Conditions Originating in the Perinatal Period ( <i>ICD-9-CM 760-779</i> )	0	0	<sup>a</sup>
Symptoms, Signs, and Ill-Defined Conditions ( <i>ICD-9-CM 780-799</i> )	2	2	3.3 (0.4 - 26.3)
Injury and Poisoning ( <i>ICD-9-CM 800-999</i> )	19	35	1.6 (0.9 - 2.9)
Motor Vehicle Accidents ( <i>ICD-9-CM 810-825, 929-929.0</i> )	3	6	1.3 (0.3 - 5.6)
Other Accidents ( <i>ICD-9-CM 800-807, 826-828, 829.1-949</i> )	10	14	2.5 (1.1 - 5.8)
Suicide ( <i>ICD-9-CM 950-959</i> )	4	8	1.3 (0.4 - 4.4)
Homicide ( <i>ICD-9-CM 960-969</i> )	1	6	0.5 (0.1 - 4.1)

<sup>a</sup> Indicates indeterminate relative risk due to absence of deaths among never-smokers.

Key: CI = confidence interval; ICD-9-CM = International Classification of Diseases: 9th Revision. Clinical Modification (U.S. Department of Health and Human Services, 1991); COPD = chronic obstructive pulmonary disease.

Table 10

**Age-adjusted relative risks of death due to other selected causes in current smokers as compared with never-smokers—men**

Cause of Death	Current	Never	Relative Risk (95-percent CI)
All Causes	308	625	1.9 (1.7 - 2.2)
Infectious and Parasitic Diseases ( <i>ICD-9-CM 001-139</i> )	10	18	0.9 (0.4 - 2.0)
Neoplasms ( <i>ICD-9-CM 140-239</i> )	135	135	2.3 (1.8 - 2.9)
Cancer: Esophagus ( <i>ICD-9-CM 150</i> )	4	3	3.3 (0.7 - 15.8)
Cancer: Stomach ( <i>ICD-9-CM 151</i> )	12	11	2.4 (1.0 - 5.5)
Cancer: Colon ( <i>ICD-9-CM 153</i> )	5	20	0.5 (0.2 - 1.4)
Cancer: Liver and biliary tract ( <i>ICD-9-CM 155-156</i> )	3	6	0.9 (0.2 - 3.8)
Cancer: Pancreas ( <i>ICD-9-CM 157</i> )	8	10	2.1 (0.8 - 5.6)
Cancer: Trachea, bronchus, lung ( <i>ICD-9-CM 162</i> )	53	14	8.1 (4.4 - 15.0)
Cancer: Prostate ( <i>ICD-9-CM 185</i> )	10	19	1.6 (0.7 - 3.6)
Cancer: Kidney ( <i>ICD-9-CM 189-189.1</i> )	2	4	1.6 (0.3 - 8.8)
Cancer: Brain tumors ( <i>ICD-9-CM 191-192</i> )	3	5	1.1 (0.3 - 4.7)
Cancer: Leukemias ( <i>ICD-9-CM 204-208</i> )	5	7	1.7 (0.5 - 5.5)
Cancer: Other hematopoietic/lymphatic ( <i>ICD-9-CM 202-203</i> )	2	10	0.5 (0.1 - 2.4)
Endocrine, Nutritional, and Metabolic Diseases and Immunity Disorders ( <i>ICD-9-CM 240-279</i> )	8	10	1.5 (0.6 - 3.9)
Diabetes ( <i>ICD-9-CM 250</i> )	1	7	0.3 (0.0 - 2.7)
Diseases of Blood and Blood-Forming Organs ( <i>ICD-9-CM 280-289</i> )	1	1	2.8 (0.2 - 46.2)
Mental Disorders ( <i>ICD-9-CM 290-319</i> )	5	4	2.3 (0.6 - 8.8)
Diseases of the Nervous System ( <i>ICD-9-CM 320-389</i> )	3	10	0.8 (0.2 - 3.1)

Table 10 (continued)

Cause of Death	Current	Never	Relative Risk (95-percent CI)
Diseases of the Circulatory System ( <i>ICD-9-CM 390-459</i> )	162	237	1.7 (1.3 - 2.0)
Ischemic heart disease ( <i>ICD-9-CM 410-414</i> )	109	152	1.7 (1.3 - 2.2)
Hypertensive heart disease ( <i>ICD-9-CM 402, 404</i> )	9	8	2.6 (1.0 - 6.9)
Cerebrovascular disease ( <i>ICD-9-CM 430-438</i> )	11	35	0.8 (0.4 - 1.7)
Other heart and circulatory disease ( <i>ICD-9-CM 390-459</i> )	32	38	2.0 (1.2 - 3.2)
Diseases of the Respiratory System ( <i>ICD-9-CM 460-519</i> )	36	33	2.9 (1.8 - 4.7)
Asthma ( <i>ICD-9-CM 493</i> )	1	1	2.0 (0.1 - 33.1)
Pneumonia ( <i>ICD-9-CM 480-486</i> )	12	19	1.9 (0.9 - 3.9)
COPD, including chronic bronchitis ( <i>ICD-9-CM 491</i> ), emphysema ( <i>ICD-9-CM 492</i> ), and other chronic airway obstruction ( <i>ICD-9-CM 496</i> )	18	4	10.0 (3.3 - 30.9)
Other respiratory disease ( <i>ICD-9-CM 460-519</i> )	5	9	1.5 (0.5 - 4.4)
Diseases of the Digestive System ( <i>ICD-9-CM 520-579</i> )	17	18	2.1 (1.1 - 4.2)
Cirrhosis of the liver ( <i>ICD-9-CM 571</i> )	10	10	1.7 (0.7 - 4.1)
Diseases of the Genitourinary System ( <i>ICD-9-CM 580-629</i> )	0	2	0
Diseases of Skin and Subcutaneous Tissue ( <i>ICD-9-CM 680-709</i> )	0	2	0
Diseases of the Musculoskeletal System and Connective Tissue ( <i>ICD-9-CM 710-739</i> )	0	1	0
Congenital Anomalies ( <i>ICD-9-CM 740-759</i> )	0	0	<sup>a</sup>
Certain Conditions Originating in the Perinatal Period ( <i>ICD-9-CM 760-779</i> )	0	0	<sup>a</sup>
Symptoms, Signs, and Ill-Defined Conditions ( <i>ICD-9-CM 780-799</i> )	1	1	2.0 (0.1 - 33.1)
Injury and Poisoning ( <i>ICD-9-CM 800-999</i> )	33	38	1.6 (1.0 - 2.5)
Motor vehicle accidents ( <i>ICD-9-CM 810-825, 929-929.0</i> )	4	9	0.8 (0.3 - 2.8)
Other accidents ( <i>ICD-9-CM 800-807, 826-828, 829.1-949</i> )	16	9	3.3 (1.4 - 7.6)
Suicide ( <i>ICD-9-CM 950-959</i> )	7	13	1.0 (0.4 - 2.5)
Homicide ( <i>ICD-9-CM 960-969</i> )	6	6	1.5 (0.5 - 4.8)

<sup>a</sup> Indicates indeterminate relative risk due to absence of deaths among never-smokers.

Key: CI = confidence interval; ICD-9-CM = International Classification of Diseases: 9th Revision. Clinical Modification (U.S. Department of Health and Human Services, 1991); COPD = chronic obstructive pulmonary disease.

information about these less frequent causes of mortality and about racial differences.

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# Appendix A

## Portions of the Smoking Habit Questionnaire Used in This Study

If you have never used any tobacco product (cigarettes, cigars, tobacco pipe, chewing tobacco, snuff), check box below and then skip to questions 41-52.

1  <sup>25</sup> Never used any tobacco product

If you have ever used any tobacco product (cigarettes, cigars, tobacco pipe, chewing tobacco, snuff), answer questions below, then answer questions 41-52.

1. Have you ever smoked cigarettes regularly for at least 1 year? (Here "regularly" means at least five cigarettes per week, almost every week.)

1  <sup>26</sup> Yes     If Yes, answer questions 2-19 below.  
2  No     If No, skip to question 20.

2. How old were you when you started smoking cigarettes regularly?

$\frac{\quad}{27} - \frac{\quad}{38}$  years old

3. Do you still smoke cigarettes regularly?

1  <sup>29</sup> Yes     3  No, not at all  
2  No, but I still smoke cigarettes occasionally.

4. If you have stopped smoking cigarettes regularly, how many years ago did you stop? (If you stopped in the past year, write in 00).

$\frac{\quad}{40} - \frac{\quad}{41}$  years ago

7. How many cigarettes do you smoke per day, on the average? Or, if you have stopped smoking regularly, how many did you smoke, on the average, before you stopped? (1 pack = 20 cigarettes)

$\frac{\quad}{45} - \frac{\quad}{46}$  cigarettes per day

\*\*\*\*\*

20. Have you ever smoked cigars regularly for at least 1 year? (Here "regularly" means at least two cigars per week, almost every week.)

1  <sup>28</sup> Yes     If Yes, answer questions 21-30 below.  
2  No     If No, skip to question 31.

\*\*\*\*\*

31. Have you ever smoked a tobacco pipe regularly for at least 1 year? (Here "regularly" means at least two pipefuls of tobacco per week, almost every week.)

1  <sup>30</sup> Yes     If Yes, answer questions 32-39 below.  
2  No     If No, skip to question 40.

\*\*\*\*\*

62. What is your race?

1  <sup>37</sup> Black  
2  White  
    Oriental/Asian  
3  Japanese     4  Chinese     5  Filipino     6  Other Oriental/Asian  
7  Other, specify \_\_\_\_\_

