Cigarette Smoking and Occupational Status: 1977 to 1990

ABSTRACT

Objectives. In this study we examined the relationship between occupational status and smoking habits in men and women during the period from 1977 to 1990.

Methods. Cigarette smoking and occupational history were obtained from 8045 men and women who served as controls for a hospital-based study of tobacco-related diseases.

Results. There was an association between increasing occupational status and tobacco exposure in men, but not in women. The quit rate increased over time in all sex-occupational groups except for male laborers, whose quit rate remained constant. Nicotine-dependent smokers are likely to find it difficult to quit. Male nicotine-dependent smokers were consistently found in greater numbers among blue collar workers throughout the study period. Initially, female nicotine-dependent smokers were more often found among blue collar workers, but in recent years became more frequent among white collar workers.

Conclusion. These trends provide clues to the future epidemiological distribution of lung cancer and other tobacco-related diseases. An understanding of gender differences in the occupational profile of cigarette smokers can provide guidelines for effective antismoking interventions. (*Am J Public Health.* 1992;82: 1230–1234)

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Introduction

Ten years ago, we reported observations from a hospital-based epidemiological study that indicated a strong relationship between occupational status and smoking behavior in men.[1] Men in white-collar occupations, particularly those in professional-level jobs, were less likely to have ever smoked. Among individuals who did smoke, men in white-collar occupations were more likely to have quit, and among those who continued to smoke, white-collar workers were more likely to be smoking cigarette brands with lower tar and nicotine yields. The higher prevalence of cigarette smoking in male blue-collar workers than in male white-collar workers was also observed in representative samples of the US population.[2]

During the past decade, we have continued to obtain detailed smoking and occupational information from the same epidemiologic study that provided the database for our earlier study.[1] These data enabled us to perform an updated examination of the relationship between occupational status and smoking habits in both men and women, and to record the changes in smoking behavior by occupational category over the years 1976 to 1990. Additionally, using criteria suggested by the work of Fagerstrom,[3] we estimated the prevalence of "nicotine-dependent smokers" in each occupational group, by sex.

Methods

The data used in this analysis were collected as part of a large ongoing study of tobacco-related diseases that has been described elsewhere.[4] We included 8042 subjects (4985 male and 3057 female controls in the database) who were recruited between the years 1977 and 1990 from hospitals located in the New York, Long Island, and Chicago metropolitan areas in the United States and who did not have a history of tobacco-related diseases, such as cancers of the lung, oral cavity, larynx, esophagus, pancreas, kidney, or bladder; myocardial infarction, stroke, angina pectoris, or peripheral vascular disease; chronic bronchitis or emphysema. Among the admission diagnoses were malignancies (of the stomach, colon, prostate, and breast; leukemias; lymphomas; multiple myeloma; sarcomas), benign neoplasms, and acute or chronic conditions (e.g., cataracts, glaucoma, arthritis, fractures). Breast cancer in women (10%) and colorectal cancer in men (3%) were the most frequent diagnoses.

All data were collected by means of a detailed, standardized questionnaire filled out by trained interviewers; the questionnaire included information on demographic factors, smoking history, and occupation. Non-Whites and individuals younger than 40 years each constituted only approximately 5% of the population in the database, and they were excluded from the analyses.

Occupational Classification

Occupational classification was elicited by the question, "What has been your

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Editor's Note. See related editorial by Giovino et al. (p 1203) in this issue.

TABLE 1—Characteristics of the Study Population

	1977–1980		1981–1984		1985–1990	
	Men	Women	Men	Women	Men	Women
	n = 1568	n = 1071	n = 1703	n = 956	n = 1714	n = 1030
Age, y						
40–49	16.2	15.5	14.9	15.6	16.3	13.6
50–59	36.4	37.2	34.0	34.7	31.2	29.5
60–69	36.0	35.3	40.0	35.2	39.4	39.4
70+	11.5	12.0	11.2	14.5	13.0	17.5
Education completed						
Elementary school	26.7	26.3	24.2	21.9	18.2	16.4
High school	25.8	37.4	30.1	41.3	27.2	38.5
College	47.6	36.3	45.7	36.7	54.6	45.1
Religion						
Protestant	21.4	20.6	21.8	19.9	21.5	18.9
Catholic	42.5	47.4	50.3	52.2	54.9	54.6
Jewish	29.3	28.3	22.0	24.2	21.2	24.7
Other	6.8	3.7	5.9	3.7	2.4	1.8
Marital status						
Single	5.2	7.2	7.6	6.0	6.6	5.4
Married	85.3	67.7	81.2	66.0	81.6	63.5
Divorced/separated	5.2	6.2	6.9	8.3	7.0	9.0
Widowed	4.3	18.9	4.2	19.8	4.8	22.0
City hospital						
Chicago	27.7	19.4	35.2	25.4	25.7	18.5
Long Island	19.4	12.5	17.7	16.6	20.0	20.9
New York	52.9	68.1	47.2	58.0	54.6	60.7
Occupation						
Professional/managerial	24.0	16.2	20.7	20.0	25.3	22.7
Manager	22.1	...	16.0	...	14.4	...
Sales/clerical	14.2	32.5	12.9	33.7	15.1	38.8
Craftsworker	18.4	...	27.0	...	28.6	...
Other blue-collar[a]	26.3	11.8	23.5	16.7	16.6	15.6
Homemaker	...	39.6	...	29.6	...	22.8

Note. All figures are percentages.
[a]Labor, operative, service.

usual occupation?" Responses were coded according to the categories employed by the US Bureau of the Census: professionals, managers, sales and clerical workers, craftsworkers, laborers, operatives, and service workers.[5] In addition, we included a separate code for homemakers, to designate women who had not generally been employed outside the home. Because of the small numbers, laborers, operatives, and service workers were grouped together as laborers in the analyses of data for men. For women, we combined professionals and managers into a single category, and craftsworkers, laborers, operatives, and service workers were classified as blue-collar workers.

Measures of Smoking Behavior

"Ever smokers" were defined as those who had ever smoked cigarettes at least once a day for 1 year. "Current smokers" included those who either were smoking at the time of the interview or had stopped less than 12 months earlier. Persons who smoked pipes or cigars, either alone or in addition to cigarettes, were excluded from the analyses. Rates of ever smoking and current smoking were both calculated using the total sample size in each sex-specific occupational group as the denominator.

"Quitters" were defined as previous smokers who had not smoked during the previous year, and the proportion of quitters was calculated using the total number of ever smokers in each sex-specific occupational group as the denominator. Additionally, we calculated the proportions of smokers who smoked more than 30 cigarettes per day, of those who smoked cigarettes yielding more than 20 milligrams of tar, and of nicotine-dependent smokers, each time using the total number of current smokers in each sex-specific occupational category as the denominator.

Drawing from the literature on the Fagerstrom Tolerance Questionnaire,[2] we defined nicotine-dependent smokers as current smokers who smoked more than 25 cigarettes per day and who lit up in the morning within 30 minutes of awakening. It has been shown that these two behaviors are both highly associated with biochemical measures of smoking—for example, cotinine and nicotine in the serum[6]—and are most characteristic of smokers who are unable to quit.[7]

Data Analysis

The percentages of individuals in each of the above smoking categories were calculated by occupation and sex.

TABLE 2—Specific Smoking Behaviors in Men, by Occupational Status, in Three Time Periods

	Time 1 (1977–1980) n = 1568	Time 2 (1981–1984) n = 1703	Time 3 (1985–1990) n = 1714	Difference Time 3 − Time 1
Ever smokers				
Professional	57.2	62.3	59.6	+2.4
Managerial	63.9	72.8	68.8	+4.9
Sales/clerical	62.6	71.7	74.1	+11.5
Craftsworker	72.3	72.3	71.6	−0.7
Laborer/operative	70.0	80.8	81.4	+11.4
Current smokers				
Professional	21.5	21.3	16.4	−5.1
Managerial	27.2	29.8	24.7	−2.5
Sales/clerical	28.8	28.8	27.8	−1.0
Craftsworker	37.4	33.1	26.1	−11.3
Laborer/operative	33.1	38.8	39.0	+5.9
Quitters[a]				
Professional	62.3	65.9	72.5	+10.2
Managerial	57.5	59.0	64.1	+6.6
Sales/clerical	54.0	59.9	62.5	+8.5
Craftsworker	48.3	54.2	63.5	+15.2
Laborer/operative	52.4	52.0	52.5	+0.1
Smoking ≥30 cigarettes/d[b]				
Professional	45.1	41.6	40.9	−4.2
Managerial	48.4	48.0	43.5	−4.9
Sales/clerical	52.5	51.0	54.7	+2.2
Craftsworker	51.2	49.7	46.4	−4.8
Laborer/operative	53.2	48.6	51.3	−1.9
Smoking ≥20 mg tar/cigarette[b]				
Professional	14.8	10.7	7.0	−7.8
Managerial	16.0	9.9	11.5	−4.5
Sales/clerical	12.5	9.5	13.9	+1.4
Craftsworker	24.1	20.4	14.8	−9.3
Laborer/operative	15.3	23.9	15.3	0.0
Nicotine-dependent[b]				
Professional	33.3	26.7	35.2	+1.9
Managerial	35.1	43.2	31.2	−3.9
Sales/clerical	42.2	39.7	47.2	+5.0
Craftsworker	41.7	47.4	45.3	+3.6
Laborer/operative	46.0	40.0	51.4	+5.4

Note. All figures are percentages.
[a]Based on ever smokers.
[b]Based on current smokers.

We examined temporal changes in smoking by dividing the data into three time intervals: 1977 to 1980, 1981 to 1984, and 1985 to 1990. Although the time intervals correspond with progressively expanded and modified versions of the survey instrument, none of the revisions involved the variables analyzed in this study.

The three geographic areas (Chicago, Long Island, and New York) that served as the sources for recruitment of our sample did not yield substantially different distributions by age, occupation, and smoking exposure. We therefore combined them in subsequent analyses.

Results

Demographic Characteristics

The characteristics of the study population are summarized in Table 1. In men, the age distribution was relatively consistent over time; more than 80% of the sample were older than 50 years of age, and roughly half were older than 60 years of age. The proportion of college-educated men in relation to those with only an elementary education increased slightly over time. The sample included more Catholics than men of other religions, and more than 80% of the men were married. By geographic location, New York hospitals accounted for about 50% of the sample. About half of the men held white-collar jobs.

The demographic distributions of the women in the study resembled those of the men for all three time periods, except that fewer women were college educated and women were more likely than men to be widowed. Also, there were fewer women than men in professional and managerial occupations, but more in the sales/clerical category. In line with nationwide trends, the proportion of homemakers decreased over time.

The Relationship Between Smoking Behavior and Occupation

Men (Table 2). In each of the time periods, professional men were less likely to have ever smoked than were those in other occupational groups, and all groups except craftsworkers showed an increase in ever smokers from time 1 to time 3. The largest change, which occurred between time 1 and time 2, was seen among sales/clerical workers and laborers.

Professionals consistently had the highest quit rates, and men in blue-collar occupations had the lowest quit rates. Over time, quit rates increased and the proportion of current smokers decreased in all occupational categories with the exception of laborers. Blue-collar workers were twice as likely as professionals to be current smokers.

A less consistent association was found between heavy smoking (≥30 cigarettes per day) and occupation. Professionals were least likely to be heavy smokers, but sales/clerical workers surpassed blue-collar workers in heavy smoking at times 2 and 3, and they were the only group that showed an increase in heavy smoking over time.

In all categories except sales/clerical workers and laborers, the proportion of smokers who smoked high-tar-yield cigarettes decreased over time. The proportion of such smokers was consistently lower among white-collar workers.

Nicotine dependence was least common among professionals, particularly in time 2, and most common among blue-collar workers. In contrast to the general decline in smoking exposure (except among laborers), the proportion of dependent smokers showed an overall increase over time.

A noteworthy finding is the reduction in smoke exposure among craftsworkers, the most highly skilled blue-collar group,

among whom the proportion of current smokers declined while the quit rate continued to increase.

Women (Table 3). Fewer women than men smoked, and their smoking behavior was less clearly associated with occupation. Homemakers did not consistently resemble members of any other occupational category in their smoking patterns.

In contrast to men, proportionately fewer women white-collar workers had ever smoked. Blue-collar workers and homemakers showed a notable increase in this category over time.

Women's patterns of quitting were similar to those of men: quit rates were generally highest among professionals and managers and lowest among women in blue-collar jobs. Although homemakers resembled blue-collar workers in their increasing frequency of ever smoking, the proportion of quitters among homemakers was similar to that among white-collar workers. Overall, quit rates increased steadily over time among women. In accord with the trends in quit rates, professional women and homemakers were less likely to be current smokers than were women in blue-collar jobs. As with men, the numbers of current smokers diminished over time.

No consistent trend in the frequency of heavy smokers by occupation was evident among women. There was a general decline in heavy smoking, but this decline did not occur among those in sales and clerical positions.

Fewer women than men smoked high-tar-yield cigarettes, and the proportion of such smokers declined over time in all occupations. Women in blue-collar jobs were more likely to smoke the high-tar-yield brands, but they also showed the largest decrease in this behavior over time.

There was no clear relationship between occupation and nicotine dependence among the women in the sample, except that the proportions of dependent smokers increased in the white-collar occupations but decreased among blue-collar workers and homemakers.

TABLE 3—Specific Smoking Behaviors in Women, by Occupational Status, in Three Time Periods

	Time 1 (1977–1980) n = 1071	Time 2 (1981–1984) n = 956	Time 3 (1985–1990) n = 1030	Difference Time 3 − Time 1
Ever smokers				
Professional/managerial	50.3	51.3	53.4	+3.1
Sales/clerical	50.3	50.6	50.8	+0.5
Blue-collar[a]	32.5	48.8	42.9	+10.4
Homemaker	41.0	51.2	48.9	+7.9
Current smokers				
Professional/managerial	23.7	28.3	16.2	−7.5
Sales/clerical	27.9	25.5	22.5	−5.4
Blue-collar[a]	25.4	28.1	22.4	−3.0
Homemaker	23.4	23.7	18.3	−5.1
Quitters[b]				
Professional/managerial	52.9	44.9	69.6	+16.7
Sales/clerical	44.6	49.7	55.7	+11.1
Blue-collar[a]	22.0	42.3	47.8	+25.8
Homemaker	43.1	53.8	62.6	+19.5
Smoking ≥30 cigarettes/d[c]				
Professional/managerial	25.3	30.6	24.0	−1.3
Sales/clerical	26.3	30.7	32.0	+5.7
Blue-collar[a]	34.2	26.9	27.5	−6.7
Homemaker	28.7	26.4	23.5	−5.2
Smoking ≥20 mg tar/cigarette[c]				
Professional/managerial	9.8	7.4	2.6	−7.2
Sales/clerical	8.3	8.5	4.4	−3.9
Blue-collar[a]	21.9	15.6	8.3	−13.6
Homemaker	11.1	6.0	2.3	−8.8
Nicotine-dependent[c]				
Professional/managerial	17.1	22.2	26.3	+9.2
Sales/clerical	17.5	35.4	35.6	+18.1
Blue-collar[a]	31.3	22.2	16.7	−14.6
Homemaker	26.3	26.9	20.9	−5.4

Note. All figures are percentages.
[a]Craftsworkers, laborers, operatives combined.
[b]Based on ever smokers.
[c]Based on current smokers.

Discussion

Although our study population consisted of hospitalized patients, the information obtained on their smoking behavior and usual occupation referred to their activities prior to their diagnoses. It is unlikely that these variables would have been influenced by their illness. An additional possibility of bias would be due to key differences in the populations sampled at the three time periods. However, as shown in Table 1, the demographic characteristics were approximately the same except for the overall increase in the educational level of the latest sample, which reflects a nationwide trend.

The results can be summarized as follows:

1. The apparent strong association between occupation and cigarette smoking among men that we reported 10 years ago continues.
2. Smoking behavior is much less related to occupation among women than among men.
3. The proportion of smokers who are most likely to have difficulty when attempting to quit, that is, nicotine-dependent smokers, is lowest among men in professional and managerial occupations. In women, dependent smokers were more frequently found among blue-collar workers and homemakers during the first period of observation (1977 to 1980). Over time, however, the proportion of nicotine-dependent smokers decreased among blue-collar workers and increased among women in white-collar occupations.

Among men, higher status occupations were generally associated with lesser smoking exposure as estimated by quit rate, current smoking prevalence, average tar yield per cigarette, and nicotine dependence. In contrast, although women in higher level occupations were more likely to have ever smoked, they were also more likely to have quit and to smoke lower-tar-yield brands than were those em-

ployed in lower level occupations. Homemakers, undoubtedly a heterogeneous group with regard to sociodemographic status, showed an irregular pattern in their smoking behavior as well as in changes over time; in some ways they resembled professional women and in others they resembled blue-collar workers.

Our results also indicate that women included fewer ever smokers than men, but that women had somewhat lower quit rates. Consequently, the proportions of current smokers were not much lower among women than among men, although women smoked fewer cigarettes per day, were less likely to smoke high-tar-yield brands, and were less likely to be dependent smokers. In a related paper, it has been shown that the women in this sample began to smoke later in life than did men and that this delayed onset of smoking was subsequently associated with a lower number of cigarettes smoked per day.[8] These findings suggest that although the incidence of tobacco-related diseases may continue to rise among women, as long as present smoking patterns prevail it will not reach the peak levels recorded for men.

The higher prevalence of tobacco use among men in blue-collar jobs is significant in light of the fact that these occupational groups are also more likely to be exposed to other hazardous substances through their work. Although broad estimates of lung cancer risk attributable to occupations range from 4% to 36%, with a mean of 13%, the estimated proportion of risk attributable to cigarette smoking is far greater, about 85%.[9] Consequently, increased efforts at reducing smoking exposure would contribute substantially to the overall reduction in the risk of lung cancer and other diseases related to both smoking and occupational exposures.

With the exception of male laborers, the proportion of current smokers in all occupations and in both sexes decreased over time, accompanied by a concurrent increase among current smokers in the frequency of nicotine dependence. This increasing proportion of individuals who are unable to quit points up the continuing need for efficacious smoking cessation intervention programs, particularly those targeted to reach the hard-core, nicotine-dependent smoker.

The difference by gender in the occupational profile of dependent smokers, who are predominantly blue-collar workers among men but predominantly white-collar workers among women, is intriguing. An understanding of the apparent interaction between gender and occupational status with regard to dependent smoking may lead to more efficacious smoking prevention and smoking cessation programs in the workplace. □

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