Title

Demographic and Health Characteristics of Elderly Smokers: Results from Established Populations for Epidemiologic Studies of the Elderly

Journal

American Journal of Preventive Medicine, 6(2)

ISSN

0749-3797

Authors

Colsher, Patricia L
Wallace, Robert B
Pomrehn, Paul R
et al.

Publication Date

1990-03-01

DOI

10.1016/s0749-3797(18)31026-2

Peer reviewed

Demographic and Health Characteristics of Elderly Smokers: Results from Established Populations for Epidemiologic Studies of the Elderly

Patricia L. Colsher, PhD, Robert B. Wallace, MD, Paul R. Pomrehn, MD, Andrea Z. LaCroix, PhD, Joan Cornoni-Huntley, PhD, Dan Blazer, MD, PhD, Paul A. Scherr, PhD, Lisa Berkman, PhD, and Charles H. Hennekens, MD

Although smoking has been shown to be associated with excess morbidity and mortality, most studies have focused on young and middle-aged rather than elderly smokers. We examined the demographic characteristics and physical and psychological health of elderly cigarette smokers in four population-based studies (N = 3,673, 3,811, 2,811, and 4,165) of persons 65 years of age and older. Although there was substantial geographic variation in the percentages of smokers, the demographic and health characteristics of smokers were similar across the sites. Most women had never smoked, but most men were former or current smokers. The percentage of never smokers was highest in the "oldest old." Among the elderly ever smokers, men were more likely to have quit than women, and the relative percentage of former smokers increased with age. Current smokers were generally more likely to consume alcohol than never smokers. In this age group, cigarette smoking was typically associated with higher rates of physical disease and symptoms, poorer self-perceived health status, and higher levels of depressive symptoms. Based on these four large geographically diverse population surveys, cigarette smoking remains an important health burden and public health challenge among the elderly. [Am J Prev Med 1990;6:61–70]

In the elderly, cigarette smoking has been shown to be associated with excessive mortality from all causes and from cardiovascular disease.[1–10] Elderly cigarette smokers also appear to be at increased risk of nonfatal cardiovascular disease,[10–14] respiratory illnesses,[1,10] and physical function limitations;[15] to have poorer cerebral perfusion;[16,17] and to report more health complaints[18] than nonsmokers. Thus, most studies have found cigarette smoking to be an important determinant of morbidity and mortality among the elderly (but compare references 19 and 20).

In order to define more fully smoking habits among the elderly, to assess the impact of smoking in the community, and to target smoking cessation programs effectively, it is necessary to determine more precisely the prevalence and nature of smoking behavior in populations. We present baseline data on cigarette smoking behavior and correlates from four large population-based cohort studies of the elderly, the Established Populations for Epidemiologic Studies of the Elderly, (EPESE), sponsored by the U.S. National Institute on Aging.[21] We describe the demographic characteristics of cigarette smokers, the extent of their smoking habits, lifetime history rates of smoking-associated diseases, and prevalence rates for respiratory and cardiovascular disease symptoms. We report on depressive symptoms, which have recently been related to the likelihood of successful smoking cessation,[22] and dis-

From the Department of Preventive Medicine and Environmental Health, The University of Iowa, Iowa City (Colsher, Wallace, and Pomrehn), the National Institute on Aging, National Institutes of Health (LaCroix and Cornoni-Huntley), The Affective Disorders Program, Duke University, Durham, North Carolina (Blazer), Channing Laboratory, Departments of Medicine and Preventive Medicine, Harvard Medical School, Brigham and Women's Hospital, and the East Boston Neighborhood Health Center, Boston, Massachusetts (Scherr and Hennekens), and Yale University, New Haven, Connecticut (Berkman).

Address reprint requests to Dr. Colsher, Department of Preventive Medicine and Environmental Health, The University of Iowa, Iowa City, IA 52242.

cuss demographic and health factors associated with smoking cessation.

METHODS

Respondents

The EPESE surveys were conducted at four locations: (1) two rural counties in east-central Iowa, (2) East Boston, Massachusetts, (3) New Haven, Connecticut, and (4) a five-county area including Durham, North Carolina. The Iowa, East Boston, and New Haven data were collected between 1981 and 1983, and the North Carolina (Piedmont) data were collected in 1986 and 1987. The EPESE include information on the physical, psychological, and social health of participants, as well as their health practices and health care utilization. The Iowa and East Boston studies were undertaken in census-defined areas; the New Haven and Piedmont studies were stratified random samples. The New Haven sample was stratified by housing type (public housing for the elderly, private housing for the elderly, and other housing). The Piedmont sample was stratified by residence (urban, rural), socioeconomic status, and race. Blacks were oversampled to assure an equivalent black–white distribution.

In Table 1 are listed the target populations, survey dates, participation rates, rates of nonproxy interviews, sex-specific numbers, and mean ages of respondents for each of the study sites. For the New Haven and Piedmont cohorts, actual sample sizes weighted population size estimates, and both associated means are given.

The Iowa cohort was rural, and the majority of participants lived in small towns with populations of between 150 and 2,000 persons. The largest town in the area had a population of 6,500 persons. Most of the male Iowa participants were, when working, engaged in farming occupations, and most of the women described themselves as housewives. Most of the Iowa men had not completed high school, but most of the Iowa women had done so. The East Boston cohort lived on an island in Boston Harbor and was a largely blue-collar, low- and middle-income community. Italians were the dominant ethnic group. Most of the East Boston participants had not completed high school. The New Haven cohort included a large percentage of persons living in public or private housing for the elderly (56.8% of respondents). Although the dominant ethnic group was Italian, 21% of the New Haven participants were nonwhite. Among men in the New Haven cohort, blue-collar occupations predominated, but there was no consistent pattern of occupation among women. Most of the New Haven participants had not completed high school. The Piedmont cohort was added to the EPESE to facilitate comparisons of black and white elderly. Blacks make up from one- to two-thirds of the participants in each of the counties. Occupational status of participants varied with counties and was primarily professional, administrative, and clerical in the urban county and farming, manufacture, and unskilled labor in the rural counties. More detailed descriptions of each survey are available elsewhere.[21,23]

Questionnaire

Smoking status was determined by two questions: "Do you smoke cigarettes (regularly) now," and "Did you ever smoke cigarettes (regularly)?" The

Table 1. Target populations, participation rates, population/sample sizes, and mean ages (years) for each of four EPESE study sites

Study site and year of survey	Target population	Participation/ nonproxy rates (%)		Men		Women	
				n	Mean age	*n*	Mean age
Iowa (1982)	Iowa and Washington counties	80/93		1,420	74.7	2,253	75.6
East Boston (1982)	East Boston community	84/96		1,455	73.4	2,356	73.9
New Haven (1982)	New Haven community	84/98	actual	1,166	73.9	1,645	74.9
			weighted	5,574	73.4	9,842	74.3
Piedmont (1986–1987)	Durham, Vance, Franklin Granville, and Warren counties	84/96	actual	1,469	72.3	2,696	74.3
			weighted	10,582	72.7	17,449	73.9

Late-1987 and early-1988 data tapes were used in the present analyses.

word "regularly" was used by the East Boston and Iowa studies but not by the New Haven study. Persons who reported that they smoked at the time of the interview were classified as "current smokers," persons who were not current smokers but had smoked at some time were classified as "former smokers," and persons who reported that they had never smoked cigarettes were classified as "never smokers." The starting ages of former and current smokers and the quitting ages of former smokers were obtained, as was the average or usual number of cigarettes smoked. Demographic data included sex, age, marital status, number of years of education, and income range. Respondents were asked about lifetime histories of physician-diagnosed myocardial infarction, stroke, hypertension, and cancer (all sites), as well as current respiratory symptoms, such as coughing, production of phlegm, wheezing, or shortness of breath.[24] Two items from the London School of Hygiene Cardiovascular Questionnaire,[25] chest pain and pain or cramps in legs while walking, are reported in this paper. Overall self-perceived health status[26] was rated on a scale of 1–5 in Iowa (excellent, good, fair, poor, or very poor) and New Haven (excellent, good, fair, poor, or bad), and 1–4 in East Boston and Piedmont (excellent, good, fair, or poor). The Rosow-Breslau Functional Health Index,[27] consisting of items querying the ability to do heavy housework, walk up and down a flight of stairs, and walk half a mile, was administered.

A modified version of the Center for Epidemiologic Studies Depression Scale[28] was administered. The items included whether the respondent felt happy, sad, depressed, or lonely; lacked appetite; enjoyed life; found everything required effort; had trouble "getting going;" felt that people were unfriendly or disliked the respondent; and experienced restless sleep. Iowa respondents were asked whether they experienced the specified feelings hardly ever, some of the time, or most of the time during the past week. East Boston respondents were asked whether they felt as described much of the time during the past week; the appetite item was not included. New Haven respondents were asked whether they had experienced the feelings rarely or none of the time, some of the time, much of the time, or most or all of the time during the past week. Piedmont respondents were asked whether or not they had experienced the feelings during the past week. Depression symptom scores are the number of items the respondent answered in a depressive direction, regardless of the frequency for the Iowa and New Haven respondents. However, because of the differences in depression response scales, comparisons should not be made across study sites.

Data Analysis

Separate sets of analyses were performed for each of the study sites, and rates were age-adjusted directly to the overall sex-specific age structure of each site. The rates and medians for the New Haven and Piedmont samples are based on weighted observations. Descriptions of the derivations of the weights are available elsewhere (reference 21 for New Haven; Piedmont weights are available from D. B. on request). All interviews (both proxy and nonproxy) were included in the demographic descriptions of smokers. Analyses of subjective measures (for example, self-perceived health status and depressive symptoms) include only nonproxy interviews. Because two of the EPESE are censes, inferential statistics are not appropriate, and no tests of statistical significance are reported here.

RESULTS

Tables 2 and 3 show the percentages of never, former, and current smokers among men and women, respectively, according to demographic characteristics. The education- and marital status–specific percentages are age-adjusted. Data are presented separately for each of the study sites. At all the sites, the largest percentages of men were former smokers, whereas the largest percentages of women were never smokers. Contrasting the four study sites, Iowa men and women were most likely to be never smokers and least likely to be current smokers. The percentages of current smokers were lowest in the oldest groups of men and women at all sites, and the percentages of never smokers were highest in the oldest groups of men and women at all sites.

The relationship between educational attainment and smoking status appears to differ between men and women. The age-adjusted percentage of never smokers was highest among the most educated men at the Iowa, East Boston, and Piedmont sites, but was highest among the least educated women at the Iowa, New Haven, and Piedmont sites. Among New Haven men, the percentage of never smokers was highest in the middle education group, and among East Boston women, the percentage of never smokers was lowest in the middle education group. Thus, in general, more educated men were less likely to smoke than were less educated men, but more educated women were more likely to smoke than less educated women.

The age-adjusted percentage of never smokers was higher among never- than ever-married men at all sites, and higher among never- than ever-married women at Iowa and East Boston. Tables 2

Table 2. Percentages of never (N), former (F), and current (C) smokers according to specified demographic characteristics: men

	Iowa			East Boston			New Haven			Piedmont		
	N	F	C	N	F	C	N	F	C	N	F	C
Crude	41.9	44.2	13.9	28.2	46.9	24.9	33.8	44.1	22.1	27.5	46.6	25.9
Age group (years)												
65–74	37.1	47.1	15.8	25.9	45.8	28.3	33.8	40.7	25.5	23.6	46.6	29.7
75–84	45.4	42.2	12.4	28.2	49.0	22.7	29.6	52.6	17.8	33.1	47.4	19.5
>84	64.0	31.4	4.6	45.1	48.4	6.6	48.8	40.4	10.8	54.1	40.6	5.4
Education (years)												
<9	43.5	42.4	14.2	23.4	51.9	24.6	28.7	42.6	28.9	25.0	43.2	31.2
9–12	41.1	45.3	13.6	29.7	44.7	25.5	42.0	40.1	18.1	26.1	49.9	23.9
>12	47.6	37.6	12.7	38.6	39.2	22.1	33.5	53.8	12.9	37.2	50.2	12.6
Marital status												
Never	47.6	42.6	9.8	33.5	42.7	23.7	38.2	40.7	21.4	33.0	41.6	25.3
Ever	43.0	43.4	13.6	27.4	47.4	25.1	33.6	44.6	22.1	27.9	46.9	25.3

Education- and marital status–specific rates are age-adjusted.

and 3 do not show the relationships between smoking status and income. There was little consistency in the relationship between income level and cigarette smoking status either within or across the populations. In general, the percentage of never smokers was higher at the income extremes among men and greater at lower income levels among women.

Site-specific, age-adjusted quit ratios are shown in the upper portion of Table 4 for men and in the lower portion for women. Quit ratios were computed as follows:

$$\frac{\text{Number of former smokers}}{(\text{Number of former smokers}) + (\text{Number of current smokers})} \times 100$$

The quit ratio thus allows a comparison of the relative percentage of former smokers in groups having different percentages of ever smokers. The top line in each table shows the crude quit ratios for each of the sites; subsequent entries are stratified on various demographic characteristics. The education- and marital status–specific quit ratios are age-adjusted. Men consistently had higher quit ratios than did women. Quit ratios were higher for Iowa men than the other groups of men. Among women, the differences across sites were more modest, and the women in the Piedmont group had the highest crude quit ratio. Respondents over the age of 85 consistently had the highest quit ratios. The most educated respondents had the highest quit ratios among all groups except the East Boston men and women. Quit ratios were higher among never-married women than ever-married women at all study sites except Piedmont. Among men, quit ratios were

Table 3. Percentages of never (N), former (F), and current (C) smokers according to specified demographic characteristics: women

	Iowa			East Boston			New Haven			Piedmont		
	N	F	C	N	F	C	N	F	C	N	F	C
Crude	86.6	7.3	6.1	67.9	15.8	16.3	63.1	19.4	17.4	67.7	19.8	12.6
Age group (years)												
65–74	81.4	9.0	9.6	58.5	18.8	22.7	54.2	24.2	21.6	60.2	23.1	16.7
75–84	92.0	5.4	2.9	79.9	12.6	7.5	70.1	15.6	14.3	77.7	15.4	6.9
>84	93.9	5.0	1.1	91.6	5.6	2.8	91.1	5.0	4.0	87.8	10.3	1.8
Education (years)												
<9	92.2	9.9	3.8	72.6	12.5	14.8	67.6	16.9	15.5	75.1	15.6	9.4
9–12	85.0	8.1	7.0	61.9	19.9	18.1	62.1	18.2	19.5	65.8	19.1	15.3
>12	84.8	9.1	6.2	70.0	15.3	14.6	48.6	31.6	19.7	57.9	30.8	11.4
Marital status												
Never	90.2	6.9	3.0	69.4	17.0	13.5	57.2	25.8	16.8	62.3	24.7	13.1
Ever	87.2	6.8	6.1	67.7	15.6	16.6	63.7	18.7	17.5	68.4	19.3	12.3

Education- and marital status–specific rates are age-adjusted.

Table 4. Sex-specific quit ratios according to selected demographic variables

	Iowa	East Boston	New Haven	Piedmont
Men				
Overall	76.1	65.2	66.7	64.3
Age (years)				
65–74	74.9	61.8	61.5	61.1
75–84	77.3	68.3	74.7	70.9
>84	87.1	88.1	78.8	88.2
Education (years)				
<9	76.1	68.2	60.1	59.0
9–12	75.3	64.7	70.8	68.6
>12	76.3	64.7	80.6	80.7
Ever married				
No	82.9	64.7	64.5	70.2
Yes	75.9	65.9	67.3	64.5
Women				
Overall	54.3	49.1	52.8	61.1
Age (years)				
65–74	48.4	45.0	52.9	58.0
75–84	67.8	62.7	52.2	69.0
>84	81.8	66.7	55.6	84.9
Education (years)				
<9	50.2	48.4	48.5	65.5
9–12	61.5	56.1	50.0	59.7
>12	64.9	52.3	65.4	74.2
Ever married				
No	67.6	58.8	59.9	62.5
Yes	58.0	52.0	52.0	63.9

Education- and marital status–specific quit rates are age-adjusted.

higher among the never married than the ever married at the Iowa and Piedmont sites, but higher among the ever married than the never married from East Boston and New Haven.

Table 5 shows the age-adjusted percentages of never, former, and current smokers who consumed alcohol in the year preceding the interview. With the exception of East Boston women, never smokers were the least likely to have consumed alcohol, and, with the exception of New Haven men and Piedmont women, current smokers were most likely.

Table 5. Age-adjusted percentages of persons who consumed alcohol in past year according to cigarette smoking status and sex

Smoking status	Iowa	East Boston	New Haven	Piedmont
Men				
Never	40.4	80.4	69.9	44.0
Former	60.8	80.7	79.3	45.7
Current	62.3	82.8	74.0	53.8
Women				
Never	34.1	64.1	55.6	16.5
Former	55.2	63.1	68.2	46.4
Current	57.8	68.7	70.5	43.5

Table 6 shows the sex-specific median age at starting smoking, median number of years of smoking, and median number of cigarettes usually smoked for male and female former and current smokers. Men started smoking at earlier ages and smoked more years than did women. Men who were former smokers started at an older age than did current smokers, as did women former smokers from Iowa. East Boston and New Haven women who were former smokers reported the same median age at starting to smoke as did current smokers, and Piedmont women who were current smokers started at a later age than did former smokers. Although men at the various sites did not differ greatly in the age at which they started to smoke, Iowa women were the oldest when they started to smoke.

There was a marked numerical preference in reporting the average number of cigarettes smoked: from 24% to 34% of ever smokers reported that they smoked one pack a day, and the median clearly reflects this bias. However, examination of the cumulative distributions revealed that men smoked more cigarettes than did women. The lightest current smokers were women from Iowa, New Haven, and Piedmont, and the heaviest were East Boston men. The lightest former smokers were women from Iowa and Piedmont, and the heaviest were New Haven men. Examination of the 75th percentile of the number of cigarettes smoked indicated that the number was consistently higher among men who were former as opposed to current smokers (Iowa:

Table 6. Median age at starting smoking, number of years of smoking, and average number of cigarettes smoked per day for former (F) and current (C) smokers

	Iowa		East Boston		New Haven		Piedmont	
	F	C	F	C	F	C	F	C
Men								
Starting age (years)	18	16	16	15	17	16	18	16
Number of years of smoking	38	54	41	55	41	54	36	53
Number of cigarettes per day	20	20	20	20	30	20	20	18
Women								
Starting age (years)	28	25	22	22	20	20	21	23
Number of years of smoking	28	45	33	47	35	50	32	47
Number of cigarettes per day	10	15	15	20	15	15	10	15

Table 7. Self-reported lifetime history rates (per 100) of physician-diagnosed illnesses and self-reported rates (per 100) of specified symptoms among never (N), former (F), and current (C) smokers

	Iowa			East Boston			New Haven			Piedmont		
	N	F	C	N	F	C	N	F	C	N	F	C
Men												
Illness												
Myocardial infarction	17.1	22.9	17.8	11.6	15.3	13.6	13.3	17.2	13.1	12.4	17.5	18.5
Stroke	5.9	9.7	6.0	5.6	5.7	6.1	6.7	8.8	7.4	7.8	9.5	9.6
Hypertension	33.0	35.6	29.9	34.7	32.4	31.0	37.3	40.0	34.5	45.1	42.1	44.6
Cancer	14.0	13.6	11.1	8.7	11.8	7.4	6.8	13.3	7.3	10.3	16.9	12.4
Symptom												
Respiratory[a]	41.8	53.2	61.8	45.6	61.1	76.0	39.7	55.1	70.1	48.5	61.3	73.4
Chest pain	27.9	35.3	30.8	24.8	23.9	28.4	25.2	33.2	24.7	34.9	41.2	37.7
Leg pain[b]	17.5	23.3	27.3	29.1	34.4	42.8	22.8	38.1	38.2	28.5	37.8	40.7
Women												
Illness												
Myocardial infarction	7.1	13.5	17.1	7.9	12.5	8.1	8.3	10.3	8.2	10.4	11.6	9.8
Stroke	5.5	6.6	4.0	3.8	3.9	5.4	6.0	5.9	6.3	5.5	5.0	4.0
Hypertension	48.3	59.8	51.0	48.0	49.8	43.8	51.5	58.1	37.9	57.5	50.1	59.2
Cancer	14.0	15.4	17.3	16.7	17.1	16.8	15.3	18.1	15.9	10.8	14.3	12.4
Symptom												
Respiratory[a]	36.2	36.6	52.5	49.5	57.2	62.2	43.3	54.9	66.5	55.6	55.0	68.3
Chest pain	23.7	23.7	23.8	24.2	28.6	22.0	27.3	29.6	25.0	39.8	40.3	36.1
Leg pain[b]	20.7	16.5	26.9	43.7	38.6	34.3	36.4	36.7	44.4	42.7	36.2	47.4

[a] One or more of the following: coughing, wheezing, shortness of breath, production of phlegm.
[b] Pain or cramps in legs when walking.

40 and 20; East Boston: 40 and 27; New Haven: 40 and 20; Piedmont: 30 and 20). The differences in the 75th percentile among female former and current smokers among the populations were not consistent.

Table 7 shows, for each of the sites, the sex- and smoking status–specific, age-adjusted lifetime history rates (per 100) for myocardial infarction, stroke, hypertension, and cancer (all sites); and self-reported rates (per 100) of respiratory symptoms (at least one of the following: coughing, wheezing, shortness of breath, and production of phlegm), chest pain, and pain or cramps in legs when walking. Among both men and women, disease history rates were typically highest among former smokers, whereas symptom rates were typically highest among current smokers. In only five instances (cancer in Iowa men, hypertension in East Boston and Piedmont men, stroke in Piedmont women, and leg pain in East Boston women) did never smokers have the highest disease or symptom rates.

Table 8 shows self-perceived health status, phys-

Table 8. Self-perceived health status, physical functional status, and depressive symptoms among never (N), former (F), and current (C) smokers

	Iowa			East Boston			New Haven			Piedmont		
	N	F	C	N	F	C	N	F	C	N	F	C
Men												
Self-perceived health[a]	74.6	63.8	64.4	69.1	61.7	58.0	68.8	61.0	54.4	60.1	57.0	42.8
Physical function[b]	70.5	60.4	59.1	64.2	58.6	53.3	71.0	65.7	64.8	71.5	64.2	56.3
Depressive symptoms[c]	3	3	4	2	3	3	5	5	6	3	3	3
Women												
Self-perceived health[a]	72.6	67.4	58.3	54.3	57.1	59.1	60.8	63.6	55.2	54.5	57.4	53.6
Physical function[b]	61.5	49.0	42.5	45.8	44.9	49.4	57.1	47.9	48.9	50.9	49.8	49.4
Depressive symptoms[c]	4	4	5	5	4	4	6	6	7	3	4	4

[a] Age-adjusted percentage of persons reporting excellent or good self-perceived health status.
[b] Age-adjusted percentage of persons reporting they were able to do all three Rosow-Breslau tasks (heavy housework, walk up and down a flight of stairs, walk half a mile).
[c] 75th percentile of number of symptoms reported in a depressive direction. Depressive symptom scores are expressed as any report of the symptoms. Response scales differed across the study sites; hence, the scales are not comparable.

ical function status, and depressive symptoms among men and women according to smoking status. Self-perceived health status, shown as the age-adjusted percentage of persons who reported excellent or good health, was typically poorest among current smokers (but compare East Boston women). Similarly, the age-adjusted percentage of persons who reported that they could perform all three of the gross physical function tasks was lowest among current smokers, with the exception of East Boston and New Haven women. Within each study site, the 75th percentile for the number of depressive symptoms was typically lowest among never smokers. Although the absolute difference in number of depressive symptoms between never and ever (typically current) smokers is small (one symptom), it represents an increase in depressive symptoms of from 16% to 33%.

DISCUSSION

We have described the demographic characteristics and health status of elderly smokers in four large-scale studies centered in eastern Iowa, East Boston, Massachusetts, New Haven, Connecticut, and central North Carolina (Piedmont). Although the percentages of smokers and the nature of their smoking habits varied considerably across the sites, the relationship of smoking to demographic and health characteristics was consistent. Men were more likely to be ever smokers than were women, and, given that they were smokers, men were more likely to have quit than were women. The percentage of never smokers was highest among the oldest respondents, and quit rates were highest among the oldest respondents. Cigarette smokers were more likely than were nonsmokers to consume alcohol. Both former and current smokers were more likely than never smokers to report major illnesses such as myocardial infarction, stroke, cancer, and hypertension, as well as respiratory symptoms, chest pain, and leg pain and cramps. Depressive symptoms were somewhat less common in never smokers than ever smokers.

Recent data from the National Center for Health Statistics (NCHS)[29] indicate that 36% of men and 54% of women have never smoked cigarettes, 31% and 18%, respectively, are former smokers, and 32% and 28%, respectively, are current smokers. Among persons 65 years of age or older, 50%, 34%, and 16% are never, former, and current smokers, respectively. Our data indicate that elderly Iowans (especially women) were substantially less likely to have ever smoked than the NCHS sample. Women taking part in the East Boston and New Haven studies were also less likely than might be expected to be ever smokers. The East Boston and New Haven men, on the other hand, were slightly more likely than the general population to have ever smoked. Thus, although many elderly persons have never smoked, the majority of elderly men and a sizable percentage of elderly women have a history of cigarette smoking and thus still may be at increased risk of smoking-associated morbidity and mortality.

Age-adjusted rates of myocardial infarction, stroke, hypertension, and cancer were typically lowest among never smokers. Among ever smokers, disease rates were often higher among former than current smokers. This may be due to several factors, including selective survivorship in those with smoking-related illnesses, the cessation of smoking after onset of any serious condition, and any changes in mortality risk that may occur with cessation. However, conclusions should not be drawn from cross-sectional correlations of prevalent cases; the relationships are best evaluated by other means.

On the other hand, rates of respiratory and cardiovascular symptoms were typically highest among current smokers, and self-perceived health status was typically poorest among current smokers. This suggests a continuing health burden when smoking is maintained, even in the oldest age category. Such symptoms and their physiological concomitants should be evaluated for their special impact on risk of incident disease, disease progression, and death.

Given the observed higher rates of serious illness among former compared with current smokers, the poorer self-perceived health status and physical functional status among the latter are somewhat surprising. The types of symptoms reported by current smokers (notably shortness of breath, wheezing, and pain or cramps in legs when walking) might be expected to interfere with the Rosow-Breslau tasks (performing heavy housework, walking a half mile, and walking up and down stairs). Poorer physical functional status and the symptoms reported by current smokers may in turn contribute to their poorer self-perceived health status. In addition, it may be that denial of the seriousness of their illnesses results in somewhat higher self-perceived health status ratings among former smokers. It is possible that cognitive dissonance[30] also may operate in smoking cessation. That is, the effort former smokers expend in smoking cessation causes them to attribute positive characteristics to cessation that may not be true objectively. In addition, the higher levels of depressive symptoms among current smokers may be related (either as cause or reflection) to their poorer self-perceived health status.

The higher levels of depressive symptoms typically found among current smokers is consistent with recent reports of clinical depression in heavy smokers[22] and higher smoking prevalences in patients with depression[31] and adults with histories of depressive symptoms during adolescence.[32] Although our data do not allow inferences as to the direction of the relationship, Glassman et al.[22] found that heavy smokers with histories of major depression were less likely to be successful in cessation than were heavy smokers without histories of depression. It may be, therefore, that elderly smokers as a group are likely to report more depressive symptoms simply because other smokers (that is, those with lower levels of depressive symptoms) are more likely to have successfully quit.

Examination of quit ratios indicated that, although men were more likely than women to start smoking, the relative percentage of men who quit was higher. Perhaps because men are more likely to smoke and also tend to start earlier and smoke more heavily than women, and because, historically, more research has been directed towards the relationship between smoking and disease in men than in women, men are more likely to be advised to quit and have greater motivation to remain abstinent because of incident illness. It is clear, however, that women are at substantial risk for smoking-related disease and need to be advised and encouraged to quit.

The observation that smoking rates were lowest among least-educated women but typically lowest among most-educated men may reflect several factors. It may be that more highly educated women are less traditional and thus more likely to engage in what, for their generation, was a relatively uncommon activity. More-educated women may also be exposed to more situations in which smoking occurs. They may, for example, be more likely to work outside the home in occupations where smoking is more common.

Because our data are cross-sectional, it is difficult to interpret the age-related trends. That is, it is unclear whether the lower percentages of ever smokers in the older age groups is a result of selective mortality or cohort differences. Regardless of the issue of selective mortality, however, a number of former and current smokers do survive to age 85 or older, and these persons may have health care needs beyond those of their age-mates who never smoked.

The rural nature of the Iowa population and the urban characteristics of the East Boston and New Haven populations allow tentative rural–urban comparisons. Iowa men and women were less likely to have ever smoked than their urban counterparts. Respondents from the Piedmont site, which included both urban and rural respondents, had smoking habits similar to those of respondents from East Boston and New Haven. The smoking rates of the Piedmont respondents may, however, reflect the strength and pervasiveness of the tobacco industry in that region. Iowans were less likely to drink than the urban respondents, but they evidenced a stronger relationship between smoking and drinking than did the others. That is, although the majority of East Boston and New Haven men and women had consumed alcohol in the past year regardless of smoking status, the majority of Iowa never smokers (both men and women) had not consumed alcohol. The relatively weak association between cigarette smoking and alcohol consumption among Piedmont respondents may be a reflection of the lower percentage of drinkers among that population. Respiratory symptom rates, which have been reported to be higher among farm populations, possibly because of farm chemical and dust exposure,[33] did not show a clear urban–rural differential. Examination of the individual symptoms, however, indicated that Iowa men younger than 85 years of age were more likely to report shortness of breath, regardless of smoking status, than were men in the other populations.

The clinical implications of these findings are similar to the clinical implications of studies of cigarette smoking in younger persons. That is, cigarette smoking among the elderly is associated with an increased burden of major illnesses, respiratory and cardiovascular symptoms, and physical functional limitations. Smoking cessation, on the other hand, may result in decreased respiratory and cardiovascular symptoms. Thus, among the elderly as among younger persons, smoking cessation has beneficial effects. Clinicians may wish to emphasize relief from symptoms when counseling elderly persons about smoking cessation.

As noted above, an important limitation of these results is that they are cross-sectional. We are not able to determine, for example, whether stopping smoking would be beneficial to elderly smokers. However, the EPESE studies are longitudinal, and longitudinal analyses of smoking-associated morbidity and mortality are underway. Data on self-reported illnesses were not confirmed from medical records and may have introduced some inaccuracy. This is true also of self-reported smoking behavior. Finally, although we obtained estimates of average or usual number of cigarettes smoked at the time of the interview for current smokers and at the time of quitting for former smokers, the estimates may not

reflect accurately the individuals' lifetime smoking habits. That is, there is likely to be variation in number of cigarettes consumed per day over a lifetime of smoking, and summary pack-year estimates may not reflect accurately this consumption.

In summary, a significant percentage of elderly persons are current cigarette smokers, and larger numbers of elderly persons are former smokers. Elderly persons who have histories of cigarette smoking report more illness than do those who have never smoked, and there is evidence that continued smoking is associated with an increased health burden. Based on the experience in these four large geographically diverse populations, smoking in the elderly remains an important public health burden.

This research was supported by National Institute on Aging Contracts NO1-Ag-0-2105, NO1-AG-0-2106, NO1-AG-0-2107, and NO1-AG-4-2110. Additional support was provided by National Institute on Aging Grant AG-07094. The National Institutes of Health program center and four field centers of the Established Populations for Epidemiologic Studies of the Elderly, their institutions, investigators, and principal staff are as follows: Epidemiology, Demography and Biometry Program, National Institute on Aging, National Institutes of Health, Bethesda, Maryland: J. David Curb (Associate Director), Dwight Brock, Paulette Campbell, Joan Cornoni-Huntley, Josephine Cruz, Don Everett, Mary Farmer, Daniel Foley, Jack Guralnik, Andrea LaCroix, Mary Lafferty, Caroline Phillips, and Lon White; Iowa 65+ Rural Health Study, University of Iowa, Iowa City, Iowa: Robert B. Wallace (Principal Investigator), Elizabeth Chrischilles, Patricia Colsher, Gregg Drube, Alex Heckert, Ellen Heywood, James Hulbert, Frank Kohout, Jon Lemke, Michael Mueller, and Andrea Voelker; East Boston Senior Health Project, Brigham and Women's Hospital, Boston, Massachusetts: James O. Taylor (Principal Investigator), Marilyn Albert, Laurence Branch, Nancy Cook, Denis Evans, Harris Funkenstein, Liesi Hebert, Charles Hennekens, Paul Scherr, Laurel Smith, and Terrie Wetle; Yale Health and Aging Project, Yale University, New Haven, Connecticut: Adrian M. Ostfeld (Principal Investigator), Lisa Berkman, Wanda Carr, Peter Charpentier, Stansilav Kasl, Linda Leo-Summers, Joanne McGloin, and Janet Nabors; Piedmont Health Survey of the Elderly, Duke University, Durham, North Carolina: Dan Blazer (Principal Investigator), Bruce Burchett, Harvey Cohen, Gerda Fillenbaum, Linda George, Celia Hybels, Janie Judkin, Ken Manton, Connie Service, and Max Woodbury. The authors gratefully acknowledge the residents of Iowa and Washington counties, Iowa; East Boston, Massachusetts; New Haven, Connecticut; and Durham, Vance, Franklin, Granville, and Warren counties, North Carolina, for their sustained participation in this study.

REFERENCES

1. Agner E. Smoking and health in old age. Acta Med Scand 1985;218:311–6.

2. Agner E. Some cardiovascular risk markers are also important in old age. Acta Med Scand 1985;696(Suppl.):3–50.

3. Barrett-Connor E, Suarez L, Khaw K, Criqui M, Wingard M. Ischemic heart disease risk factors after age 50. J Chron Dis 1984;37:903–8.

4. Doll R, Hill AB. Mortality in relation to smoking: ten years' observations of British doctors. Br Med J 1964;1:1399–410.

5. Hammond EC. Smoking in relation to the death rates of one million men and women. Nat Cancer Inst Monogr 1966;19:127–204.

6. Kaplan GA, Seeman TE, Cohen RD, Knudsen LP, Guralnik J. Mortality among the elderly in the Alameda County Study: behavioral and demographic risk factors. Am J Public Health 1987;77:307–12.

7. Hennekens CH, Buring JE, Mayrent SL. Smoking and aging in coronary heart disease. In: Basse R, Noje G, eds. Smoking and aging. Lexington, Massachusetts: DeGeuth, 1984:95–115.

8. Jajich CL, Ostfeld AM, Freeman DH. Smoking and coronary heart disease mortality in the elderly. JAMA 1984;252:2831–4.

9. Khaw K, Barrett-Connor E, Suarez L, Criqui MH. Predictors of stroke associated mortality in the elderly. Stroke 1984;15:244–8.

10. Shroll M. Smoking habits in the Golstrup population of men and women born in 1914. Acta Med Scand 1980;208:245–56.

11. Arnow WS, Starling L, Etienne F, et al. Risk factors for coronary artery disease in persons older than 62 years in a long-term health care facility. Am J Cardiol 1986;57:518–20.

12. Arnow WS, Starling L, Etienne F, et al. Risk factors for atherothrombotic brain infarction in persons over 62 years in a long-term care facility. J Am Geriatr Soc 1987;35:1–3.

13. Mellstrom D, Savnborg A. Tobacco smoking—a major cause of sex differences in health. Compre Gerontol 1987;1:34–9.

14. Rosenberg L, Miller DR, Kaufman DW, et al. Myocardial infarction in women under 50 years of age. JAMA 1983;250:2801–6.

15. Branch LG. Health practices and incident disability among the elderly. Am J Public Health 1985;75:1436–9.

16. Rogers RL, Meyer JS, Judd BW, Mortel KF. Abstention from cigarette smoking improves cerebral perfusion among elderly chronic smokers. JAMA 1985;253:2970–4.

17. Rogers RL, Meyer JS, Shaw TG, et al. Cigarette smoking decreases cerebral blood flow suggesting increased risk for stroke. JAMA 1983;250:2796–800.

18. Seidell JC, Bakx KC, Deurenberg P, Burema J, Hautvast JGAJ, Huygen FJA. The relation between overweight and subjective health according to age, social class, slimming behavior, and smoking habits in Dutch adults. Am J Public Health 1986;76:1410–4.

19. Branch LG, Jette AM. Personal health practices and mortality among the elderly. Am J Public Health 1984;74:1126–9.

20. Bush TL, Comstock GW. Smoking and cardiovascular mortality in women. Am J Epidemiol 1983;118:480–8.

21. National Institute on Aging. Established populations for epidemiologic studies of the elderly. Edited by J Corn-

oni-Huntley J, Brock DB, Ostfeld AM, Taylor JO, Wallace RB, eds. Bethesda, Maryland: National Institutes of Health, 1986.

22. Glassman AH, Stetner F, Walsh BT, et al. Heavy smokers, smoking cessation, and clonidine. Results of a double-blind, randomized trial. JAMA 1988;259:2863–6.

23. Cornoni-Huntley J, White LR, Cartwright WS, Brock DB, Brody JA. Development of the Epidemiology, Demography, and Biometry Program at the National Institute on Aging: a plan for epidemiologic research on aging. In: Brody JA, Maddox, GL eds. Epidemiology and aging: an international perspective. New York: Springer, 1988:80–99.

24. American Thoracic Society Committee on Standards for Epidemiologic Surveys in Chronic Respiratory Disease. Standards for epidemiologic surveys in chronic respiratory disease. New York: National Tuberculosis and Respiratory Disease Association, 1978.

25. Rose GA, Blackburn H. Cardiovascular survey methods. Geneva, Switzerland: World Health Organization, 1968.

26. US Bureau of the Census. Health interview survey. Washington, DC: US Bureau of the Census, 1979.

27. Rosow I, Breslau N. A Guttman health scale for the aged. J Gerontol 1966;21:556–9.

28. Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. Appl Psychol Meas 1977;1:385–401.

29. Thornberry OT, Wilson RW, Golden PM. Health promotion data for the 1990 objectives. Advance data from vital and health statistics, no. 126. Hyattsville, Maryland: US Public Health Service, 1986.

30. Festinger L. A theory of cognitive dissonance. Stanford, California: Stanford University Press, 1957.

31. Hughes JR, Hatsukami DK, Mitchell JE, et al. Prevalence of smoking among psychiatric outpatients. Am J Psychiatry 1986;143:993–7.

32. Kandell DB, Davies M. Adult sequelae of adolescent depressive symptoms. Arch Gen Psychiatry 1986;43:255–62.

33. Yesalis GE, Lemke JH, Wallace RB, Kohout FJ, Morris MC. Health status of the rural elderly according to farm work history: the Iowa 65+ Rural Health Study. Arch Environ Health 1985;40:245–53.