A Prospective Study of Age and Lifestyle Factors in Relation to Community-Acquired Pneumonia in US Men and Women

Inkyung Baik, PhD; Gary C. Curhan, MD; Eric B. Rimm, ScD; Adrianne Bendich, PhD; Walter C. Willett, MD; Wafaie W. Fawzi, MD, DrPH

Background: Information is limited on risk factors for community-acquired pneumonia (CAP) in free-living populations. We examined the associations of age, smoking status, body mass index (BMI), weight change during adulthood, physical activity, and alcohol intake with risk of CAP among men and women.

Methods: The study population included 26,429 men aged 44 to 79 years from the Health Professionals Follow-up Study and 78,062 women aged 27 to 44 years from the Nurses’ Health Study II. Information was collected by biennial mailed questionnaires and the main outcome was physician-diagnosed incident pneumonia.

Results: There were 290 cases among men (6 years of follow-up) and 305 cases among women (2 years of follow-up). Age, smoking status, BMI, physical activity, and alcohol intake were taken into account in the multivariate logistic regression model. There was a dose-response relation between aging and risk of CAP among men. Compared with never smokers, current smoking was associated with risk of CAP among men (relative risk, 1.46; 95% confidence interval, 1.00-2.14) and women (relative risk, 1.55; 95% confidence interval, 1.15-2.10). In addition, BMI was directly associated with an increased risk of CAP among women. Compared with the participants who maintained their weight during adulthood, the risks were nearly 2-fold higher among men and women who gained 40 lb or more (≥18 kg). The risk of CAP decreased with increasing physical activity among women. We also found no significant relation between alcohol intake and risk of CAP among men and women.

Conclusions: Smoking and excessive weight gain are risk factors for CAP among men and women, and physical activity was inversely associated with risk of CAP only among women. The incidence of CAP could possibly be decreased by lifestyle factors.

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PNEUMONIA IS one of the most frequent infectious diseases and ranks as the sixth leading cause of death in the United States. More than 4 million Americans are estimated to develop pneumonia annually. Risk factors for mortality of community-acquired pneumonia (CAP) among hospitalized patients and for developing CAP in case-controlled studies were identified. However, a few investigations have focused on risk factors for CAP in a general population. Relations between lifestyle factors such as cigarette smoking, alcohol consumption, exercise, and body weight and risk for developing pneumonia leading to death or hospitalization were examined.

Heavy smoking and alcoholism are established strong risk factors for CAP. Current smoking increased risks of hospitalization due to pneumonia in women and men as well as CAP incidence. However, possible con founding of chronic pulmonary disease, asthma, or heart disease existed in the relation between smoking and risk of CAP, and it remained unclear whether past smoking or light-to-moderate smoking is related to CAP incidence. Similarly, heavy alcohol drinking was known to increase risks of pneumococcal infection, but data including moderate alcohol use have been limited. Low body weight, especially in the setting of chronic or severe nutritional deprivation, has been considered a risk factor for CAP. Despite the high prevalence of obesity in the United States, little information is available on the association between body fatness and risk of CAP; recent studies reported that obesity was associated with impaired immune function and that weight reduction resulted in recovering from immune impairment. One strategy to reduce body weight is regular exercise, which may increase immunocompetence and resistance to infections. However, the effects of the intensity or duration of exercise on immune function or the incidence of respiratory tract infection are

From the Departments of Nutrition (Drs Baik, Rimm, Willett, and Fawzi) and Epidemiology (Drs Rimm, Willett, and Fawzi), Harvard School of Public Health, and Channing Laboratory, Department of Medicine, Harvard Medical School, and Brigham and Women’s Hospital (Drs Curhan and Willett), Boston, Mass; and Smithkline Beecham, Consumer Healthcare, Parsippany, NJ (Dr Bendich).
RESULTS

We identified 290 CAP cases during 6 years of follow-up (149,818 person-years) among men and 305 cases during 2 years of follow-up (138,262 person-years) among women. We did not have any death due to pneumonia among men and women.

The characteristics of the 2 cohorts are shown in Table 1. Men who developed CAP were more likely to be old and current smokers. Women who developed CAP were more likely to be heavy and current smokers and exercised less than those who did not develop CAP.

Among men, age and smoking were strong risk factors for CAP in the age-adjusted and multivariate analyses (Table 2). Compared with men younger than 50 years, the multivariate RRs (95% CIs) of CAP increased from 1.52 (0.97-2.39) for men aged 50 to 54 years to 6.17 (2.81-13.04) for those 70 years or older (test for trend P=.001). Compared with never smokers, current cigarette smoking was related to CAP; the multivariate RRs (95% CIs) of CAP for those who quit less than 10 years ago compared with never smokers. The corresponding RR (95% CI) for those who quit smoking 10 years or more ago was 1.23 (0.93-1.62).

In the analyses for body weight, men who gained 18 kg or more since the age of 21 years had about a 2-fold increased risk of CAP compared with those who maintained their weight, whereas there was no linear relation between BMI and CAP (Table 2). To reduce bias from misclassification of body fatness at older age and from leanness due to preclinical or chronic illness, we limited the analysis to 13,604 men younger than 60 years;
relating to the diagnosis of pneumonia, and a diagnosis was considered confirmed if a pulmonary infiltrate was noted on the chest x-ray report. From women who reported that they had definite pneumonia, we obtained medical records from a random sample of 76 subjects. A radiographic diagnosis of pneumonia based on medical record review was confirmed in 82% of cases. Given this high rate of concordance between self-report and the medical records in this subsample, pneumonia among women was based on self-report. The reviewer of medical records was blinded to the self-reported diagnosis.

Deaths were ascertained by information provided by family members, the postal service, and a search of the National Death Index.32 Participants who did not respond were assumed to be alive if they were not listed in the National Death Index.

RISK FACTORS

On the baseline questionnaire, we collected information on age, weight (in pounds), height (in inches), present and past smoking history, physical activity, and alcohol intake. The validity of self-reported body weight, height, physical activity, and alcohol consumption has been reported in detail elsewhere.33–35 We calculated BMI (a measure of weight in kilograms divided by the square of height in meters) using the reported weight and height. Height and recalled weight at the age of 21 years (for men) or at the age of 18 years (for women) were obtained in 1986 and 1991, respectively. We asked about smoking status according to never, past, and current smoking and average number of cigarettes per day (1-4, 5-14, 15-24, 25-34, 35-44, ≥45 cigarettes). We calculated a metabolic equivalents (MET)–hour score for recreational or leisure-time physical activity. The MET-hour score was calculated for each participant by multiplying the reported average time spent at each activity per week by the typical energy expenditure requirements for the activity (expressed in MET-hours).33

Intake of alcohol during the previous year was estimated from a semiquantitative food frequency questionnaire, which included questions about average daily consumption of beer (1 bottle or can), wine (4-oz glass), and spirits (1 drink or shot). For each item on the questionnaire, participants could select 1 of 9 frequency response categories, ranging from never or less than once per month to 6 times or more per day. Total daily alcohol consumption in grams was calculated by multiplying the frequency of consumption and alcohol content of those beverages.

DATA ANALYSIS

We grouped participants into 5-year intervals of age, 5 categories of smoking status (never smoker, past smoker, current smoker of <25 cigarettes per day, current smokers of ≥25 cigarettes per day, and current smoker who did not report the number of cigarettes), 6 categories of BMI (<21, 21-22.9, 23-24.9, 25-26.9, 27-29.9, and ≥30), weight change since the age of 21 years (men) or the age of 18 years (women) (≥5-lb loss, −4.9 to +4.9, +5 to 9.9, +10 to 19.9, +20 to 39.9, ≥40-lb gain), alcohol intake (0, 0.1-5, 5.1-10, 10.1-15, 15.1-30, >30 g/d), and quintiles of physical activity. The number of cases and the cumulative number of person-years of follow-up were assigned to each category of exposure as determined at baseline. Relative risks (RRs) were calculated by dividing the incidence rate of each specific category of exposure by that of the corresponding reference category. We calculated RRs adjusted for age (5-year categories) using the Mantel-Haenszel method,36 and the Mantel extension test was used to test for a linear trend.35 We also estimated RRs adjusted for age, smoking, and other risk factors using multiple logistic regression models. We calculated 95% confidence intervals (CIs) for RRs, and all P values are 2-tailed.

Smokers who spent at least 30 MET-hours per week were 0.66 (95% CI, 0.46-0.95) compared with those in the lowest quintile (MET-hours per week, ≤3.8) after adjusting for age, smoking status, and alcohol intake. After further adjusting for BMI at baseline, the risk was attenuated (RR, 0.76; 95% CI, 0.53-1.10).

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There was no association between alcohol intake and risk of CAP among women (Table 3).

In these 2 prospective studies of men and women, cigarette smoking and excessive weight gain during adulthood were associated with increased risk of CAP. In addition, an increased risk of pneumonia was related to age among men and to BMI and sedentary lifestyle among women.

Our results are based on a prospective study of 2 large cohorts. We tried to reduce the possibility of confounding due to comorbid illnesses by excluding individuals with asthma, cardiovascular disease, cancer, and diabetes at baseline. We used the first event of CAP and also required the diagnosis of pneumonia to be confirmed by a chest x-ray examination for men. For women, self-report of the occurrence was validated in a subsample of women who stated that they had definite pneumonia. The differences in risk factors for pneumonia observed in men and women in part might be due to different age ranges between men and women rather than due to sex differences. For this issue, however, more investigations are needed.

Age, smoking, and low body weight have been previously related to pneumonia. However, since these relations were examined among hospitalized patients or an elderly population who might have a higher underlying risk of pneumonia due to physical or cognitive impairment or other illnesses, the generalizability of the findings is questionable. In general, with advancing age, immune function becomes impaired, and there is a higher incidence of impaired T- and/or B-cell function. The relation between obesity and risk of pneumonia. Obesity is associated with impaired T- and/or B-cell function. The relation between obesity and impaired immunity may be mediated in part by metabolic consequences of obesity, such as hyperglycemia and insulin resistance.

The relation between exercise and respiratory tract infections is controversial. Although high-intensity and long-duration exercise may increase risk of upper respiratory infection, long-duration exercise may increase risk of upper respiratory infection.
data on moderate exercise in an active general population are limited. In a randomized controlled study involving 36 women, the risk of upper respiratory tract infections was reduced during moderate exercise. In addition, moderate physical activity was reported to enhance natural killer cell activity. In one investigation among the elderly, exercise and risk of pneumonia were unrelated. We found a significantly beneficial effect of physical activity on risk of pneumonia among younger women. However, after adjusting for body weight, the relation was attenuated, possibly because of obesity being in the causal pathway between physical activity and developing pneumonia. Among men, the relation between physical activity and pneumonia was U-shaped; however, we did not observe a significant association between heavy exercise and pneumonia.

Heavy alcohol intake is closely related to the risk of pneumonia. In our cohort, since only 0.1% of all subjects were heavy drinkers, defined as daily consumption of alcohol of more than 100 g for men and 80 g for women, we had limited power to observe the effect of heavy drinking. However, our data were adequate to deter-

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>No. of Cases</th>
<th>Person-Years</th>
<th>Age-Adjusted*</th>
<th>Multivariate†</th>
<th>P for Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤49</td>
<td>44</td>
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<td>&lt;.001</td>
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<td>50-54</td>
<td>33</td>
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<td>1.54 (0.98-2.42)</td>
<td>1.52 (0.97-2.39)</td>
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<td>55-59</td>
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<td>60-64</td>
<td>54</td>
<td>20,471</td>
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<td>65-69</td>
<td>55</td>
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<td>2.98 (2.00-4.43)</td>
<td>2.94 (1.97-4.40)</td>
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<tr>
<td>&gt;70</td>
<td>60</td>
<td>14,816</td>
<td>4.19 (2.84-6.19)</td>
<td>4.17 (2.81-6.19)</td>
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<td>Smoking status</td>
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<td></td>
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<td>Never smokers</td>
<td>106</td>
<td>70,513</td>
<td>1.00 (Referent)</td>
<td>1.00 (Referent)</td>
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<tr>
<td>Former smokers‡</td>
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<td></td>
<td></td>
<td></td>
<td>Not applicable</td>
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<td>≥10 years ago</td>
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<tr>
<td>&lt;10 years ago</td>
<td>31</td>
<td>13,464</td>
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<td>Current smokers§</td>
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<tr>
<td>&lt;25 cigarettes/d</td>
<td>18</td>
<td>7,699</td>
<td>1.47 (0.89-2.43)</td>
<td>1.42 (0.85-2.35)</td>
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<tr>
<td>≥25 cigarettes/d</td>
<td>13</td>
<td>3,310</td>
<td>2.65 (1.49-4.74)</td>
<td>2.54 (1.40-4.59)</td>
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</tr>
<tr>
<td>Body mass index (kg/m²)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;21.0</td>
<td>17</td>
<td>5,666</td>
<td>1.57 (0.89-2.78)</td>
<td>1.55 (0.87-2.75)</td>
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<tr>
<td>21.0-22.9</td>
<td>39</td>
<td>22,050</td>
<td>1.00 (Referent)</td>
<td>1.00 (Referent)</td>
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</tr>
<tr>
<td>23.0-24.9</td>
<td>67</td>
<td>41,128</td>
<td>0.92 (0.62-1.37)</td>
<td>0.91 (0.62-1.36)</td>
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<td>25.0-26.9</td>
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<td>0.94 (0.63-1.39)</td>
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<tr>
<td>27.0-29.9</td>
<td>78</td>
<td>28,566</td>
<td>1.57 (1.07-2.32)</td>
<td>1.53 (1.04-2.26)</td>
<td></td>
</tr>
<tr>
<td>≥30.0</td>
<td>21</td>
<td>12,331</td>
<td>1.02 (0.60-1.73)</td>
<td>0.97 (0.57-1.67)</td>
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</tr>
<tr>
<td>Weight change since age 21 y, lb</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥5 loss</td>
<td>45</td>
<td>19,826</td>
<td>1.61 (0.96-2.70)</td>
<td>1.58 (0.93-2.67)</td>
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</tr>
<tr>
<td>≥4.9 to &lt; 4.9</td>
<td>21</td>
<td>16,180</td>
<td>1.00 (Referent)</td>
<td>1.00 (Referent)</td>
<td></td>
</tr>
<tr>
<td>+5.0 to 9.9</td>
<td>28</td>
<td>16,523</td>
<td>1.37 (0.78-2.42)</td>
<td>1.38 (0.78-2.43)</td>
<td></td>
</tr>
<tr>
<td>+10 to 19.9</td>
<td>55</td>
<td>34,880</td>
<td>1.19 (0.72-1.97)</td>
<td>1.17 (0.71-1.94)</td>
<td>.27</td>
</tr>
<tr>
<td>+20 to 39.9</td>
<td>89</td>
<td>43,880</td>
<td>1.45 (0.90-2.34)</td>
<td>1.41 (0.87-2.30)</td>
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<tr>
<td>≥40 gain</td>
<td>52</td>
<td>19,529</td>
<td>1.79 (1.08-2.98)</td>
<td>1.71 (1.01-2.90)</td>
<td></td>
</tr>
<tr>
<td>Quintile of MET-hours‡</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.74</td>
</tr>
<tr>
<td>Q1 (0-5.9)</td>
<td>57</td>
<td>26,000</td>
<td>1.00 (Referent)</td>
<td>1.00 (Referent)</td>
<td></td>
</tr>
<tr>
<td>Q2 (6.0-14.3)</td>
<td>77</td>
<td>33,571</td>
<td>1.04 (0.74-1.47)</td>
<td>1.07 (0.76-1.51)</td>
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<tr>
<td>Q3 (14.4-26.5)</td>
<td>44</td>
<td>30,217</td>
<td>0.67 (0.45-1.00)</td>
<td>0.69 (0.47-1.03)</td>
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<tr>
<td>Q4 (26.8-45.9)</td>
<td>50</td>
<td>29,961</td>
<td>0.77 (0.53-1.13)</td>
<td>0.80 (0.54-1.17)</td>
<td>.74</td>
</tr>
<tr>
<td>Q5 (≥46.0)</td>
<td>62</td>
<td>30,069</td>
<td>0.93 (0.65-1.33)</td>
<td>0.96 (0.67-1.38)</td>
<td></td>
</tr>
<tr>
<td>Alcohol intake, g/d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.85</td>
</tr>
<tr>
<td>Never drinkers</td>
<td>60</td>
<td>34,028</td>
<td>1.00 (Referent)</td>
<td>1.00 (Referent)</td>
<td></td>
</tr>
<tr>
<td>≤5</td>
<td>78</td>
<td>37,769</td>
<td>1.30 (0.94-1.79)</td>
<td>1.33 (0.97-1.84)</td>
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<tr>
<td>5.1-10</td>
<td>33</td>
<td>20,017</td>
<td>1.02 (0.68-1.55)</td>
<td>1.04 (0.69-1.57)</td>
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<tr>
<td>10.1-15</td>
<td>34</td>
<td>18,015</td>
<td>1.13 (0.75-1.71)</td>
<td>1.13 (0.75-1.70)</td>
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</tr>
<tr>
<td>15.1-30</td>
<td>38</td>
<td>16,546</td>
<td>1.39 (0.94-2.07)</td>
<td>1.39 (0.93-2.07)</td>
<td></td>
</tr>
<tr>
<td>&gt;35</td>
<td>35</td>
<td>14,816</td>
<td>1.32 (0.88-1.98)</td>
<td>1.17 (0.77-1.77)</td>
<td></td>
</tr>
</tbody>
</table>

*Crude relative risks for age.
†To obtain multivariate relative risks, a logistic regression model includes all explanatory variables: age (5-year intervals), smoking status (never, former, current smoker of fewer than 25 cigarettes per day, current smoker of 25 or more cigarettes per day, and current smoker with unknown amount), body mass index (calculated as weight in kilograms divided by the square of height in meters; 6 categories), quintile of metabolic equivalent (MET) per week of physical activity, and alcohol intake (0, 0.1-5, 5.1-10, 10.1-15, 15.1-30, or ≥30.1 g/d).
‡Years since quit smoking.
§Average number of cigarettes smoked per day.
||For weight change since the age of 21 years, the multivariate relative risks were further adjusted for body mass index at the age of 21 years.
¶For mean MET per week of physical activity, the multivariate relative risks were adjusted for age, smoking status, and alcohol intake except body mass index.


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mine that there was no association between low or moderate alcohol intake and risk of pneumonia.

Our study has several limitations. First, we used different approaches for case ascertainment among men and women. We confirmed the diagnosis of pneumonia by reviewing medical records for all male cases but not for all female cases. However, there was a relatively high concordance rate (82%) between radiographic diagnosis of pneumonia and self-report of pneumonia in a subsample of women. Second, we could not discriminate between bacterial and viral pneumonia, because we did not have etiologic information. Third, we could not take into account potential confounding by use of pneumococcal or influenza vaccination, other unmeasured illness that might affect immunity, and infections from children, especially in women. In future studies, these possible confounders should be considered, and younger men and older women should be investigated.

In summary, we found several risk factors for CAP using prospective data obtained from 2 cohort studies. Risk factors included age and cigarette smoking for men and current smoking for women. Obesity was a risk factor for CAP among women but not among men, but both men and women who gained 40 lb or more during adulthood had nearly twice the risk compared with those who maintained their weight. Active women had a lower risk

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>No. of Cases</th>
<th>Person-Years</th>
<th>Relative Risk (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
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<td></td>
<td>Age-Adjusted*</td>
</tr>
<tr>
<td>≤34</td>
<td>101</td>
<td>44,964</td>
<td>1.00 (Referent)</td>
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<td>35-39</td>
<td>99</td>
<td>49,143</td>
<td>0.89 (0.68-1.18)</td>
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<td>40-45</td>
<td>105</td>
<td>44,155</td>
<td>1.05 (0.80-1.38)</td>
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<td>Smoking status</td>
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<tr>
<td>Never smokers</td>
<td>180</td>
<td>91,493</td>
<td>1.00 (Referent)</td>
</tr>
<tr>
<td>Former smokers‡</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>≥10 years ago</td>
<td>52</td>
<td>23,957</td>
<td>1.10 (0.80-1.50)</td>
</tr>
<tr>
<td>&lt;10 years ago</td>
<td>15</td>
<td>5,550</td>
<td>0.90 (0.40-2.01)</td>
</tr>
<tr>
<td>Current smokers§</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>≤25 cigarettes/d</td>
<td>46</td>
<td>13,761</td>
<td>1.68 (1.21-2.32)</td>
</tr>
<tr>
<td>≥25 cigarettes/d</td>
<td>8</td>
<td>2,510</td>
<td>1.60 (0.79-3.26)</td>
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<tr>
<td>Body mass index</td>
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</tr>
<tr>
<td>&lt;21.0</td>
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<td>35,790</td>
<td>0.99 (0.69-1.42)</td>
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<td>21.0-22.9</td>
<td>58</td>
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<td>1.00 (Referent)</td>
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<td>23.0-24.9</td>
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<td>24,705</td>
<td>0.61 (0.39-0.97)</td>
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<td>25.0-26.9</td>
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<td>27.0-29.9</td>
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<td>15,087</td>
<td>1.93 (1.30-2.95)</td>
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<tr>
<td>≥30.0</td>
<td>71</td>
<td>16,881</td>
<td>2.32 (1.64-3.30)</td>
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<tr>
<td>Weight change since age 18 y, lb</td>
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<td></td>
</tr>
<tr>
<td>≥5 loss</td>
<td>27</td>
<td>15,522</td>
<td>1.05 (0.62-1.78)</td>
</tr>
<tr>
<td>-4.9 to +4.9</td>
<td>29</td>
<td>17,542</td>
<td>1.00 (Referent)</td>
</tr>
<tr>
<td>+5 to 9.9</td>
<td>29</td>
<td>16,409</td>
<td>1.07 (0.64-1.79)</td>
</tr>
<tr>
<td>+10 to 19.9</td>
<td>43</td>
<td>31,767</td>
<td>0.82 (0.51-1.31)</td>
</tr>
<tr>
<td>+20 to 39.9</td>
<td>90</td>
<td>34,723</td>
<td>1.57 (1.03-2.38)</td>
</tr>
<tr>
<td>≥40 gain</td>
<td>87</td>
<td>22,300</td>
<td>2.35 (1.54-3.59)</td>
</tr>
<tr>
<td>Quintile of MET-hours‡</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q1 (0-3.8)</td>
<td>75</td>
<td>27,414</td>
<td>1.00 (Referent)</td>
</tr>
<tr>
<td>Q2 (3.9-9.1)</td>
<td>70</td>
<td>27,714</td>
<td>0.93 (0.67-1.29)</td>
</tr>
<tr>
<td>Q3 (9.2-17.3)</td>
<td>58</td>
<td>27,684</td>
<td>0.78 (0.55-1.09)</td>
</tr>
<tr>
<td>Q4 (17.4-32.2)</td>
<td>54</td>
<td>27,803</td>
<td>0.72 (0.51-1.02)</td>
</tr>
<tr>
<td>Q5 (≥32.3)</td>
<td>48</td>
<td>27,649</td>
<td>0.64 (0.44-0.92)</td>
</tr>
<tr>
<td>Alcohol intake, g/d</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never drinkers</td>
<td>135</td>
<td>56,053</td>
<td>1.00 (Referent)</td>
</tr>
<tr>
<td>≤5</td>
<td>107</td>
<td>51,864</td>
<td>0.86 (0.66-1.10)</td>
</tr>
<tr>
<td>5.1-10</td>
<td>25</td>
<td>13,020</td>
<td>0.80 (0.52-1.22)</td>
</tr>
<tr>
<td>10.1-15</td>
<td>18</td>
<td>6,823</td>
<td>1.09 (0.67-1.79)</td>
</tr>
<tr>
<td>15.1-30</td>
<td>8</td>
<td>3,466</td>
<td>0.96 (0.47-1.97)</td>
</tr>
<tr>
<td>&gt;30</td>
<td>4</td>
<td>1,380</td>
<td>1.22 (0.45-3.28)</td>
</tr>
</tbody>
</table>

*Crude relative risks for age.
†To obtain multivariate relative risks, a logistic regression model includes all explanatory variables: age (5-year intervals), smoking status (never, former, current smoker of fewer than 25 cigarettes per day, current smoker of 25 or more cigarettes per day, and current smoker with unknown amount), body mass index (calculated as weight in kilograms divided by the square of height in meters; 6 categories), quintile of metabolic equivalent (MET) per week of physical activity, and alcohol intake (0, 0.1-5, 5.1-10, 10.1-15, 15.1-30, or ≥30.1 g/d).
‡Years since quit smoking.
§Average number of cigarettes smoked per day.
\|For weight change since the age of 18 years, the multivariate relative risks were further adjusted for body mass index at the age of 18 years.
¶For mean MET per week of physical activity, the multivariate relative risks were adjusted for age, smoking status, and alcohol intake except body mass index.
for CAP than inactive women. Apparent variations in associations by sex may be related to the age difference of the cohorts. These data suggest that to a considerable degree CAP may be a preventable disease if physical activity is increased and smoking and weight gain are avoided.

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Corresponding author: Wafaie W. Fawzi, MD, DrPH, Harvard School of Public Health, Department of Nutrition, 665 Huntington Ave, Bldg 2, Room 329, Boston, MA 02115 (e-mail: mina@hsph.harvard.edu).

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