Chronic Obstructive Pulmonary Disease Prevalence Among Nonsmokers by Occupation in the United States

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Objective: To examine the prevalence of chronic obstructive pulmonary disease (COPD) among nonsmokers by occupation in the United States. **Methods:** The 1997 to 2004 National Health Interview Survey data for working adults aged 25 years or more were used to estimate the COPD prevalence and to examine change in COPD prevalence between 1997 to 2000 and 2001 to 2004 by occupational groups. **Results:** During 1997 to 2004, COPD prevalence was 2.8%. The COPD prevalence was highest in financial records processing (4.6%) occupations. There was a slight increase in COPD prevalence during the two survey periods from 2.8% during 1997 to 2000 compared with 2.9% during 2001 to 2004. **Conclusions:** No significant changes in the COPD prevalence between the two periods were found. Nevertheless, the elevated COPD prevalence in certain occupational groups suggests that other risk factors play a role in developing COPD.

Chronic obstructive pulmonary disease (COPD) is characterized by the presence of airflow limitation that is not fully reversible.[1,2] This disease is the third leading cause of mortality in the United States and a target for public health prevention.[3] It was the fifth leading cause of death worldwide in 2001, and according to the Global Burden of Disease Study, it will become the third leading cause of death worldwide by 2020.[4] The growing burden of COPD is partly due to cigarette smoking, the aging of the world population, and environmental and occupational factors.[4,5]

In 2009, more than 12 million adults aged 25 years or more were diagnosed with COPD in the United States.[6] In 2006, approximately 670,000 hospitalizations[7] and in 2007, 128,000 deaths were associated with COPD.[8]

The Healthy People 2020 initiative tracks approximately 1200 objectives to promote quality of life, longer lives free of preventable diseases, and to improve the health of the US population.[9] The respiratory disease objectives seek a reduction in COPD-related emergency department visits, hospitalizations, and deaths.[10]

Cigarette smoking is associated with 80% to 85% of all COPD cases.[11] During 1988 to 1994, COPD prevalence among currently smoking US adults was 12.8% compared with 2.5% among nonsmoking adults.[12] Studies from Europe and Asia reported that the prevalence of COPD among nonsmokers ranged from 3.1% to 16.7%.[13–16] Among working adults, an estimated 25% to 45% people with COPD have never smoked, and COPD in these adults may be associated with occupational and environmental exposures or other risk factors.[17,18] On the basis of a review of the scientific literature, in 2003, the American Thoracic Society has concluded that a median of 15% (range 4% to 24%) of COPD is attributable to occupational exposures.[2] Occupational exposures associated with COPD include dusts, gases, minerals (coal, oil mist, and silica), fibers, chemicals (vanadium, cadmium, isocyanates, vinyl chloride, and polycyclic aromatic hydrocarbons), and welding fumes.[19–24] A study based on the Third National Health and Nutrition Examination Survey (NHANES III) reported that the fraction of COPD attributable to occupation was 31.1% among nonsmokers and prevalence odds ratio for COPD was elevated for certain industries and occupations among nonsmokers.[12] For example, COPD was significantly associated with the utility industry (odds ratio = 27.7; 95% confidence interval [CI] = 3.6 to 214) and the records processing and distribution clerks occupation (odds ratio = 2.9; 95% CI = 1.1 to 7.6).[12] The objective of this study was to examine COPD prevalence changes among nonsmoking working adults between 1997 to 2000 and 2001 to 2004 by occupational groups.

MATERIALS AND METHODS

The National Health Interview Survey (NHIS) is a personal household interview survey of the civilian noninstitutionalized US population on various health conditions conducted by the National Center for Health Statistics since 1957.[25] The NHIS data are collected annually from approximately 43,000 households including about 106,000 people. For this study, we used publicly available 1997 to 2004 NHIS data collected from 258,279 adults aged 18 years or more. The NHIS questionnaire was redesigned in 1997, and there were changes from the prior sampling design but the coding schemes used to create the industry and occupation recodes were same during 1997 through 2004. Therefore, we used the 1997 to 2004 NHIS data for analysis. After 2004, there were changes in coding of occupations,[26] and occupational data collected after 2004 were not comparable to the previous years. The survey response rate for NHIS Adult Sample ranged from 80.4% in 1997 to 72.5% in 2004. Questionnaires, data sets, and related documentation are available at http://www.cdc.gov/nchs/nhis.htm.

We examined data for currently employed nonsmoking participants aged 25 years or more (n = 78,163). Survey participants were determined to be currently employed if they indicated that they were "working at a job or business," "with a job or business but not at work," or "working, but not for pay, at a job or business" during the week prior to their interview. Employed adults were asked about their current occupation. For confidentiality reasons, the National Center for Health Statistics created 41 occupational groups for public use data files.[27] These recodes were based on occupational groups and subgroups consistent with the 1987 Standard Occupation Code.[28] Nonsmokers were defined as survey participants who reported that they had never smoked or those who had smoked fewer than 100 cigarettes during their entire life. We restricted the study to those aged 25 years or more because COPD due to occupational exposure would not generally be observed before that age.[29] Participants were determined to have COPD using a "yes" response to one or both questions: "During the past 12 months, have you been told by a doctor or other health professional that you had chronic bronchitis?" or "Have you ever been told by a doctor or other health professional that you had emphysema?"

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The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the National Institute for Occupational Safety and Health.

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Data Analysis

We used SAS® software version 9.2 (SAS Institute Inc, Cary, NC) for analysis. To estimate the COPD prevalence, sample weights from NHIS were used to account for the complex sampling design and nonresponse. To improve the precision and reliability of the estimates, we combined NHIS data for 1997 to 2000 and for 2001 to 2004. Because of small sample sizes, we collapsed 41 occupational groups into 27 groups, after a previously used procedure (Table 1).[30] We calculated the relative standard error (RSE) for each estimate.[31] The RSE is a measure of the precision of estimates and was calculated as follows: standard error/estimates × 100. Prevalence estimates with the RSE between 30% and 50% are reported but may be unreliable. Estimates with the RSE of 50% or more are not reported. We examined means and 95% CIs for age by occupational groups between 1997 to 2000 and 2001 to 2004 to assess potential confounding by age in comparing COPD prevalence for two periods. We used the *t* test for the difference of the COPD prevalences between groups; $P \leq 0.05$ was considered to be significant.

TABLE 1. Occupational Groups on the Basis of NHIS Occupational Codes

NHIS Code	Occupational Group	Occupations (1987 Standard Occupation Code)[26]
22	Private household	Launderers and ironers, housekeepers and butlers, child care workers, private household cleaners, and servants (403–407)
35	Machine operators and tenders, except precision	Machine operators and tenders, except precision (703–779)
17	Other administrative support: computer operators	Computer equipment operators (308–309)
4–6	Engineers and scientists	Engineers (044–049, 053–059); architects and surveyors (043, 063); natural mathematical and computer scientists (064–069, 073–079, 083)
40, 41	Material handlers, equipment cleaners, helpers, and laborers	Construction laborers (869); freight, stock, and material handlers (864–868, 874–878, 883, 885, 887–889)
37–39	Transportation and material moving	Motor vehicle operators (803–814); other transportation, except motor vehicles (823–834); material moving equipment operators (843–859)
13	Technicians	Technologists, technicians except health (213–218, 223–229, 233–235)
27	Cleaning and building service	Cleaning and building service (448–449, 453–455)
32	Mechanics and repairers	Automobile mechanics, aircraft engine mechanics, industrial machinery repairers, electronic repairers, heating and air conditioning and refrigerator mechanics, elevator installers and repairers, locksmiths and safe repairers (503, 505–549)
9	Teachers, librarians, and counselors	Teachers, librarians, counselors, activists, curators (113–165)
25	Food service	Food services (433–436, 438–439, 443–444)
7, 8, 12, 26	Health related	Health diagnosing occupations (084–089); health assessment and treating occupations (095–099, 103–106); health technologists and technicians (203–208); health service (445–447)
28	Personal service	Personal service (456–459, 461–469)
15	Sales representative, commodities, and finance	Sales representatives, commodities, and finance (253–259)
33	Construction and extractive trades	Construction and extractive trades (553–617)
24	Other protective service	Other protective service occupations (415, 425–427)
10	Writers, artists, entertainers, and athletes	Authors, craft artists, painters (183–189); dancers, artists, editors, athletes (193–199)
1–3, 21	Management related	Officials and administrators; public administration (003–006); managers and administrators (007–008, 013–038, 021–022); management-related occupations (023–029, 033–037); other administrative support (303–307, 316–319, 325–387, 389)
11	Other professional specialty	Economists, psychologists, sociologists, social scientists, social workers, lawyers, judges (166–179)
18	Secretaries, stenographers, and typists	Secretaries, stenographers, and typists (313–315)
14	Supervisors and proprietors	Supervisors and proprietors (243)
34, 36	Fabricators, assemblers, inspectors, and precision production	Precision production occupations (628, 634–699); fabricators, assemblers, inspectors (783–787, 789, 793, 795–799)
19	Financial records processing	Financial records processing (337–339, 343–344)
20	Mail and message distributing	Mail and message distributing (354–357)
16	Other sales	Other sales (263–269, 274–278, 283–285)
23	Police and firefighters	Police and firefighters (413–414, 416–418, 423–424)
29–31	Farming, forestry, and fishing	Farm operators and managers (473–476); farm workers and other agricultural workers (477–489); forestry and fishing (494–499)

NHIS, National Health Interview Survey.

We calculated the percentage change in the COPD prevalence between 1997 to 2000 and 2001 to 2004 and tested the significance.[32] The percentage change estimates with the RSE of more than 30% were not tested. We calculated 95% CIs for the percentage change estimate.[32]

RESULTS

During 1997 to 2004, the COPD prevalence among nonsmoking working adults aged 25 years or more was 2.8% (95% CI = 2.7 to 3.0) (Table 2). The prevalence was significantly higher in females than in males, in both whites and blacks compared with other races. Between 1997 to 2000 and 2001 to 2004, the overall average annual COPD prevalence and prevalence by age, sex, and race did not change significantly (Table 2).

During 1997 to 2004, of the 27 occupational groups, 3 groups had significantly higher annual average COPD prevalence than the overall annual prevalence (2.8%): *financial records processing* (4.6%), *mail and message distributing* (4.4%), and *secretary, stenographers, and typists* (4.1%). The differences in annual average COPD prevalences in these occupational groups were not confounded by age. The mean ages in these occupational groups do not differ statistically between the two periods. For example, the mean age for *financial records processing* was 43.6 (95% CI = 42.9 to 44.3) years and 44.7 (95% CI = 44.0 to 45.3) years for 1997 to 2000 and 2001 to 2004, respectively (data not shown). In 17 occupational groups, the COPD prevalence increased between 1997 to 2000 and 2001 to 2004, but these changes were not significant (Table 3). The percentage change in COPD prevalence ranged from −70.0% (ie, indicating the decrease in prevalence) to 93.3% (ie, indicating the increase in prevalence). The COPD prevalence increased more than 50% in *private household* (93.3%), *machine operators and tenders*, *except precision* (92.3%), *other administrative support* (61.5%), and *engineers and scientists* (53.3%) occupational groups. The COPD prevalence decreased more than 50% in *farming*, *forestry*, *and fishing* (−70.0%) and *police and firefighters* (−57.1%) occupational groups. No statistically significant percentage change was found in these occupational groups (Table 3).

DISCUSSION

This study found that during 1997 to 2004, the NHIS estimate of the average annual prevalence of COPD among nonsmoking working adults was 2.8%. This prevalence was similar to the COPD estimate of 2.4% in US nonsmoking working adults from the 1988 to 1994 NHANES III data[12] that defined COPD using the Global Initiative for Chronic Obstructive Lung Disease (GOLD) working group spirometric criteria.[33]

Other studies corroborate our findings. Miravitlles et al[34] reported that the COPD prevalence in Spain was 2.1% in a general population sample of 4035 nonsmokers aged 40 years or more. Lamprecht et al[35] reported that COPD prevalences, on the basis of GOLD criteria, among nonsmoking participants aged 40 years or more in Sweden and Germany were 3.4% and 3.7%, respectively. The reported prevalence of COPD among nonsmokers in Asian countries is higher than that in our study. Data from the 2008 Korean National Health and Nutrition Examination Survey of 6840 adults aged 19 years or more showed that according to the GOLD criteria, the COPD prevalence among nonsmokers was 7.7%.[14] Zhou et al[15] reported that the COPD prevalence among 12,471 Chinese nonsmokers aged 40 years or more was 5.2%. In their study, biomass smoke from cooking, family history of respiratory disease, and low educational levels were independently associated with COPD. In a study among Japanese nonsmokers aged 40 years or more, 5.8% had COPD[16] and the disease was associated with second-hand smoke. In these studies, the COPD prevalence was assessed using the GOLD criteria and different age groups, and the results might not be comparable with the result of this study because we used self-reported physician diagnosis information compared with other studies on the basis of diagnosis with spirometry. In a recent cross-sectional population study in Lebanon among nonsmokers (aged 40 years or more), the prevalence of COPD was 3.4%. Exposure to diesel, which was used for house heating, and old age were associated with COPD.[36] Our results are somewhat different compared with other studies in the world as discussed previously. The reasons may be due to different study methodology including the definition of COPD used and selected subjects' age range in the study. We set the lower age range at 25 years to identify COPD cases to include more of the working population and to increase the sample size by occupation. Nevertheless, most other studies set a lower age limit of 40 years to identify COPD

TABLE 2. Prevalence of COPD Among Nonsmoking Workers by Selected Characteristic and Year (NHIS, 1997 to 2004)

	1997–2004			1997–2000			2001–2004			Prevalence Percentage Change†	
	Workers*	COPD Prevalence		Workers*	COPD Prevalence		Workers*	COPD Prevalence			
Characteristics	(in 1,000s)	%	95% CI	(in 1,000s)	%	95% CI	(in 1,000s)	%	95% CI	%	95% CI
Age group, y											
25–44	39,241	2.4	2.3–2.6	38,643	2.4	2.2–2.6	39,840	2.5	2.3–2.7	4.2	−7.9–16.2
≥45	23,014	3.5	3.3–3.8	20,522	3.5	3.1–3.8	25,506	3.6	3.2–3.9	2.9	−13.5–19.3
Sex											
Male	30,964	1.8	1.6–1.9	29,378	1.6	1.4–1.8	32,551	1.9	1.7–2.2	18.8	−0.7–38.2
Female	31,291	3.9	3.7–4.1	29,787	3.9	3.6–4.2	32,795	3.9	3.6–4.2	0.0	−10.9–10.9
Race											
White	49,848	2.9	2.8–3.1	47,394	2.9	2.7–3.1	52,303	3.0	2.8–3.2	3.4	−6.5–13.4
Black	7,886	2.7	2.4–3.0	7,435	2.6	2.2–3.0	8,337	2.9	2.4–3.3	11.5	−14.2–37.3
Others	4,521	2.0	1.6–2.4	4,336	1.7	1.2–2.2	4,706	2.3	1.7–2.9	35.3	−17.9–88.5
Total	62,255	2.8	2.7–3.0	59,165	2.8	2.6–3.0	65,346	2.9	2.7–3.1	3.6	−6.7–13.9

*Average estimated workers per year.
†Percentage change in the COPD prevalence between 1997 to 2000 and 2001 to 2004; no prevalence percentage change was significant at $P \leq 0.05$.
CI, confidence interval; COPD, chronic obstructive pulmonary disease; NHIS, National Health Interview Survey; y, years.

TABLE 3. Prevalence of COPD Among Nonsmoking Workers by Occupation and Year (NHIS, 1997 to 2004)

		COPD Prevalence							
		1997–2004		1997–2000		2001–2004		Prevalence Percent Change†	
Occupational Groups	Workers* (in 1,000s)	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Private household	379	2.3	1.0–3.6	1.5‡	0.1–2.9	2.9‡	1.0–4.8	93.3	– 127.1–313.8
Machine operators and tenders, except precision	1,351	1.9	1.2–2.6	1.3‡	0.6–2.1	2.5	1.3–3.7	92.3	– 46.4–231.0
Other administrative support and computer operators	413	1.7‡	0.6–2.8	1.3‡	0.1–2.5	2.1‡	0.2–4.1	61.5	– 147.3–270.3
Engineers and scientists	2,963	1.9	1.4–2.5	1.5	0.9–2.2	2.3	1.4–3.1	53.3	– 32.5–139.1
Material handlers, equipment cleaners, helpers, and laborers	1,696	2.3	1.6–3.0	1.8	0.9–2.8	2.7	1.6–3.7	50.0	– 46.7–146.7
Transportation and material moving	2.047	2.1	1.5–2.8	1.7	0.9–2.5	2.5	1.5–3.5	47.1	– 43.8–137.9
Technicians	2,272	2.3	1.7–2.9	1.9	1.2–2.6	2.7	1.7–3.7	42.1	– 32.1–116.3
Cleaning and building service	1,388	3.4	2.5–4.3	2.8	1.7–3.9	3.9	2.5–5.3	39.3	– 34.8–113.4
Mechanics and repairers	1,737	1.4	0.8–2.1	1.2‡	0.4–2.1	1.6	0.7–2.5	33.3	– 83.0–149.6
Teachers, librarians, and counselors	4,481	3.4	2.8–3.9	2.9	2.2–3.5	3.8	3.0–4.6	31.0	– 10.9–73.0
Food service	1,562	3.2	2.3–4.2	2.8	1.6–4.0	3.6	2.2–5.0	28.6	– 45.8–103.0
Health related	4,035	2.8	2.3–3.4	2.5	1.8–3.2	3.1	2.3–3.9	24.0	– 23.2–71.2
Personal service	1,319	4.1	3.0–5.2	3.7	2.3–5.0	4.5	2.9–6.0	21.6	– 41.5–84.8
Sales representatives, commodities, and finance	2,135	2.7	2.0–3.4	2.5	1.6–3.3	2.9	1.9–3.9	16.0	– 41.8–73.8
Construction and extractive trades	2.052	1.4	0.9–1.9	1.3	0.6–2.0	1.5	0.8–2.2	15.4	– 66.8–97.6
Other protective service	376	2.9	1.2–4.6	2.7	0.5–4.9	3.1‡	0.6–5.6	14.8	– 116.8–146.4
Writers, artists, entertainers, and athletes	1,179	3.1	2.2–4.0	2.9	1.8–4.1	3.2	1.9–4.6	10.3	– 51.0–71.7
Management related	9,585	2.7	2.4–3.0	2.7	2.2–3.2	2.7	2.3–3.2	0.0	– 23.7–23.7
Other professional specialty	1,718	3.4	2.4–4.4	3.4	2.1–4.7	3.4	2.1–4.7	0.0	– 54.1–54.1
Secretaries, stenographers, and typists	5,521	4.1	3.5–4.7	4.2	3.4–5.0	4.0	3.2–4.7	– 4.8	– 31.1–21.5
Supervisors and proprietors	1,760	3.1	2.3–4.0	3.3	1.9–4.7	2.9	1.9–4.0	– 12.1	– 60.2–35.9
Fabricators, assemblers, inspectors, and precision production	2,953	3.1	2.4–3.7	3.3	2.4–4.3	2.8	1.9–3.6	– 15.2	– 50.9–20.6
Financial records processing	1,471	4.6	3.5–5.7	5.0	3.3–6.6	4.2	2.7–5.6	– 16.0	– 57.4–25.4
Mail and message distributing	1,090	4.4	3.3–5.5	5.2	3.2–7.1	3.7	2.1–5.3	– 28.8	– 70.0–12.3
Other sales	2,104	3.7	2.8–4.6	4.4	3.0–5.8	3.1	2.1–4.2	– 29.5	– 61.5–2.4
Police and firefighters	828	1.4	0.7–2.2	2.1‡	0.7–3.4	0.9‡	0.1–1.8	– 57.1	– 104.8–9.5
Farming, forestry, and fishing	1,368	1.3	0.7–1.8	2.0	1.0–3.0	0.6‡	0.1–1.0	– 70.0	– 99.2–40.8
Total	62,255	2.8	2.7–3.0	2.8	2.6–3.0	2.9	2.7–3.1	3.6	– 6.7–13.9

*Average estimated workers per year.
†Percentage change of COPD prevalence between 1997 to 2000 and 2001 to 2004; no prevalence percentage change was significant at $P \leq 0.05$.
‡Relative standard error for the estimate 30% to 50%; estimate may be unreliable.
CI, confidence interval; COPD, chronic obstructive pulmonary disease; NHIS, National Health Interview Survey.

cases.[15,16,34,35] In addition, these studies included both workers and nonworkers although we examined only currently employed adults.

During 1997 to 2004, the annual average COPD prevalence was higher in currently employed nonsmoking women than in currently employed nonsmoking men. Results of an international study showed that among nonsmoking women, the prevalence of COPD ranged from 2.9% in Hannover, Germany, to 11.2% in Krakow, Poland.[13] Among nonsmoking men, the prevalence of COPD ranged from 3.1% in Cape Town, South Africa, to 9.4% in Manila, Philippines.[13] Higher COPD prevalence among nonsmoking women has been associated with increased indoor air pollution because of biomass fuels used at home.[15,37,38] Other studies have shown that development of COPD could result from exposures to second-hand smoke at home or in the workplace.[39–41] For example, COPD prevalence among nonsmoking women living with a smoking husband was significantly higher than that among nonsmoking women living with a nonsmoking husband.[39]

During 1997 to 2004, the annual average COPD prevalence in whites was similar to that in blacks and the prevalence in these two races was higher than that in other races. Racial differences in COPD prevalence among nonsmokers have previously been reported.[12,42] The prevalence of COPD, on the basis of NHANES III, was higher

in nonsmoking whites (2.5%) than in nonsmoking blacks (1.6%).[12] In 1995, Whitemore et al[42] reported that the prevalence of COPD among nonsmokers was lower in nonwhites than in whites on the basis of data from NHANES I (1971 to 1975) and NHANES II (1976 to 1980). The reason for these racial differences in COPD prevalence was not addressed in these studies. Eisner et al[43] reported that blacks had greater COPD severity scores than other races, but these differences were not significant when adjusted for socioeconomic status, occupational exposures, and other factors in a cohort study of 1202 Kaiser Permanente Northern California Medical Care Plan members with COPD.

We did not find evidence for the change in the annual average COPD prevalence among employed nonsmoking adults by occupational groups between 1997 to 2000 and 2001 to 2004. Nevertheless, we identified specific occupational groups with more than 30% increase in COPD prevalence during the two periods. Among occupational groups with the increase in COPD prevalence, *machine operators* were associated with the greatest change in the prevalence followed by *engineers and scientists*, *cleaning and building service*, *mechanics and repairers*, and *transportation and material moving.* Various exposures in these occupations have been associated with COPD. For example, *machine operators* and *transportation and material moving* are exposed to diesel exhaust containing combustion gases and fine particles,[23,44] and *cleaning and building service* workers are exposed to bleach and other cleaning products.[45,46] Other occupations (eg, *financial record processing*) have higher COPD prevalence than the overall prevalence. Nevertheless, the risk factors associated with COPD in these occupations are obscure and need to be investigated.

Among eight occupational groups with the decrease in COPD prevalence, two groups including *farming*, *forestry*, *and fishing* and *police and firefighters* had the greatest changes. It is likely that seasonal employment of migrating workers might have affected COPD prevalence in the *farming*, *forestry*, *and fishing* occupational group. Among firefighters and police workers, their medical requirements for the job, such as pulmonary function tests and chest radiographs, could be related to changes in COPD prevalence over time because of enforcement of regulations of medical surveillance.[47] For example, if firefighters have less than 59% of forced expiratory volume in 1 second/forced vital capacity, they will be removed from active duty field assignment[48] and it would be possible that these workers would be reassigned to an administrative or clerical job.

Seven occupational groups had too small a number of cases among never smokers to calculate reliable estimates (ie, standard error of the estimate was 30% to 50%). The low COPD prevalence in certain occupational groups may be explained, in part, by the healthy worker effect.[49] The healthy worker effect occurs because relatively healthy individuals are likely employed and severely ill or disabled workers are likely to leave the workforce.[50] Zhou et al[15] offered a similar explanation for their findings of no significant association between COPD and occupational exposure to dusts and fumes among nonsmokers.

This exploratory cross-sectional study has some limitations. No measurements of cotinine levels for nonsmokers were available to confirm their nonsmoking status. No information on secondhand smoke exposure was available in these NHIS data. Therefore, we could not examine a potential association between secondhand smoke exposure and COPD prevalence. The NHIS is a cross-sectional study, and no causal association between occupation and COPD could be evaluated. Also, the COPD attribution to occupations is subject to possible misclassification. The NHIS collected information on occupations for adults who were working in the week prior to the survey interview and some participants may have changed jobs prior to the interview. Nevertheless, we could not look at the longest held occupations because this information was not included in all survey years. Nevertheless, Gomez-Marin et al[51] reported high agreement between the current job and the longest held job on the basis of the 1986 and 1988 NHIS data and concluded that current occupation could be used as a surrogate for the longest held job. It is possible that the relevant occupational exposures associated with the development of COPD occurred in an occupation different to that reported. Moreover, occupations may not be homogeneous with respect to potential exposures.

Future analysis of COPD by occupation with the use of a job exposure matrix might clarify the association between specific job and COPD.[52,53] The COPD definition was based on self-reported physician diagnosis of chronic bronchitis or emphysema and no pulmonary function data were available to validate the diagnoses; thus, our prevalence estimates may be underestimated.[54] This study was not designed to assess cause-and-effect relationship with a specific hypothesis to test. Finally, no information on other risk factors associated with COPD among nonsmokers, such as indoor air pollution (eg, biomass combustion), family history of respiratory diseases, and genetic factors (eg, α_1-antitrypsin deficiency), was available.[11,14,55–57]

CONCLUSIONS

This study did not find evidence for the significant changes in the COPD prevalence among employed nonsmoking adults between the two periods. Nevertheless, the elevated COPD prevalence in nonsmokers in certain occupational groups suggests that other risk factors play a role in developing COPD. Further epidemiologic studies are needed to identify the specific exposures and factors associated with COPD among nonsmoking workers.

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