The Influence of Chronic Respiratory Conditions on Health Status and Work Disability

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Objectives. This study examined the impact of asthma and chronic obstructive pulmonary disease (COPD) on health status and work disability.

Methods. We used data from a population-based sample of 3805 California adults.

Results. Compared with adults with no chronic health conditions, adults with COPD or asthma had a greater risk of self-reported diminished general health (odds ratio [OR]=10.95; 95% confidence interval [CI]=6.31, 19.0 and OR=3.92; 95% CI=2.31, 6.65, respectively). Respondents with COPD or asthma also had worse mental health status, as indicated by a greater risk of depressive symptoms (OR=10.05; 95% CI=5.29, 19.08 and OR=2.59; 95% CI=1.33, 5.04). COPD was associated with reduced current employment (OR=0.41; 95% CI=0.24, 0.71).

Conclusions. Asthma and COPD are associated with poor health status and greater work disability. (*Am J Public Health.* 2002;92:1506–1513)

Asthma is a common chronic health condition, affecting about 5% of the US adult population.[1] It may have a significant negative impact on health status and the capacity to work. Previous investigators have found that asthma is associated with significant reduction in health-related quality of life.[2–7] As a result, work limitation appears to be common among persons with asthma.[8–14] In terms of indirect health costs, the impact of asthma on decreased work productivity is substantial, accounting for hundreds of millions of dollars annually in the United States.[15,16]

Chronic obstructive pulmonary disease (COPD) is also a common and costly chronic medical condition. Among adults of working age (18–64 years), about 5% report having COPD, defined as either chronic bronchitis or emphysema.[1] COPD has been associated with significantly decreased health-related quality of life.[17–23] Although several studies have examined the impact of workplace conditions on the development of COPD, the impact of COPD on work disability has received less attention.[24–28]

Asthma and COPD, the most common obstructive lung diseases, appear to be associated with impaired health status. Previous studies have examined health status and work disability in samples recruited from clinical sources.[2–4,6–9,17–23] As a consequence, these estimates are based on persons who probably have more severe disease. The impact of asthma and COPD on health status and employment in the general population has not been well characterized. In this study, we examined the impact of asthma and COPD on health status and work disability.

METHODS

Sample Recruitment

We used data from the California Work and Health Survey, a population-based study of California adults aged 18 years or older. The survey was conducted 3 times with independent samples in 1998, 1999, and 2000, for a total of 3805 participating subjects. In all 3 survey waves, the majority of subjects were recruited by random-digit dialing. Detailed sampling methods have been reported.[29] Of the 1771 participating subjects in 1998, 271 African Americans, Asians/Pacific Islanders, and adults with disabilities were randomly oversampled by previously described procedures.[29] Of 1131 subjects in 1999, 431 African Americans, Asians/Pacific Islanders, adults with disabilities, and adults aged 45 to 70 years were randomly oversampled. Of 903 subjects in 2000, 462 African Americans, Asians/Pacific Islanders, and Latinos were randomly oversampled. The completion rates for each survey wave ranged from 55% to 57%.

Classification of Chronic Health Conditions

Structured telephone interviews included a list of common chronic health conditions. Subjects were asked whether they had ever received a physician's diagnosis of each condition. In this study, we defined adults with asthma as respondents who reported ever receiving a physician's diagnosis of asthma. We defined persons with COPD as respondents who reported ever receiving a physician's diagnosis of "a chronic lung disease, like emphysema or chronic bronchitis." As in previous epidemiological surveys,[30] our definition of asthma excluded subjects who also reported emphysema, chronic bronchitis, or other chronic lung disease to reduce misclassification with smoking-related COPD. As a consequence, we classified subjects who reported both asthma and COPD as having COPD. Subjects with both conditions and subjects reporting COPD alone were highly similar in terms of age, sex, and smoking status (data not shown).

The survey elicited other physician-diagnosed chronic health conditions, including hypertension, heart disease (angina, congestive heart failure, heart attack, or other heart problems), diabetes, cancer, migraine headaches, ulcer, kidney or bladder problems, back problems, carpal tunnel syndrome, and arthritis. Among respondents who did not report asthma or COPD, those who reported 1 or more of these conditions were defined as having other, nonrespiratory chronic health conditions.

Health Status Outcomes

The survey included multiple items that measured physical health status. Self-rated general health was assessed by a question developed for the National Health Interview Survey (NHIS) and used in the SF-36 questionnaire, the most widely used generic health

status instrument.[31] On the basis of this item, we defined adverse physical health status as self-reported fair or poor general health (as opposed to good, very good, or excellent health). We ascertained current activity limitation through the following question from the NHIS: "Are you limited in any way in any activities because of a long-term physical or mental impairment or medical condition?"[1] An item from the Behavioral Risk Factor Surveillance System was used to assess recent exercise: "During the past month, did you participate in any physical activities such as running, calisthenics, golf, gardening, or walking for exercise?"[32] We used the following question from the Health and Retirement Survey to evaluate the number of bed days during the past year: "During the past 12 months, how many days did you stay in bed more than half the day because of illness or injury?"[33]

The survey also included questions that ascertained mental health status. Depressive symptoms were evaluated with the Short Geriatric Depression Score, a 15-item scale that assesses mood during the past week.[34,35] A score cutpoint of 7 indicates a high degree of depressive symptomatology. A question from the Detroit Area Study was used to assess sleep quality: "During the past month, how would you rate your sleep quality overall—excellent, very good, good, fair, or poor?"[36] To assess diminished social functioning, we used 3 questions from the Alameda County Study.[37] We defined the outcome "no close friends" as the response "none" to the question, "How many close friends do you have? (People that you feel at ease with, can talk to about private matters and can call on for help)." We ascertained frequency of face-to-face contact using the survey item, "How many of these friends or relatives do you see at least once a month?" We measured frequency of telephone contact using the question, "How often do you talk on the telephone with any close relatives or friends?" For both questions, we defined infrequent contact as less than once per month.

Employment Status

The survey included employment status questions that were patterned after the Bureau of Labor Statistics Current Population Survey.[38] On the basis of these questions, we defined current employment as working or employed but not at work owing to temporary factors, such as illness, vacation, or bad weather. We defined prolonged labor force nonparticipation as no regular job for more than 5 years. Among employed respondents, job loss during the past 3 years was defined as an affirmative response to either of 2 items[38]: "In the past 3 years, did you yourself ever lose a job?" or "In the past 3 years, did you leave a job specifically because you expected to be laid off?" The survey also assessed work duration, in terms of weeks worked per year and hours usually worked per week.

The survey also assessed self-perceived limitation in work capacity due to a chronic health condition (lasting ≥ 3 months).[1] Specifically, subjects who indicated any activity limitation due to a long-term physical or mental impairment were asked, "Does any long-term physical or mental impairment or medical condition now keep you from working at a job or business?" Respondents were also asked, "Are you limited in the kind or amount of work you can do because of any long-term impairment or health problem?"

Other Demographic and Personal Characteristics

On the basis of the survey, we defined low household income as less than 125% of the federal poverty line.[39] Three categories of educational attainment were defined: high school or less, some college, and completed college or greater (includes graduate school). The survey ascertained whether respondents were of Latino or Hispanic descent. Respondents further indicated their race/ethnicity by choosing from several categories: White, Black/African American, Asian/Pacific Islander, or other. Using their responses, we defined 2 racial/ethnic categories: non-Hispanic White and other. We evaluated cigarette smoking by using standard questions.[40]

Statistical Analysis

We performed statistical analysis with SAS 6.12 (SAS Institute, Cary, NC). In all analyses, sampling weights were used to account for oversampling. We report weighted results in all instances, including proportions and means. To evaluate work disability among persons of usual working age, we restricted employment analyses to respondents aged 18 to 64 years (all other analyses used the entire sample).

To evaluate the impact of asthma and COPD on health status and work disability, we conducted logistic regression analyses comparing these subjects with 2 general-population reference groups: persons with other, nonrespiratory chronic health conditions and persons with no chronic conditions. In this manner, we evaluated disability specifically attributable to asthma or COPD (vs that attributable to any chronic medical condition). In addition, we evaluated the health and employment status of adults with COPD compared with those with asthma.

For each health status or employment outcome variable, we conducted these comparisons using a series of logistic regression models with different referent groups. The first logistic regression model included indicator predictor variables for asthma, COPD, and other chronic health conditions (referent group = no chronic conditions). The second model included indicator variables for asthma, COPD, and no chronic health conditions (referent group = other chronic health conditions). This model evaluated the impact of asthma and COPD compared with other, nonrespiratory chronic health conditions. The third model compared COPD with asthma, including indicator variables for COPD, other chronic health conditions, and no chronic health conditions (referent group = asthma). We used the Bonferroni method to calculate 95% confidence intervals corrected for multiple comparisons.

In all logistic regression models, we controlled for demographic and personal characteristics that have been shown to confound the relationship between chronic respiratory health condition and health status. These variables included age, sex, race (non-Hispanic White vs others), smoking status (current and ex-smoking), educational attainment, and low income. Because employment status directly influences income, we excluded income from logistic models evaluating employment variables.

To calculate population attributable risk percentage (etiologic fraction) for selected health status measures, we used the following

expression for adjusted risk estimates: PAR%=(OR−1/OR)×Pc, where PAR% is the population attributable risk percentage, Pc is the proportion of cases exposed to the risk factor (e.g., asthma, COPD, or other chronic health conditions), and OR is the odds ratio for asthma or COPD.[41]

RESULTS

Demographic and Personal Characteristics

A substantial proportion of the general population sample reported either asthma (7.8%), COPD (4.5%), or other, nonrespiratory chronic health conditions (45.9%) (Table 1). Fewer than half of respondents indicated no chronic health conditions (41.8%). All demographic and personal characteristics differed among the 4 groups ($P<.05$ in all cases, see Table 1).

Impact on Health Status of Asthma and COPD Compared With No Chronic Health Conditions

Table 2 demonstrates the bivariate relationship between the 4 health condition groups and health status. Most measures of physical and mental health status were poor among adults with COPD, intermediate in persons with asthma or other chronic conditions, and good in those with no chronic health conditions.

Compared with adults with no chronic health conditions, those with COPD or asthma had a greater risk of diminished physical health status after demographic characteristics and smoking were controlled (Table 2). Respondents with COPD or asthma had a higher likelihood of self-reported fair or poor general health (odds ratios [ORs]=10.95 and 3.92, respectively), current activity limitation (ORs=10.44 and 3.90), and bed days due to illness during the past 12 months (ORs=2.39 and 2.15). Adults with COPD were more likely to report no exercise during the past month (OR=2.01), whereas there was no association between asthma and exercise.

Respondents with COPD or asthma also had worse mental health status than persons with no chronic health conditions (Table 2). Adults with COPD had a greater risk of depressive symptoms (OR=10.05), as did subjects with asthma (OR=2.59) and other chronic health conditions (OR=2.95) after covariates were controlled. Subjects with COPD or asthma also had a greater likelihood of poor sleep quality during the past month (ORs=5.51 and 2.64, respectively). Adults with COPD had diminished social functioning, as indicated by a greater risk of having infrequent face-to-face contact with friends or relatives (OR=2.09; 95% confidence interval [CI]=0.99, 4.39). There was no statistical association between health condition and other

TABLE 1—Demographic and Personal Characteristics of Adults With Asthma, Chronic Obstructive Pulmonary Disease (COPD), Other Chronic Health Conditions, and No Chronic Conditions

	Asthma (n=297, 7.8%)	COPD (n=172, 4.5%)	Other Chronic Conditions (n=1747, 45.9%)	No Chronic Conditions (n=1589, 41.8%)	*P* for Overall Comparison
Mean age, y (SD)	42.2 (16.3)	54.7 (18.1)	50.3 (16.9)	36.5 (14.4)	<.001
Female, n (%)	156 (53)	102 (59)	956 (55)	701 (44)	<.001
Race/ethnicity, n (%)					<.001
White, non-Hispanic	180 (61)	119 (69)	1095 (63)	798 (50)	
African American	32 (11)	13 (8)	131 (8)	93 (6)	
Asian/Pacific Islander	19 (6)	10 (6)	150 (9)	179 (11)	
Hispanic/Latino[a]	61 (21)	27 (16)	360 (21)	525 (33)	
Other[a]	8 (3)	3 (2)	31 (2)	16 (1)	
Educational attainment, n (%)					<.001
High school or less	77 (26)	80 (46)	594 (34)	593 (37)	
Some college	113 (38)	61 (36)	607 (35)	495 (31)	
Completed college or greater	107 (36)	31 (18)	546 (31)	500 (31)	
Low income,[b] n (%)	42 (14)	37 (22)	266 (15)	288 (18)	.023
Married (or cohabitating), n (%)	170 (57)	104 (60)	875 (50)	796 (50)	.008
US Born, n (%)	260 (88)	151 (88)	1366 (78)	1051 (66)	<.001
Smoking status, n (%)					<.001
Ever smoked cigarettes	147 (49)	122 (71)	832 (48)	558 (35)	
Current smoker	62 (21)	52 (30)	351 (20)	262 (17)	
Ex-smoker	85 (29)	70 (41)	481 (28)	296 (19)	
Cumulative smoking intensity (pack-years)[c]	6 (1–22)	24 (8–44)	13 (3–30)	5 (1–15)	<.0001

Note. Results are weighted to account for oversampling of African Americans, Asian/Pacific Islanders, Latinos, persons with disabilities, and persons aged 45 to 70 years.
[a]Hispanic/Latino category overlaps with African American and Asian/Pacific Islander categories; other = none of the race/ethnicity categories.
[b]Low-income category corresponds to below 125% of poverty level.
[c]Median cumulative smoking intensity among ever smokers, with 25th–75th interquartile range given in parentheses. A pack-year corresponds to the number of packs of cigarettes smoked per day times the number of years of smoking.

TABLE 2—Health Status of Adults With Asthma, Chronic Obstructive Pulmonary Disease (COPD), and Other Chronic Health Conditions Compared With Those Without Chronic Conditions: Bivariate Relationships and Multivariate Analysis Controlling for Demographic and Personal Characteristics

	Asthma		COPD		Other Chronic Health Conditions		No Chronic Condition	
Health Status Variable[a]	n (%)	OR (95% CI)[b]	n (%)	OR (95% CI)[b]	n (%)	OR (95% CI)[b]	n (%)	OR (95% CI)[b]
Physical health status								
General health fair or poor	51 (17)	**3.92 (2.31, 6.65)**	75 (45)	**10.95 (6.31, 19.0)**	362 (21)	**4.05 (2.85, 5.75)**	100 (6)	1.0 (referent)
Any current activity limitation	55 (18)	**3.90 (2.36, 6.47)**	77 (45)	**10.44 (6.12, 17.82)**	363 (21)	**3.91 (2.74, 5.57)**	82 (5)	1.0 (referent)
No exercise in past 1 mo	51 (17)	0.83 (0.53, 1.31)	67 (39)	**2.01 (1.25, 3.23)**	373 (21)	0.94 (0.73, 1.21)	330 (21)	1.0 (referent)
At least 1 bed day due to illness in past 12 mo	162 (55)	**2.15 (1.51, 3.05)**	80 (46)	**2.39 (1.49, 3.81)**	743 (43)	**1.76 (1.43, 2.18)**	589 (37)	1.0 (referent)
Mental health status								
Depressive symptoms (geriatric depression score ≥ 7)	25 (8.5)	**2.59 (1.33, 5.04)**	41 (23.9)	**10.05 (5.29, 19.08)**	150 (8.6)	**2.95 (1.91, 4.56)**	62 (3.9)	1.0 (referent)
Poor sleep quality, past month	39 (13)	**2.64 (1.52, 4.60)**	42 (25)	**5.51 (3.04, 9.99)**	196 (11)	**2.41 (1.65, 3.53)**	83 (5)	1.0 (referent)
Diminished social functioning								
No close friends	8 (2.5)	1.31 (0.47, 3.69)	5 (2.7)	0.80 (0.20, 3.20)	72 (4.1)	1.47 (0.84, 2.58)	48 (3.0)	1.0 (referent)
Infrequent face-to-face contact with friends or relatives (<1 time/mo)	10 (3.3)	0.60 (0.24, 1.50)	19 (11.3)	2.09 (0.99, 4.39)	113 (6.5)	1.15 (0.76, 1.75)	88 (5.6)	1.0 (referent)
Infrequent telephone contact with friends or relatives (<1 time/mo)	3 (0.9)	0.48 (0.09, 2.60)	4 (2.5)	1.36 (0.33, 5.67)	25 (1.4)	0.77 (0.36, 1.63)	35 (2.2)	1.0 (referent)

Note. OR = odds ratio; CI = confidence interval. Boldface indicates comparisons in which the 95% confidence interval excludes no effect (i.e., conventional statistical significance). Results are weighted to account for oversampling of African Americans, Asian/Pacific Islanders, Latinos, persons with disabilities, and persons aged 45 to 70 years. For explanation of geriatric depression score, see Methods section.

[a]*P* values for all bivariate comparisons are < .001 except for "no close friends" (*P* = .27) and "infrequent telephone contact" (*P* = .18).

[b]Multiple logistic regression analysis controlling for age, sex, race, educational attainment, smoking status (current and ex-smoker), and low income. Referent group = no chronic health condition. Confidence intervals are adjusted for multiple comparisons using the Bonferroni method.

measures of diminished social functioning in multivariate analysis (Table 2).

Impact on Health Status of Asthma and COPD Compared With Other Chronic Health Conditions

Visual inspection of Table 2 suggests that, compared with those without chronic health conditions, adults with COPD had the most impaired physical and mental health status, whereas the health status of those with asthma and those with other, nonrespiratory health conditions were similar. As shown in Table 3, further logistic regression analyses performed with different referent groups supported this impression. Compared with subjects with other, nonrespiratory chronic health conditions, adults with COPD had a greater risk of fair or poor general health (OR=2.71), activity limitation (OR=2.67), and no recent exercise (OR=2.14). COPD was also related to poorer mental health status. Subjects with COPD had a higher likelihood of depressive symptoms (OR=3.41) and poor sleep quality (OR=2.29) than did those with other chronic conditions. COPD appeared to be associated with a greater risk of infrequent face-to-face social contact (OR=1.81; 95% CI=0.90, 3.64). However, there appeared to be no association between asthma and any physical or mental health status measure in this analysis, indicating that the overall health status of adults with asthma was similar to that of adults with other, nonrespiratory chronic health conditions. Compared with adults with asthma, those with COPD had poorer mental and physical health status (Table 3).

Influence of Asthma and COPD on Employment Status

Among respondents of usual employment age (18–64 years), current employment status differed among the health condition groups (Table 4). The prevalence of current employment was lowest among adults with COPD (46.5%), whereas current employment was higher in the groups with other chronic health conditions (66.2%), asthma (67.6%), and no chronic conditions (71.1%) (*P*<.001).

After control for demographic characteristics and smoking, COPD was associated with a lower likelihood of current employment compared with no chronic health conditions (OR=0.41) (Table 4). There was no statistical relation between current employment and asthma (OR=0.82; 95% CI=0.55, 1.21) or other chronic conditions (OR=0.86; 95% CI=0.68, 1.08). COPD was also related to a greater risk of prolonged nonparticipation in the labor force (OR=2.92), whereas there was no clear impact from asthma or other chronic conditions. Adults with COPD were more likely to indicate a perceived inability to work (OR=19.5) or limitation in the type or amount of work they

TABLE 3—Attributable Impact of Asthma and Chronic Obstructive Pulmonary Disease (COPD) on Adult Health Status

Health Status Variable	Impact Compared With That of Nonrespiratory Chronic Conditions: Asthma, OR (95% CI)[a]	Impact Compared With That of Nonrespiratory Chronic Conditions: COPD, OR (95% CI)[a]	Impact of COPD Compared With That of Asthma, OR (95% CI)[a]
Physical health status			
General health fair or poor	0.97 (0.60, 1.56)	**2.71 (1.68, 4.35)**	**2.80 (1.49, 5.26)**
Any current activity limitation	1.0 (0.64, 1.55)	**2.67 (1.70, 4.20)**	**2.68 (1.48, 4.83)**
No exercise in past 1 mo	0.88 (0.56, 1.39)	**2.14 (1.35, 3.38)**	**2.42 (1.32, 4.44)**
At least 1 bed day due to illness in past 12 mo	1.22 (0.86, 1.72)	1.35 (0.86, 2.12)	1.11 (0.65, 1.91)
Mental health status			
Depressive symptoms (geriatric depression scale score ≥7)	0.88 (0.48, 1.63)	**3.41 (1.96, 5.92)**	**3.88 (1.80, 8.35)**
Poor sleep quality in past 1 mo	1.10 (0.66, 1.83)	**2.29 (1.35, 3.87)**	**2.09 (1.06, 4.12)**
Diminished social functioning			
No close friends	0.89 (0.32, 2.46)	0.55 (0.14, 2.06)	0.61 (0.12, 3.08)
Infrequent face-to-face contact with friends or relatives (<1 time/mo)	0.52 (0.21, 1.29)	1.81 (0.90, 3.64)	**3.47 (1.17, 10.32)**
Infrequent telephone contact with friends or relatives (<1 time/mo)	0.62 (0.11, 3.49)	1.77 (0.43, 7.25)	2.84 (0.35, 23.19)

Note. OR = odds ratio; CI = confidence interval. Boldface indicates comparisons in which the 95% confidence interval excludes no effect (i.e., conventional statistical significance). All results are weighted to account for oversampling of African Americans, Asians/Pacific Islanders, Latinos, persons with disabilities, and persons aged 45 to 70 years. For explanation of geriatric depression score, see Methods section.

[a]Multiple logistic regression analysis controlling for age, sex, race, educational attainment, smoking status (current and ex-smoker), and low income. Referent group is subjects with other chronic health conditions (first 2 columns) or asthma (last column). Confidence intervals are adjusted for multiple comparisons using the Bonferroni method.

could perform (OR=12.90). Asthma and other chronic conditions were also associated with these perceived work limitation measures, although the relationships were less strong. There were no statistical interactions between gender and chronic health condition ($P>.10$).

Among currently employed respondents, COPD (OR=2.14; 95% CI=0.87, 5.26) and other chronic conditions (OR=1.38; 95% CI=0.96, 1.97) were associated with recent job loss, although the confidence intervals did not exclude the possibility of no actual relationship (Table 4). The data also suggested that adults with asthma, COPD, or other chronic conditions worked fewer hours per year, but the confidence intervals included no difference. There was no clear statistical association between asthma and recent job loss. No health condition was related to weekly work duration.

We further examined the relative impact of COPD and asthma on health status, controlling for covariates. Compared with adults with other, nonrespiratory chronic health conditions, those with COPD were less likely to indicate current employment (OR=0.48; 95% CI=0.28, 0.83). Respondents with COPD were also more likely to report perceived inability to work (OR=3.34; 95% CI=1.76, 6.33) and limitation in type or amount of work (OR=2.75; 95% CI=1.48, 5.12). When subjects with COPD were compared with those with asthma, COPD was also associated with lower current employment (OR=0.50; 95% CI=0.27, 0.94), greater likelihood of perceived inability to work (OR=3.53; 95% CI=1.50, 8.31), and higher risk of perceived limitation in type or amount of work (OR=2.78; 95% CI=1.26, 6.12). Among adults with asthma, likelihood of current employment (OR=0.96; 95% CI=0.65, 1.41) and perceived work limitations were similar to those of adults with other, nonrespiratory chronic health conditions.

Population Attributable Risk Percentage

To place the impact of asthma and COPD in a public health perspective, we calculated the population attributable risk percentage for selected health status measures, adjusting for demographic and smoking covariates. The population attributable risk percentage for COPD as a contributor to diminished general health (i.e., fair or poor) was 11.7%; for asthma, it was 6.5%. In other words, nearly 1 in 5 cases of diminished general health among California adults can be attributed to obstructive lung disease. For depressive symptoms, the population attributable risk percentage for asthma (5.5%) and COPD (13.3%) also suggested a substantial contribution of obstructive lung disease. The population attributable risk percentage for no current employment was 1.3% for asthma and 4.6% for COPD. For all other, nonrespiratory chronic health conditions combined, the population attributable risk percentage was 46.3%, 35.6%, and 7.3% for the 3 health status outcomes, respectively.

DISCUSSION

Asthma and COPD are both associated with a major decrement in physical and mental health status and influence a broad range of functioning. Both conditions are associated with work disability, especially perceived limitation of work capacity. COPD, in particular, has a severe negative impact on health status and employment, whereas asthma has effects similar to those of other nonrespiratory chronic health conditions. These conclusions persist after demographic and personal characteristics that affect health and employment status are controlled.

Previous studies have evaluated the health status of patients with asthma[2–7] and COPD.[17–23] Although these studies did suggest that asthma and COPD are associated with impaired health status, they were conducted with subjects recruited from clinical settings. As a result, they probably sampled subjects with more severe disease; thus, their findings may not generalize to adults with asthma or COPD in the general population. In addition, these studies did not elucidate the health status decrement specifically attributable to asthma or COPD, compared with

TABLE 4—Impact of Asthma, Chronic Obstructive Pulmonary Disease (COPD), and Other Chronic Conditions on Work Disability Among Persons Aged 18 to 64 Years (n = 3243): Bivariate Relationships and Multivariate Analysis Controlling for Demographic and Personal Characteristics

	Asthma (n = 274)			COPD (n = 113)			Other Chronic Health Conditions (n = 1354)			No Chronic Condition (n = 1502)		
Employment Status Variable[a]	n (%)	Mean (SD)	OR or Mean Difference (95% CI)[b]	n (%)	Mean (SD)	OR or Mean Difference (95% CI)[b]	n (%)	Mean (SD)	OR or Mean Difference (95% CI)[b]	n (%)	Mean (SD)	OR or Mean Difference (95% CI)[b]
Currently employed[c]	185 (67.6)		0.82 (0.55, 1.21)	52 (46.5)		**0.41 (0.24, 0.71)**	896 (66.2)		0.86 (0.68, 1.08)	1067 (71.1)		1.0 (referent)
Prolonged labor force nonparticipation (> 5 y since regular employment)	19 (6.9)		1.23 (0.58, 2.59)	23 (20.8)		**2.92 (1.35, 6.29)**	106 (7.9)		1.09 (0.69, 1.73)	62 (4.2)		1.0 (referent)
Perceived limitation in work capacity due to a chronic health condition												
Inability to work	20 (7.5)		**5.53 (2.29, 13.36)**	32 (28.1)		**19.5 (8.17, 46.50)**	125 (9.2)		**5.84 (2.95, 11.58)**	18 (1.2)		1.0 (referent)
Limitation in type or amount of work	28 (10.1)		**4.65 (2.24, 9.63)**	32 (28.7)		**12.90 (6.0, 27.75)**	154 (11.4)		**4.68 (2.70, 8.12)**	30 (2.0)		1.0 (referent)
Among currently employed—												
Recent job loss (during past 3 y)	30 (16.2)		1.37 (0.77, 2.47)	13 (25.7)		2.14 (0.87, 5.26)	136 (15.2)		1.38 (0.96, 1.97)	152 (13.3)		1.0 (referent)
No. weeks worked in past 12 mo		45.7 (12.2)	-1.91 (-4.27, 0.44)		44.8 (14.0)	-2.76 (-7.12, 1.60)		46.5 (11.8)	-1.39 (-2.80, 0.028)		47.3 (11.6)	0 (referent)
No. hours worked per week (average) in past 12 mo		41.3 (12.1)	0.31 (-2.26, 2.87)		39.8 (14.5)	-0.35 (-4.50, 4.29)		41.1 (11.6)	-0.019 (-1.53, 1.49)		40.9 (13.9)	0 (referent)

Note. OR = odds ratio; CI = confidence interval. Boldface indicates comparisons in which the 95% confidence interval excludes no effect (i.e., conventional statistical significance). Results are weighted to account for oversampling of African Americans, Asians/Pacific Islanders, Latinos, persons with disabilities, and persons aged 45 to 70 years.

[a]All *P* values for bivariate comparisons are <.001 except for "lost a job" (*P* = .091) and number of weeks and hours worked in past 12 months (*P* = .18 and *P* = .91, respectively).

[b]Multiple logistic regression analysis controlling for age, sex, race, educational attainment, and smoking status (current and ex-smoker). Referent group = no chronic health condition. Work duration (mean difference) was analyzed using linear regression controlling for same covariates. Confidence intervals are adjusted for multiple comparisons using the Bonferroni method.

[c]Current employment definition was patterned after the Current Population Survey: currently working or with a job, but not at work. The alternative is "unemployed or out of labor force."

that related to having a chronic health condition more generally. We addressed these issues by using a population-based sample of adults with asthma or COPD and including 2 general population referent groups, one with other chronic health conditions and one with no chronic conditions. Furthermore, we controlled for the effects of age, smoking, and other important determinants of health status.

Although subjects reported physician-diagnosed asthma or COPD, we cannot exclude some misclassification of respiratory condition. Because this was a survey-based investigation, we had no direct measure of pulmonary function. In survey-based research, there is no fully satisfactory method for addressing the potential overlap between asthma and COPD.[42] Moreover, adults with asthma can also have concomitant chronic bronchitis or emphysema.[43] As in previous epidemiological surveys,[30] our approach was to define asthma as excluding subjects who also reported emphysema, chronic bronchitis, or other chronic lung disease to reduce misclassification with smoking-related obstructive lung disease. We reasoned that respondents who reported both asthma and COPD would more closely resemble persons with COPD alone than those with asthma alone, a hypothesis that was confirmed by analysis of demographic characteristics and smoking history. When we repeated key analyses excluding subjects who reported both asthma and COPD, there was no change in our study conclusions (data not shown).

Because this study was cross-sectional, we cannot clearly define the causal pathway in all cases. As a consequence, measures of association (e.g., odds ratio) and population impact (e.g., population attributable risk percentage) could be influenced by noncausal factors or reverse causality. For example, lack of physical activity could increase the risk of developing asthma.[44] In most cases, however, the impact of chronic health conditions on health status seems clear. It appears likely that COPD or asthma causes depressive symptoms, poor general health, or worse employment status, rather than the reverse.

Demographic and personal characteristics are powerful determinants of health status and employment. For example, older age and lower educational attainment are both inde-

pendently associated with worse health status and lower rates of employment.[10,31,45,46] As a consequence, these factors have the potential to confound the relationship between asthma or COPD and health status. Although we controlled for these variables in multivariate models, we cannot exclude residual confounding.

The relatively low survey completion rate could have introduced selection bias. In the present study, the prevalence of current smoking (18.9%) is similar to that reported in California (19.2%).[47] Similarly, the observed prevalence of asthma (7.8%) is similar to that in California (7.1%).[48] The prevalence of COPD in the present study (4.5%) is also similar to that in a general sample of US adults (5%).[1] On the basis of these findings, nonresponse probably did not significantly bias the observed relationship between the 4 health condition groups and health status.

Asthma and COPD, the most common obstructive lung diseases, are associated with substantial health status impairment and work disability. Adults with COPD are most severely affected, whereas persons with asthma experience effects similar to those of persons with other chronic health conditions. Our data indicate that nearly 1 in 5 cases of both diminished general health and depression can be attributed to obstructive lung disease. Moreover, about 1 in 17 cases of current nonparticipation in the labor force can be attributed to COPD or asthma. For the stakeholders in health care for asthma and COPD, including clinicians, health insurers, and policymakers, these results suggest that current clinical care of these disorders is inadequate to prevent health status impairment and disability. The current clinical focus on respiratory symptoms and pulmonary function should be expanded to include assessment and prevention of the diverse negative effects of these conditions on health status and employment. ■

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Contributors

M.D. Eisner conceived the analysis, analyzed the data, and wrote the article. E.H. Yelin conceived and designed the California Work and Health Study (CWHS). L. Trupin assisted with the study design for the CWHS and supervised implementation of the CWHS. Both E.H. Yelin and L. Trupin provided input into analysis and interpretation of data for this report and critical review of the article. P.D. Blanc provided input into data analysis and interpretation and contributed to the writing of the article.

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Human Participant Protection

This study was approved by the University of California–San Francisco Committee on Human Research.

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