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Associations of Self-Reported Chronic Obstructive Pulmonary Disease with Indicators of Economic Instability and Stress — 16 States, 2017

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Abstract

Objective: To examine the association between chronic obstructive pulmonary disease (COPD) status and indicators of economic instability and stress to better understand the magnitude of these issues in persons with COPD.

Methods: Analyzed 2017 Behavioral Risk Factor Surveillance System data from 16 states that administered the “Social Determinants of Health” module, which included economic instability and stress measures (N=101,461). Associations between self-reported doctor-diagnosed COPD status and each measure were examined using multinomial logistic models.

Results: Adults with COPD were more likely ($p<0.001$) than adults without to report not having enough money at month end (21.0% versus 7.9%) or just enough money (44.9% versus 37.2%); being unable to pay mortgage, rent, or utility bills (19.2% versus 8.8%); and that often or sometimes food did not last or could not afford to eat balanced meals (37.9% versus 20.6%), as well as stress all or most of the time (27.3% versus 11.6%). Associations were attenuated although remained significant after adjustments for sociodemographic and health characteristics.

Discussion: Financial, housing, and food insecurity and frequent stress were more prevalent in adults with COPD than without. Findings highlight the importance of including strategies to address challenges related to economic instability and stress in COPD management programs.

Keywords

Socioeconomic Factors; Food Insecurity; Housing; Stress and Anxiety; Lung Diseases

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Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Introduction

Healthy People 2030 identified economic stability as one of five key domains of the social determinants of health.[1] Key factors associated with economic stability include reduced employment opportunities, food insecurity, housing instability, and poverty.[2] As with all domains of the social determinants of health, economic instability can negatively affect an individual's ability to achieve optimal health via diverse mechanisms (e.g., chronic stress, poor nutrition, lack of secure housing, and less access to health care).[3] For people with chronic obstructive pulmonary disease (COPD), factors related to economic instability or their potential consequences can further influence a person's ability to treat and manage their condition.[4] For example, economic instabilities can directly influence treatment as adults may need to choose between paying for food or housing versus medical care and indirectly as related stress can influence behavioral choices, treatment adherence, and biological mechanisms that can increase risks of exacerbations.[5–8] COPD, like other chronic conditions, can also contribute to economic instability given the disease's influence on health, disability, and costs.[9–11]

Different factors related to economic instability have been examined among persons with COPD. Studies have identified higher rates of poverty using income-based measures among persons with COPD, and economic instabilities related to employment, including work impairments, reductions in employment, and early retirement have been associated with COPD status.[12–16] In addition, housing and food insecurity, two indicators of economic instability, have been positively associated with several chronic conditions, including COPD.[17, 18] To our knowledge, no studies have examined the association between COPD and a general measure of financial insecurity in a population-based study. Concerns related to overall financial security were identified by a multinational working-age cohort of adults with COPD, including concerns about future earning capacity and difficulty meeting financial commitments.[13] These concerns may not be completely captured by measures previously examined (e.g., measures of food or housing insecurity or income-based measures of poverty). A subjective measure of financial insecurity can capture the broader concept of the adequacy of household finances (e.g., income, savings, assets) to cover expenses.

Concerns related to economic instability can lead to increased stress levels among persons with COPD. Other factors, including difficulty overcoming pain or discomfort of symptoms, disruptions caused by exacerbations and emergency visits or hospitalizations, limited access to treatments for relieving symptoms, toll of caregiving on relationships, and social isolation and loneliness resulting from activity and functional limitations and changes to leisure pursuits, can contribute to increased stress levels.[19–22] Stress can negatively influence physical and mental health through multiple pathways, including negative behavioral, cognitive, physiologic, and neurologic changes.[7] To our knowledge, no studies have examined the association between COPD and a general measure of stress in a population-based study, nor have studies examined the influence of economic instability on the association between COPD and stress.

COPD is a complicated disease and factors related to economic instability and stress can contribute to its incidence, management, and subsequent impairments in function and quality of life. The purpose of our study was to examine the association between self-reported doctor-diagnosed COPD status and prevalence of multiple indicators of economic instability, including financial, housing, and food insecurity, as well as an indicator of stress. We also examined the association between COPD and indicators of economic instability after adjusting for demographic covariates, existence of any chronic disease and depression, and employment, as well as between COPD and stress before and after adjusting for indicators of economic instability. Our modeling process adds adjustments using a stepwise approach. Presenting models in this way allows for a deeper understanding of the influence different adjustments have on the associations. While our cross-sectional study cannot determine causality, improving the understanding of the challenges adults with COPD may be experiencing related to economic instability and stress, as well as understanding the influence other important factors have on this association, can help to inform programs, practices and policies related to COPD prevention, treatment, and management.

METHODS

The BRFSS is a state-based, random-digit-dialed telephone survey of the civilian, noninstitutionalized US adult population aged ≥18 years and is conducted by state health departments in collaboration with CDC.[23] The survey consists of core sections asked among all states and optional modules that states elect to use. In 2017, 16 states included the “Social Determinants of Health (SDOH)” as an optional module (Colorado, Florida, Georgia, Iowa, Maryland, Massachusetts, Minnesota, Mississippi, New Hampshire, Ohio, Oklahoma, Pennsylvania, Utah, West Virginia, Wisconsin, Wyoming). Response rates among states including this module ranged from 32.8% (Massachusetts) to 64.1% (Wyoming).[23]

Respondents were classified as having COPD if they answered “yes” to: “Have you ever been told by a doctor, nurse, or other health professional that you have chronic obstructive pulmonary disease or COPD, emphysema, or chronic bronchitis?”

As a measure of financial insecurity, respondents’ financial status at the end of the month was assessed with the question, “In general, how do your finances usually work out at the end of the month?” with response options: “end up with some money left over,” “have just enough money to make ends meet,” or “not have enough money to make ends meet.” Related to housing insecurity, respondents were asked (yes or no), “During the last 12 months, was there a time when you were not able to pay your mortgage, rent or utility bills?” Related to food insecurity, respondents identified separately whether each of the two statements were “often true,” “sometimes true,” or “never true” in the last 12 months: “The food that I bought just didn’t last, and I didn’t have money to get more” and “I couldn’t afford to eat balanced meals.” We also created a separate dichotomous variable that categorized individuals as affirmative if they identified often or sometimes true to either statement related to food insecurity.

To measure frequency of feelings of stress, respondents were first provided a definition "Stress means a situation in which a person feels tense, restless, nervous, or anxious, or is unable to sleep at night because his/her mind is troubled all the time" and were then asked to report how often, in the last 30 days, they felt this kind of stress: "none of the time," "a little of the time," "some of the time," "most of the time," or "all of the time." For our analysis, "most of the time" and "all of the time" responses were combined.

Covariates included four demographic characteristics (i.e., sex, age group, race/ethnicity, and education), an any chronic disease indicator, depression, and employment (as categorized in Table 1). Among the 127,790 adults with this module on their questionnaire, 127,122 had information on COPD status. Of those adults, 101,461 had information on the four measures of economic instability, the measure of general stress, and all covariates.

Statistical Analysis

Prevalence and associated 95% confidence intervals (CI) of each economic instability measure and the general stress measures were estimated by COPD status. In addition, prevalence and associated 95% CI of reporting feelings of stress most or all the time were estimated by COPD status and three measures of economic instability (financial insecurity, housing insecurity, and the combined food insecurity 2-level measure). Separate multinomial logistic regression models were used to examine the financial insecurity 3-level measure, housing insecurity 2-level measure, two food insecurity 3-level measures, a combined food insecurity 2-level measure, and the general stress 4-level measure. Multiple models that included different covariate adjustments were analyzed (Supplemental Tables 1–6b). SAS-Callable SUDAAN version 11.0 (Research Triangle Institute, Research Triangle Park, NC) was used for all analyses to account for the complex sampling design and to provide weighted estimates. T-tests were used to determine the significance of differences in estimates by COPD status. P-values ≤ 0.05 were considered statistically significant and only significant findings were discussed.

RESULTS

In these 16 states in 2017, the prevalence of reported COPD was 7.0% (95% CI: 6.8%, 7.3%). Compared to adults without COPD, adults with COPD were more likely to be female, aged 55 years and older, and White non-Hispanic. Those with COPD were also more likely to have lower education levels, report any chronic disease or depression, and to be retired, unemployed, or unable to work (Table 1).

Financial, Housing, and Food Insecurity

Adults with COPD were more likely than those without to report financial insecurity (e.g., they generally did not have enough money or had just enough money at the end of the month) (Table 2). Adults with COPD also had a higher prevalence than those without to report housing insecurity (i.e., they were unable to pay their mortgage, rent, or utility bills). In addition, adults with COPD had a higher prevalence of each food insecurity measure (e.g., often or sometimes food did not last and there was no money to buy more; often

or sometimes they couldn't afford to eat balanced meals) and the combined measure of reporting sometimes or often for either statement.

Associations between COPD and the financial, housing, and food insecurity indicators were generally similar after adjusting for demographic covariates and were attenuated, although all adjusted prevalence ratios remained significant, after additional adjustments for existence of any chronic disease, depression, and employment (Table 2, Supplemental Tables 1–5).

General Stress

Compared to adults without COPD, adults with COPD had a higher prevalence of reporting feelings of stress most or all the time (Table 3), and this difference remained when stratified by indicators of financial, housing, and food insecurity (Figure 1). Regardless of COPD status, the prevalence of reporting feelings of stress most or all of the time was highest among those reporting financial, housing, and food insecurity compared to their respective counterparts (Figure 1).

The association between COPD status and frequency of feelings of stress were attenuated, although all adjusted prevalence ratios remained significant, after adjusting for demographic covariates, existence of any chronic disease and depression, and employment (Table 3, Supplemental Tables 6a and 6b). Associations of COPD with reported frequency of feeling stress were further attenuated when models also adjusted for indicators of economic instability.

DISCUSSION

Indicators of economic instability (i.e., financial, housing, and food insecurity) as well as more frequent feelings of stress were more prevalent in adults with COPD than those without. Associations were attenuated, but remained significant after adjusting for demographic characteristics, presence of comorbidities, and employment. When stress was the outcome, adjusting models further for indicators of economic instability did attenuate differences, although COPD status remained significantly associated with the highest frequency category. Findings suggest programs to address COPD management could benefit from addressing issues related to economic instability and feelings of stress to further improve the health of persons with COPD.

About 21% of adults with COPD reported not having enough money at the end of the month compared to 8% among those without COPD. Previous studies have mostly focused on financial measures related to the loss of employment associated with COPD, and our findings are similar to these existing studies that demonstrated people with COPD reported they stopped working due to their COPD.[12–15] However, our study demonstrated that while employment status explained some of the association between COPD status and financial insecurity, the association remained even after adjusting for employment. We also adjusted models for the presence of other chronic diseases and depression. There is a detrimental interrelationship between comorbidities and COPD[24, 25] that can impact economic instability and stress. Our cross-sectional data do not allow us to parse out the independent influence comorbidities have on these association versus those influences

that may be on pathway by which COPD and these measures are associated. However, our findings do highlight the importance of considering comorbidities when designing intervention strategies to address economic instability, given the higher prevalence of comorbidities in adults with COPD, as well as their significant role in the associations examined. Findings suggest multiple strategies may be applicable to address financial insecurity among persons with COPD, including those that address challenges with employment as well as other factors related to financial insecurity that may be more prominent among adults with COPD, such as high medical and treatment costs; high prevalence of additional comorbidities, including depression; impact of lost household wages for informal family caregivers; and navigating complex insurance and disability benefit processes. In addition, our findings suggest a need for COPD disease management options to be tailored for adults facing challenges related to financial insecurity. For example, including considerations related to cost of treatment regiments when developing an individualized management plan[26] may be especially important for adults with COPD who are more likely to experience financial insecurity.

Similar to our study, other population-based studies have demonstrated significant associations of COPD status with indicators of housing and food insecurity.[17, 18] For example, Charkhchi et al.,[18] similarly analyzed BRFSS data (2015 data from 11 states and one territory); however, their prevalence estimates were higher than ours (51% of adults with COPD were classified as experiencing housing insecurity and 44% with food insecurity).[18] However, that study used different measures of housing insecurity (defined as they usually, always, or sometimes in the past month were worried about having enough money to pay rent/mortgage) and food insecurity (defined as they usually, always, or sometimes in the past month were worried about having enough money to buy nutritious meals) that may explain some of the difference in estimates. There are multiple ways to measure these indicators and the measure selected can greatly influence estimates.[27, 28] Regardless of the measure used, studies have consistently identified persons with COPD as an important priority group for strategies addressing these social determinants of health.

Over 1 in 4 adults with COPD reported feelings of stress most or all the time, while this prevalence was 1 in 8 among adults without COPD. Findings highlight the importance of including coping strategies within COPD management programs, including self-management, to address the higher levels of stress that those with COPD may be more likely to experience. Examples of topics to cover may include relaxation techniques, communicating effectively with family, friends, and health professionals, and techniques to deal with problems such as frustration, fatigue, pain, and isolation.[29] Findings demonstrated adjusting for economic instability attenuated the unfavorable association between COPD and higher levels of stress (i.e., were explanatory factors); therefore, incorporating strategies to help address issues of economic instability may help to reduce feelings of stress in persons with COPD. Future studies may also aim to examine the role unhealthy behaviors and behavior change may play in moderating or mediating the role between COPD and stress.

International and U.S. national committees and initiatives have provided guidance on approaches to address social determinants of health, including economic instability.[30, 31] In addition, several reviews and scientific statements have focused on the importance of

social determinants of health in patients with chronic conditions, such as cardiovascular disease, heart failure, diabetes, and cancer.[32–35] Assessment of the social determinants of health has been identified as an important first step to addressing these issues in the clinical setting.[31] Similarly, the *Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Lung Disease* recommends a detailed medical history of any patient who is known, or suspected, to have COPD should include an assessment of the impact of disease on patient's life, including limitation of activity, missed work and economic impact, and feelings of depression and anxiety.[26]

Limitations

Although this study is one of the largest studies to date to examine the relationship between COPD and multiple indicators of economic instability and general stress, it has several limitations. First, we cannot establish causality. The purpose of our cross-sectional study was to better understand the magnitude of economic instability and high stress among persons with COPD; however, we are unable to determine which indicators were present prior to the COPD diagnosis. Therefore, we did not control for behaviors (e.g., smoking) that may be part of the pathway by which COPD and economic instability, and COPD and stress, are associated. However, we did adjust for comorbidities and employment indicators which may also be on the causal pathway. Given these factors' association with COPD, controlling for them may result in overly conservative estimates. For this reason, we present multiple models. Future studies with data on the timing of factors may aim to further examine the pathways for these associations. Second, our measures are generally broad. Our measure of financial insecurity and general stress originated with some modifications from existing single-question tools;[36, 37] however, this survey was limited to a single question to assess housing insecurity and two questions to assess food insecurity, both of which are often assessed using more detailed assessments.[27, 28] While incorporating these indicators into national surveillance systems may necessitate use of shorter assessments, additional information on factors that contribute to insecurities may be important for developing intervention strategies. It will be important to match data purpose with the collection tool to best meet the needs of different data users. For example, it may be helpful to have more information on different types of expenditures, including food, housing, healthcare, insurance, and other consumables (e.g., smoking, alcohol) to further understand how different expenditures may contribute to economic instability among adults with COPD. Third, we lack information about disease severity or limitations associated with COPD. Understanding more about these characteristics could help further tailor potential intervention strategies. Fourth, while our findings are based on general-population data, we were limited to non-institutionalized adults in 16 states, the response rate was relatively low in some states (although data were weighted to adjust for several factors related to nonresponse), and we had about 20% of respondents with missing data. Finally, our data are from 2017, which is the most recent year states included the optional SDOH module.

CONCLUSION

Financial, housing, and food insecurity, as well as more frequent feelings of stress, were more prevalent in adults with COPD than without. Findings highlight the importance of

tailoring disease management plans to address the increased levels of economic instability and feelings of stress that persons with COPD may be more likely to experience. In addition, including strategies to specifically address economic instability and reduce stress may be especially important for COPD management programs.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

REFERENCES

1. U.S. Department of Health and Human Services and Office of Disease Prevention and Health Promotion. Healthy People 2030: Social Determinants of Health, https://health.gov/healthypeople/objectives-and-data/social-determinants-health (2020, accessed October 5 2020).
2. U.S. Department of Health and Human Services and Office of Disease Prevention and Health Promotion. Healthy People 2030: Social Determinants of Health Literature Summaries, https://health.gov/healthypeople/objectives-and-data/social-determinants-health/literature-summaries (2020, accessed October 5 2020).
3. Solar O and Irwin A. A conceptual framework for action on the social determinants of health. Social Determinants of Health Discussion Paper 2 (Policy and Practice), World Health Organization, https://www.who.int/sdhconference/resources/ConceptualframeworkforactiononSDH_eng.pdf (2010, accessed March 4 2021).
4. Pleasants RA, Riley IL and Mannino DM. Defining and targeting health disparities in chronic obstructive pulmonary disease. Int J Chron Obstruct Pulmon Dis 2016; 11: 2475–2496. [PubMed: 27785005]
5. Castaldi PJ, Rogers WH, Safran DG, et al. Inhaler costs and medication nonadherence among seniors with chronic pulmonary disease. Chest 2010; 138: 614–620. [PubMed: 20418367]
6. Feeding America. Hunger in America 2014, http://www.feedingamerica.org/hunger-in-america/our-research/hunger-in-america/ (2014, accessed February 3 2021).
7. Egerter S, Braveman P and Barclay C. Issue Brief #3: Stress and Health, Robert Wood Johnson Foundation, https://www.rwjf.org/en/library/research/2011/03/how-social-factors-shape-health.html (2011, accessed March 4 2021).
8. Parekh TM, Cherrington AL, Bhatia S, et al. The association of low income and high stress with acute care use in COPD patients. Chronic Obstr Pulm Dis 2020; 7: 107–117. [PubMed: 32324982]
9. Rehman AU, Hassali MAA, Muhammad SA, et al. The economic burden of chronic obstructive pulmonary disease (COPD) in Europe: results from a systematic review of the literature. Eur J Health Econ 2020; 21: 181–194. [PubMed: 31564007]
10. Ford ES, Murphy LB, Khavjou O, et al. Total and state-specific medical and absenteeism costs of COPD among adults aged ≥ 18 years in the United States for 2010 and projections through 2020. Chest 2015; 147: 31–45. [PubMed: 25058738]
11. Thornton Snider J, Romley JA, Wong KS, et al. The disability burden of COPD. COPD 2012; 9: 513–521. [PubMed: 22721264]
12. Ding B, Small M, Bergstrom G, et al. COPD symptom burden: impact on health care resource utilization, and work and activity impairment. Int J Chron Obstruct Pulmon Dis 2017; 12: 677–689. [PubMed: 28260874]
13. Fletcher MJ, Upton J, Taylor-Fishwick J, et al. COPD uncovered: an international survey on the impact of chronic obstructive pulmonary disease [COPD] on a working age population. BMC Public Health 2011; 11: 612. [PubMed: 21806798]
14. Foo J, Landis SH, Maskell J, et al. Continuing to confront COPD International Patient Survey: economic impact of COPD in 12 countries. PLoS One 2016; 11: e0152618.
15. Wheaton AG, Cunningham TJ, Ford ES, et al. Employment and activity limitations among adults with chronic obstructive pulmonary disease--United States, 2013. MMWR Morb Mortal Wkly Rep 2015; 64: 289–295. [PubMed: 25811677]

16. Akinbami LJ and Liu X. Chronic obstructive pulmonary disease among adults aged 18 and over in the United States, 1998–2009. NCHS Data Brief 2011; 63: 1–8.
17. Gregory CA and Coleman-Jensen A. Food Insecurity, Chronic Disease, and Health Among Working-Age Adults, United States Department of Agriculture, Economic Research Service (ERR 235), https://www.ers.usda.gov/webdocs/publications/84467/err-235.pdf (accessed March 4 2021).
18. Charkhchi P, Fazeli Dehkordy S and Carlos RC. Housing and food insecurity, care access, and health status among the chronically ill: an analysis of the Behavioral Risk Factor Surveillance System. J Gen Intern Med 2018; 33: 644–650. [PubMed: 29299816]
19. Vancampfort D, Koyanagi A, Ward PB, et al. Perceived stress and its relationship with chronic medical conditions and multimorbidity among 229,293 community-dwelling adults in 44 low- and middle-income countries. Am J Epidemiol 2017; 186: 979–989. [PubMed: 28637230]
20. Chin ED. The COPD exacerbation experience: A qualitative descriptive study. Appl Nurs Res 2017; 38: 38–44. [PubMed: 29241517]
21. Gabriel R, Figueiredo D, Jacome C, et al. Day-to-day living with severe chronic obstructive pulmonary disease: towards a family-based approach to the illness impacts. Psychol Health 2014; 29: 967–983. [PubMed: 24617821]
22. Tselebis A, Pachi A, Ilias I, et al. Strategies to improve anxiety and depression in patients with COPD: a mental health perspective. Neuropsychiatr Dis Treat 2016; 12: 297–328. [PubMed: 26929625]
23. Centers for Disease Control and Prevention (CDC). 2017 BRFSS Survey Data and Documentation, https://www.cdc.gov/brfss/annual_data/annual_2017.html (2020, accessed October 14 2020).
24. Chatila WM, Thomashow BM, Minai OA, et al. Comorbidities in chronic obstructive pulmonary disease. Proc Am Thorac Soc 2008; 5: 549–555. [PubMed: 18453370]
25. Maurer J, Rebbapragada V, Borson S, et al. Anxiety and depression in COPD: current understanding, unanswered questions, and research needs. Chest 2008; 134: 43S–56S. [PubMed: 18842932]
26. Vogelmeier CF, Criner GJ, Martinez FJ, et al. Global strategy for the diagnosis, management, and prevention of chronic obstructive lung disease 2017 report. GOLD Executive Summary. Am J Respir Crit Care Med 2017; 195: 557–582. [PubMed: 28128970]
27. U.S. Department of Agriculture and Economic Research Service. Food Security in the U.S.: Survey Tools, https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/survey-tools/#household (2020, accessed January 29 2021).
28. Cox R, Henwood B, Rodnyansky S, et al. Road map to a unified measure of housing insecurity. Cityscape 2019; 21: 93–128.
29. Centers for Disease Control and Prevention and National Center for Chronic Disease Prevention and Health Promotion. Managing Chronic Obstructive Pulmonary Disease (COPD), https://www.cdc.gov/learnmorefeelbetter/programs/copd.htm (2018, accessed February 10, 2021).
30. World Health Organization and Commission on Social Determinants of Health. Closing the Gap in a Generation: Health Equity through Action on Social Determinants of Health. Geneva.
31. National Academies of Sciences Engineering and Medicine. Integrating Social Care Into the Delivery of Health Care: Moving Upstream to Improve the Nation's Health. 2019. Washington, DC,: National Academies Press.
32. White-Williams C, Rossi LP, Bittner VA, et al. Addressing social determinants of health in the care of patients with heart failure: a scientific statement from the American Heart Association. Circulation 2020; 141: e841–e863. [PubMed: 32349541]
33. Hill-Briggs F, Adler NE, Berkowitz SA, et al. Social determinants of health and diabetes: a scientific review. Diabetes Care 2020; 44: 258–279. [PubMed: 33139407]
34. Alcaraz KI, Wiedt TL, Daniels EC, et al. Understanding and addressing social determinants to advance cancer health equity in the United States: a blueprint for practice, research, and policy. CA Cancer J Clin 2020; 70: 31–46. [PubMed: 31661164]
35. Havranek EP, Mujahid MS, Barr DA, et al. Social determinants of risk and outcomes for cardiovascular disease: a scientific statement from the American Heart Association. Circulation 2015; 132: 873–898. [PubMed: 26240271]

36. Pearlin LI, Lieberman MA, Menaghan EG, et al. The stress process. J Health Soc Behav 1981; 22: 337–356. [PubMed: 7320473]

37. Elo AL, Leppanen A and Jahkola A. Validity of a single-item measure of stress symptoms. Scand J Work Environ Health 2003; 29: 444–451. [PubMed: 14712852]

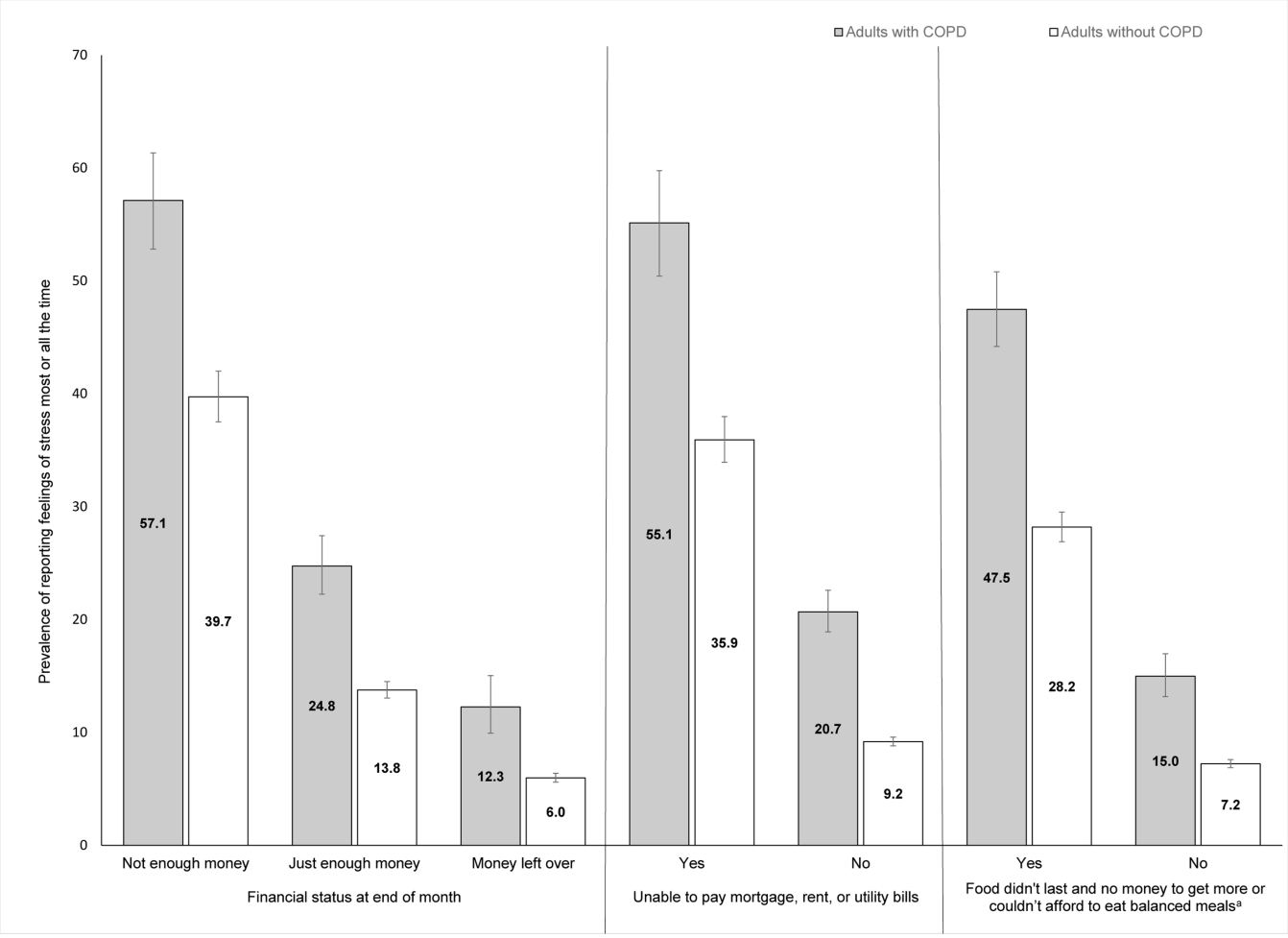

Figure 1:

Prevalence of frequent stress by COPD status and economic instability indicators, 16 states, BRFSS 2017

Note: All prevalence estimates are weighted. Error bars represent lower and upper bounds of the 95% confidence interval.

[a] Reported often or sometime true that food didn't last and no money to get more or often or sometime true couldn't afford to eat balanced meals.

Table 1:

Select characteristics of the study population by COPD status, 16 states, BRFSS 2017[a]

	Adults with COPD (n=8797)			Adults without COPD (n=92,664)		
Characteristic	**n**	**%[a]**	**95% CI**	**n**	**%[a]**	**95% CI**
Sex						
Male	3365	42.0	(40.1, 44.0)	41286	48.5	(47.9, 49.1)
Female	5432	58.0	(56.0, 59.9)	51378	51.5	(50.9, 52.1)
Age group (years)						
18–44	758	17.3	(15.5, 19.3)	26397	44.7	(44.0, 45.3)
45–54	1077	15.2	(13.8, 16.7)	14802	16.9	(16.4, 17.3)
55–64	2341	26.7	(25.1, 28.4)	20318	17.4	(17.0, 17.8)
65–74	2647	22.0	(20.7, 23.5)	18724	12.7	(12.3, 13.0)
≥75	1976	18.7	(17.3, 20.2)	12423	8.4	(8.1, 8.7)
Race/Ethnicity						
Non-Hispanic White	7517	79.7	(77.9, 81.4)	76817	71.8	(71.2, 72.3)
Non-Hispanic Black	578	10.1	(8.9, 11.5)	6795	12.2	(11.7, 12.6)
Hispanic	256	5.6	(4.5, 6.9)	5167	10.5	(10.1, 11.0)
Other	446	4.5	(3.9, 5.3)	3885	5.5	(5.3, 5.8)
Education						
Less than high school graduate	1218	21.5	(19.7, 23.4)	5109	10.1	(9.7, 10.6)
High school graduate	3246	35.3	(33.5, 37.1)	24707	29.0	(28.5, 29.6)
Some college	2650	30.5	(28.8, 32.3)	26338	31.5	(30.9, 32.0)
College graduate	1683	12.7	(11.6, 14.0)	36510	29.3	(28.8, 29.8)
Any chronic disease [c]						
Yes	7621	84.5	(82.9, 85.9)	44514	40.2	(39.6, 40.8)
No	1176	15.5	(14.7, 17.1)	48150	59.8	(59.2, 60.4)
Depression [d]						
Yes	3499	39.8	(38.0, 41.7)	17246	18.0	(17.6, 18.5)
No	5298	60.2	(58.3, 62.0)	75418	82.0	(81.5, 82.4)
Employment status						
Employed	1799	26.0	(24.1, 27.9)	49264	59.4	(58.8, 60.0)
Retired	3856	34.9	(33.2, 36.7)	26849	18.6	(18.2, 19.0)
Unemployed	498	7.0	(6.0, 8.1)	3862	5.2	(5.0, 5.5)
Unable to work	2185	25.6	(24.0, 27.3)	4906	5.2	(4.9, 5.5)
Other[e]	459	6.5	(5.5, 7.6)	7783	11.6	(11.2, 12.1)

CI, Confidence interval

[a]12 states included this module on all questionnaire versions (Florida, Georgia, Iowa, Massachusetts, Minnesota, Mississippi, New Hampshire, Pennsylvania, Utah, West Virginia, Wisconsin, Wyoming) and 4 states included this module on at least one questionnaire version (Colorado, Maryland, Ohio, Oklahoma).

[b]Weighted percentages

[c] Any chronic disease indicator defined as the presence (yes/no) of any of these conditions: heart disease (angina or coronary heart disease, heart attack, or myocardial infarction); stroke; current asthma; cancer (not skin); arthritis; chronic kidney disease; or diabetes).

[d] Depression defined as ever being told by a doctor, nurse, or other health professional about the presence (yes/no) of a depressive disorder, including depression, major depression, dysthymia, or minor depression.

[e] Other includes homemaker, student, or missing.

Table 2:

Prevalence and prevalence ratios of economic instability indicators by COPD status, 16 states, BRFSS 2017

	Prevalence				Prevalence Ratio Adjusted for (Referent: Adults without COPD):[b]							
	Adults with COPD		Adults without COPD		Unadjusted		Demographic Characteristics		Demographic Characteristics and Comorbidities		Demographic Characteristics, Comorbidities, and Employment	
Measure	%[a]	(95% CI)	%[a]	(95% CI)	PR	(95% CI)	APR	(95% CI)	APR	(95% CI)	APR	(95% CI)
Financial status at end of month												
Not enough money	21.0	(19.5, 22.7)	7.9	(7.6, 8.3)	2.65	(2.43, 2.90)	2.42	(2.20, 2.65)	1.70	(1.54, 1.88)	1.47	(1.33, 1.63)
Just enough money	44.9	(43.0, 46.9)	37.2	(36.6, 37.8)	1.21	(1.15, 1.26)	1.19	(1.14, 1.25)	1.19	(1.13, 1.25)	1.16	(1.10, 1.22)
Money left over	34.0	(32.2, 35.9)	54.8	(54.2, 55.4)	0.62	(0.59, 0.66)	0.66	(0.63, 0.70)	0.76	(0.73, 0.80)	0.82	(0.78, 0.86)
Unable to pay mortgage, rent, or utility bills												
Yes	19.2	(17.7, 20.9)	8.8	(8.5, 9.2)	2.18	(1.98, 2.39)	2.36	(2.15, 2.60)	1.66	(1.50, 1.84)	1.51	(1.35, 1.69)
No	80.8	(79.1, 82.3)	91.2	(90.8, 91.5)	0.89	(0.87, 0.90)	0.87	(0.85, 0.89)	0.93	(0.92, 0.95)	0.95	(0.93, 0.96)
Food didn’t last and no money to get more												
Often true	11.8	(10.5, 13.3)	3.5	(3.2, 3.8)	3.38	(2.94, 3.88)	3.31	(2.88, 3.82)	2.28	(1.95, 2.65)	1.97	(1.68, 2.30)
Sometimes true	19.0	(17.5, 20.6)	11.4	(11.0, 11.9)	1.66	(1.52, 1.82)	1.80	(1.65, 1.97)	1.51	(1.37, 1.66)	1.38	(1.25, 1.52)
Never true	69.2	(67.3, 71.0)	85.1	(84.6, 85.5)	0.81	(0.79, 0.84)	0.80	(0.78, 0.82)	0.88	(0.86, 0.90)	0.91	(0.89, 0.93)
Couldn’t afford to eat balanced meals												
Often true	14.1	(12.8, 15.6)	4.8	(4.6, 5.2)	2.92	(2.60, 3.28)	3.03	(2.69, 3.41)	2.16	(1.90, 2.45)	1.92	(1.68, 2.18)
Sometimes true	18.6	(17.1, 20.3)	11.9	(11.5, 12.3)	1.57	(1.43, 1.72)	1.76	(1.61, 1.93)	1.48	(1.34, 1.63)	1.37	(1.24, 1.52)
Never true	67.2	(65.3, 69.1)	83.3	(82.8, 83.8)	0.81	(0.78, 0.83)	0.78	(0.75, 0.80)	0.86	(0.84, 0.88)	0.89	(0.87, 0.91)
Food didn’t last and no money to get more (often/sometimes true) -or- couldn’t afford to eat balanced meals (often/sometimes true)												
Yes	37.9	(36.0, 39.9)	20.6	(20.1, 21.1)	1.84	(1.74, 1.95)	1.99	(1.89, 2.10)	1.64	(1.54, 1.74)	1.50	(1.41, 1.60)
No	62.1	(60.1, 64.0)	79.4	(78.9, 79.9)	0.78	(0.76, 0.81)	0.75	(0.72, 0.77)	0.83	(0.81, 0.86)	0.87	(0.84, 0.89)

APR, Adjusted prevalence ratio; CI, Confidence interval; PR, Prevalence ratio

[a] Weighted percentage

[b] Models included variables categorized as shown in Table 1 and grouped as: demographic characteristics (sex, age group, race/ethnicity, education), comorbidities (any chronic disease indicator, depression), and employment status.

Table 3:

Prevalence and prevalence ratios of frequency of stress by COPD status, 16 states, BRFSS 2017

	Prevalence				Prevalence Ratio Adjusted for (Referent: Adults without COPD):[b]							
	Adults with COPD		Adults without COPD		Unadjusted		Demographic Characteristics and Comorbidities		Demographic Characteristics, Comorbidities, and Employment		Demographic Characteristics, Comorbidities, Employment, and Economic Instability	
Reported frequency of feelings of stress	%[a]	95% CI	%[a]	95% CI	PR	95% CI	APR	95% CI	APR	95% CI	APR	95% CI
None of the time	32.7	(31.0, 34.5)	42.5	(41.9, 43.1)	0.77	(0.73, 0.81)	0.84	(0.80, 0.89)	0.86	(0.81, 0.91)	0.93	(0.88, 0.98)
A little of the time	19.6	(18.2, 21.2)	27.6	(27.1, 28.2)	0.71	(0.66, 0.77)	0.87	(0.81, 0.94)	0.91	(0.85, 0.99)	0.93	(0.86, 1.01)
Some of the time	20.3	(18.8, 22.0)	18.3	(17.9, 18.8)	1.11	(1.02, 1.21)	1.13	(1.03, 1.23)	1.10	(1.01, 1.21)	1.05	(0.95, 1.15)
Most or all of the time	27.3	(25.5, 29.2)	11.6	(11.2, 12.0)	2.36	(2.19, 2.55)	1.65	(1.52, 1.80)	1.52	(1.39, 1.66)	1.33	(1.21, 1.45)

APR, Adjusted prevalence ratio; CI, Confidence interval; PR, Prevalence ratio

[a]Weighted percentage

[b]Models included variables categorized as shown in Table 1 and grouped as: demographic characteristics (sex, age group, race/ethnicity, education), comorbidities (any chronic disease indicator, depression), and employment status. The final model with indicators of economic instability included: financial status at end of month; unable to pay mortgage, rent or utility bills (yes/no); and combined dichotomous food insecurity indicator (i.e., food didn't last and no money to get more (often/sometimes true) or couldn't afford to eat balanced meals (often/sometimes true)).