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RESEARCH ARTICLE

Air Quality Awareness Among U.S. Adults With Respiratory and Heart Disease

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Introduction: Poor air quality affects respiratory and cardiovascular health. Information about health risks associated with outdoor air quality is communicated to the public using air quality alerts. This study was conducted to assess associations of existing respiratory and heart disease with three aspects of air quality awareness: awareness of air quality alerts, discussing with a health professional strategies to reduce air pollution exposure, and avoiding busy roads to reduce air pollution exposure when walking, biking, or exercising outdoors.

Methods: During 2014–2016, a total of 12,599 U.S. adults participated in summer waves of the ConsumerStyles surveys and self-reported asthma, emphysema/chronic obstructive pulmonary disease, heart disease, and each aspect of air quality awareness. In 2017, associations between each health condition and air quality awareness were estimated using log binomial and multinomial regression.

Results: Overall, 49% of respondents were aware of air quality alerts, 3% discussed with a health professional strategies to reduce air pollution exposure, and 27% always/usually avoided busy roads to reduce air pollution exposure. Asthma was associated with increased prevalence of awareness of air quality alerts (prevalence ratio=1.11, 95% CI=1.04, 1.20), discussing with a health professional (prevalence ratio=4.88, 95% CI=3.74, 6.37), and always/usually avoiding busy roads to reduce air pollution exposure (prevalence ratio=1.13, 95% CI=1.01, 1.27). Heart disease was not associated with air quality awareness.

Conclusions: Existing respiratory disease, but not heart disease, was associated with increased air quality awareness. These findings reveal important opportunities to raise awareness of air quality alerts and behavior changes aimed at reducing air pollution exposure among adults at risk of exacerbating respiratory and heart diseases.

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INTRODUCTION

The impact of outdoor air quality on respiratory and cardiovascular health is well established.[1–5] Exposure to ambient air pollution affects asthma,[6] school absences because of asthma,[7] emergency department visits and hospital admissions for respiratory and cardiovascular diseases,[5,8,9] and cardiopulmonary mortality.[10–13] Information about air quality and its associated health risks is communicated to the public using air quality alerts, such as the U.S. Environmental Protection Agency's Air Quality Index.[14] The Air Quality Index is a six-category index that uses daily and local measurements of air pollutants to identify air quality conditions that range from good, when air quality poses little or no health risk, to hazardous, when air quality is likely to cause serious health effects.[14,15] Air quality alerts, such as the Air Quality Index, are used to inform the public when air quality is likely to affect sensitive populations, including people with heart or lung disease.[15]

Broadly speaking, the effectiveness of air quality alerts depends on the extent to which individuals in sensitive populations are aware of the alerts and take action to reduce their exposures to poor air quality. Estimates of the proportion of the populations aware of air quality alerts range from one third in the general population[16] to 95% among parents seeking care for a child with asthma.[17] By contrast, only small fractions of the population report changing behaviors during episodes of poor air quality.[18,19] For example, data from the National Health and Nutrition Survey Examination indicate that 12% of adults reported doing something differently (e.g., spending less time outdoors, closing windows) because of poor air quality.[18] Older adults, women, those with more education, and adults with respiratory or cardiovascular conditions were more likely report such an activity change.[18] However, findings from qualitative research indicate that individuals with asthma or cardiovascular disease do not necessarily change their behaviors in response to air quality alerts (Scott A. Damon, unpublished observations, 2016).

Because of the well-recognized impact of air pollution on the health of individuals with pre-existing respiratory and heart disease, there is a need to better understand awareness of air quality alerts and specific actions taken, especially by at-risk individuals, to reduce air pollution exposure. The aim of this study is to assess associations of respiratory and heart disease with awareness of air quality alerts, discussing, with a health professional strategies to reduce air pollution exposure, and avoiding busy roads to reduce air pollution exposure.

METHODS

Data from the summer 2014–2016 waves of the ConsumerStyles surveys conducted by the public relations firm Porter Novelli Public Services were used. Each year, ConsumerStyles surveys are conducted as cross-sectional surveys of a random sample of adults from KnowledgePanel®, an Internet panel of ≅55,000 men and women aged ≥18 years. Sampling is probability-based to be representative of the U.S. adult population. Additional details about the survey are available elsewhere.[20–22] From 2014 through 2016, the summer waves of the ConsumerStyles surveys (hereafter referred to as SummerStyles) were conducted among the sample of adults who responded to the spring waves of the ConsumerStyles surveys (i.e., SpringStyles). Analysis of ConsumerStyles data is exempt from IRB review at the Centers for Disease Control and Prevention.

Study Population

These analyses included data collected in 2014, 2015, and 2016 from 12,599 adults aged 18–94 years. In 2014, the SpringStyles survey was sent to 11,018 potential respondents and completed by 6,713 (61%). Between June 13 and July 7, 2014, SummerStyles was completed by 4,269 (69%) of 6,159 SpringStyles respondents. In 2015, the SpringStyles survey was sent to 11,028 potential respondents and completed by 6,836 (62%). Between June 11 and June 29, 2015, SummerStyles was completed by 4,127 (67%) of 6,172 SpringStyles respondents. In 2016, the SpringStyles survey was sent to 10,955 potential respondents and completed by 6,490 (59%). Between June 24 and July 11, 2016, SummerStyles was completed by 4,203 (68%) of 6,166 SpringStyles respondents.

Measures

Respondents reported health conditions by responding to a single questionnaire item: *During the past year, have you had (or do you currently have) any of these health conditions?* Response options consisted of a list of health conditions, including *asthma*, *emphysema/chronic obstructive pulmonary disease (COPD)*, *atrial fibrillation*, *congestive heart failure*, and *other heart disease (angina or heart attack)*. For each condition, respondents with positive responses were categorized as having the condition within the past year. Respondents who reported atrial fibrillation, congestive heart failure, or other heart disease (angina or heart attack) were categorized as having heart disease; respondents with negative responses to all three conditions were categorized as not having heart disease.

Questionnaire items about air quality were framed using the following statement, *The next few questions are about air quality. The government routinely collects and distributes information on air quality to help inform the public about air pollution levels.* Respondents then answered three questions to determine whether they (1) were aware of air quality alerts (*Have you ever heard or read about the Air Quality Index or air quality alerts where you live?*; response options: *yes*, *no*, *don't know*); (2) discussed with a health professional strategies to reduce air pollution exposure (*Have you and your doctor, nurse, or other health professional ever talked about what to do differently when air quality is bad?*; response options: *yes*, *no*, *don't know*); and (3) avoided busy roads to reduce air pollution exposure (*When walking, biking, or*