



ELSEVIER

Contents lists available at ScienceDirect

Journal of Forest Economics

journal homepage: www.elsevier.com/locate/jfe



Valuing morbidity effects of wildfire smoke exposure from the 2007 Southern California wildfires[☆]



Ikuho Kochi^{a,c,*}, Patricia A. Champ^b, John B. Loomis^c,
Geoffrey H. Donovan^d

^a Universidad Autónoma de Ciudad Juárez, Ciudad Juárez, Chihuahua, Mexico

^b US Forest Service, Rocky Mountain Research Station, Fort Collins, CO, United States

^c Department of Agricultural and Resource Economics, Colorado State University, Fort Collins, CO, United States

^d US Forest Service, Pacific Northwest Research Station, Portland, OR, United States

ARTICLE INFO

Article history:

Received 10 February 2016

Accepted 12 July 2016

JEL classification:

I18

Q51

Q53

Keywords:

Cost of illness

Air quality

Forest fire

Cardiorespiratory illness

Social cost

ABSTRACT

This study estimated the economic costs associated with morbidity from the wildfires that occurred in 2007 in southern California. We used the excess number of hospital admissions and emergency department visits to quantify the morbidity effects and used medical costs to estimate the economic impact. With data from 187 hospital facilities and 140 emergency departments located in five counties in southern California, we found evidence of significant acute adverse health reactions to wildfire-smoke exposure. Specifically, we found approximately 80 excess respiratory-related hospital admissions, 26 excess acute cardiovascular-related hospital admissions, nearly 760 excess respiratory-related emergency department visits, and 38 excess acute cardiovascular-related emergency department visits. We estimated that the associated medical costs were over \$3.4 million. Since these cost estimates do not consider costs related to other adverse health effects, such

[☆] The study is approved by the Committee for the Protection of Human Subjects of the state of California, as well as the Institutional Review Board of Colorado State University.

* Corresponding author at: Universidad Autónoma de Ciudad Juárez, Ciudad Juárez, Chihuahua, Mexico.

E-mail address: ikuho.kochi@uacj.mx (I. Kochi).

as mortality, symptoms that were not severe enough to warrant going to the emergency room or hospital, or the costs of avoiding exposure to wildfire smoke, our estimates do not reflect the full health-related costs of wildfire smoke exposure.

© 2016 Department of Forest Economics, Swedish University of Agricultural Sciences, Umeå. Published by Elsevier GmbH. All rights reserved.

Introduction

Wildfire damages are of great concern to residents of fire-prone areas. While the physical damage caused by wildfires, such as destroyed homes, injuries, and fatalities directly linked to the fire, is well accounted for, it does not represent the full costs of catastrophic wildfires. An important social cost that is rarely quantified is the morbidity caused by wildfire-smoke exposure.

Wildfires emit substantial amounts of smoke that contains particulate matter (PM) among other air pollutants. It is well documented that exposure to PM is linked to significant increases in mortality and morbidity (USEPA, 2004). Particles smaller than 2.5 μm in diameter ($\text{PM}_{2.5}$) and particles smaller than 10 μm in diameter (PM_{10}) are of particular concern. However, most past studies of the health effects of air pollution have examined exposure to PM originated from fossil fuel combustions in urban areas. As discussed by Kochi et al. (2010), less is known about the public-health effects of short-term exposure to high levels of PM from burning vegetation. Understanding such effects and estimating the associated economic cost are critical for informing wildfire policy.

In this study, we quantify the adverse health effects of wildfire smoke exposure and estimate the associated economic costs. We focus our analysis on morbidity effects, measured by hospital admissions and emergency department visits, for large wildfires that occurred in southern California in 2007.

The following section provides an overview of the relevant literature on the economic costs of wildfire smoke exposure. The third section presents a description of the wildfire events examined in this article, while the fourth section presents the analytical method for estimating the economic costs, the data, and estimation results. The final section provides the discussions and conclusions.

Previous studies on the economic costs of wildfire smoke exposure

Adverse health effects from wildfire smoke exposure range from minor discomfort to mortality. To date, only a few studies have estimated the community-level economic costs associated with morbidity effects of wildfire smoke exposure in the United States (US) (Butry et al., 2001; Martin et al., 2007; Moeltner et al., 2013).¹ These few studies have looked at one or more health related costs including hospital admissions, emergency department visits, outpatient treatment, doctor's office visits, labor loss due to restricted activity days and respiratory symptoms.

Butry et al. (2001) evaluated the morbidity costs of smoke exposure from the large wildfires that lasted for 6 weeks burning more than 382,000 acres in St. John's River Water Management District in northeastern Florida in 1998. The authors concluded that the excess asthma-related health costs caused by wildfire smoke exposure were between \$403,000 and \$868,000, which included the costs of hospital admissions, emergency room visits, outpatient care and doctors' office visits.² Butry et al. (2001) noted that the hospital admissions and emergency department visits were responsible for the majority of the health costs. Martin et al. (2007) estimated the health costs of smoke exposure from a hypothetical 6,400 acres prescribed fire in Kaibab National Forest in the US. The authors estimated

¹ Studies that evaluated the community-level economic costs associated with wildfire smoke exposure that occurred outside of the US are summarized in Kochi et al. (2010).

² All monetary values are adjusted to the price level of year 2007.

Download English Version:

<https://daneshyari.com/en/article/4759841>

Download Persian Version:

<https://daneshyari.com/article/4759841>

[Daneshyari.com](https://daneshyari.com)