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Assessment of the impacts of PM₁₀ due to wildfires on human mortality in Portugal

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Wildfires are a major environmental problem that the current society must face and climate change will increase the number and intensity of wildfires during the next years. One of the problems is the toxicity of the pollutants emitted from biomass burning, including particulate matter (PM), carbon monoxide, methane, nitrogen oxides, volatile organic carbon, and some secondary pollutants. Some of these chemicals have demonstrated to impact human health, being responsible for increases on cardiovascular and respiratory morbidity and mortality (Johnston et al., 2012). These facts contribute to the deterioration of the air quality, therefore causing afflictions that may even end up in death. Wildfires are a worldwide concern, but in Europe the southern countries are the most affected. Thus, the estimation of the effects of wildfires on human health due to PM exposure is fundamental to manage health resources and public funds. Portugal was one of the European countries most affected by wildfires in the last decade, yet there is a lack of knowledge regarding impacts of the wildfire-related pollutants on the population mortality.

This study aims to describe the pattern of wildfires occurring in a period of 16 years (2001-2016) during the fire season (June, July, August and September) and to assess the impact of wildfire-generated PM₁₀ on the Portuguese population mortality, considering the fires that produced a burned area equal or above 1000 ha.

Data for PM₁₀ measured in background air quality monitoring stations was obtained from the Portuguese Environment Agency. All-cause (excluding injuries, poisoning and external causes) and cause-specific mortality (circulatory and respiratory) data was provided by Statistics Portugal. PM₁₀ concentrations were correlated with the burned area. Associations between PM₁₀ exposure and all-cause and cause-specific mortalities were studied using Poisson regression models. We found significant correlation between burned area and mortality in some NUTS, in particular, inland and north of Portugal mainland. Also, a good and significant correlation between burned area and

PM₁₀ is found. This means that big fires have an impact on the dwellers health due to Particulate Matter causing diseases and even provoking the death.

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