

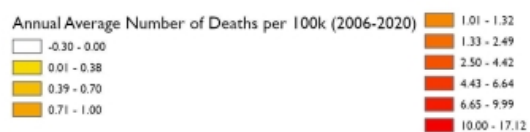
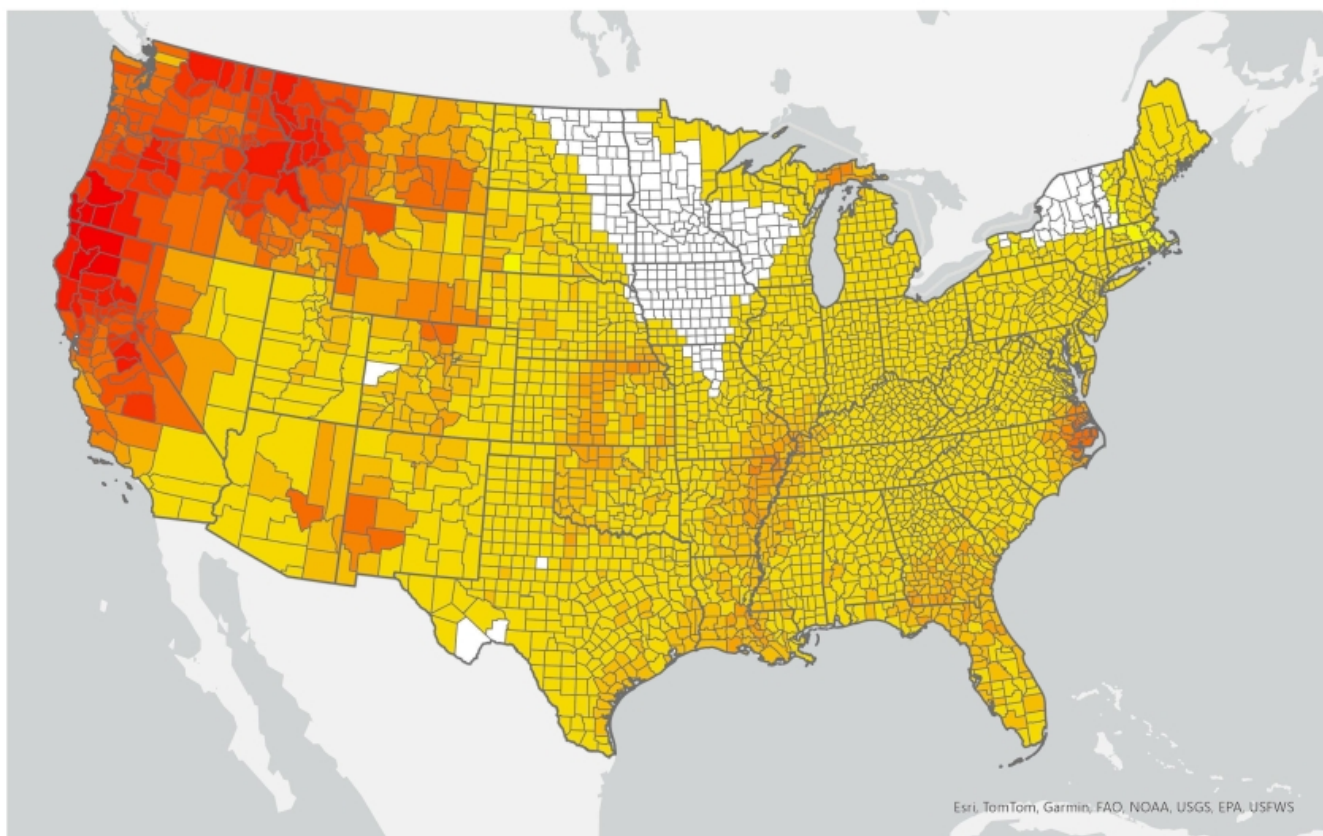
Climate Change Contributions to US Wildfire Smoke PM_{2.5} Mortality Between 2006-2020

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RATIONALE Wildfires have increased in frequency and intensity due to climate change and now contribute to nearly half of the annual average of fine particulate matter in the US. While the effects of short-term wildfire-PM_{2.5} exposure on respiratory diseases are well-described, the impact of climate change on longer duration wildfire-PM_{2.5} mortality is unknown. Our aim was to determine the contribution of anthropogenic climate change to wildfire smoke PM_{2.5} mortality on a county-level across the conterminous US between 2006-2020. **METHODS** We use an attribution model to compare observed wildfire-PM_{2.5} with a counterfactual climate that excludes the influence of climate change to approximate the fractional climate change contribution to burned area. We then use a machine learning model to determine annual wildfire-PM_{2.5} concentrations based on the wildfire burned area and meteorological variables. We apply a concentration response function from existing epidemiologic literature to quantify county-level deaths attributable to longer duration wildfire smoke PM_{2.5} exposure using the environmental Benefits Mapping and Analysis Program—Community Edition tool. Finally, we estimate the economic burden of these additional deaths using the value of a statistical life. **RESULTS** We estimate 164,000 wildfire smoke PM_{2.5} attributable deaths between 2006 and 2020, with the largest number of these deaths occurring in 2020 (28,000 wildfire PM_{2.5} deaths [95% CI 14000, 42000]). Climate change contributed to 14,800 deaths over our 15-year study period and 34% of the climate change attributable deaths occurred in 2020 (5,100 [95% CI 2,500 to 7,500]). Figure 1 shows the annual climate change-attributable wildfire smoke PM_{2.5} deaths per 100,000 people in conterminous United States between 2006 and 2020. In western US states, which had the greatest number of wildfire smoke PM_{2.5} deaths, climate change contributed to 26.8-38.3% of the deaths. We estimate the economic burden of wildfire smoke PM_{2.5} deaths was \$114 billion per year, with climate change contributing to \$10.6 billion per year. **CONCLUSIONS** We estimate that climate change is responsible for nearly 10% of wildfire smoke PM_{2.5} deaths across the United States, with greater contributions in western US states. In a scenario without climate change contributing to wildfire smoke PM_{2.5}, tens of thousands of deaths could be avoided and tens of billions of dollars saved every year.



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