Impacts of Wildfires on Global Public Health: Environmental, Health, and Social Perspectives

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Statement of the Problem

Climate change is increasingly becoming a global public health threat with far-reaching environmental, public health, and societal consequences. The most serious of these effects of climate change is intense and frequent wildfire activity. Wildfire season in the United States has now lasted for 78 more days since 1970 due to largely human-caused climate change-fueled dry weather conditions and extreme heat (U.S. Forest Service, 2022). In 2020, Australia was devastated by its worst fire season that took 33 human lives, to ashes burned thousands of houses and 18 million hectares of land was on fire and three billion animals killed or displaced (Hirschlag, 2020). 8 series of wildfire activity in Los Angeles from 7 to 31 January of 2025 is an example of expanding wildfire activity that has started to occur in abnormal wildfire months due to record-breaking warmth in months that would normally be cold together with extreme conditions of drought (Kajita et al., 2025).

Wildfires consume grasslands, forests, and other natural landscapes in millions of acres leading to loss of biodiversity, disruption of ecosystem processes, and increased risks of erosion of lands and contamination of waters (Hirschlag, 2020). Research has shown that wild fires release gigantic amounts of carbon dioxide and particulate matter that create feedback loops in the environment that induce further global warming that makes their own occurrence more severe while affecting air quality in vast distances (California Department of Fish and Wildlife, 2023).

Studies show that wildfire smoke contains toxic fine particulate that leads to respiratory illness like asthma as well as cardiovascular illness (Rizzo & Rizzo, 2024). Hospital admissions for respiratory illness in wildfire events in California increase by

10% to 34% and exert immense strain on the health system (Hirschlag, 2020). Wildfire events have adverse pregnancy outcomes like preterm birth and cause cognitive impairment in vulnerable individuals. Additionally, wildfire events have links to post-traumatic stress disorder, anxiety, and depression in 33% to 50% of people exposed to wildfire events (Rizzo & Rizzo, 2024).

Vulnerable populations, especially in low-income neighborhoods and marginalized communities, experience disproportionate wildfire burdens and have few resources to manage or recover from disaster (Davies et al., 2018). Wildfire displaces people, results in economic loss, and reduced access to healthcare, education, and basic services that create long-term social instability. Economically speaking, the damage is staggering as well at $19 billion from the fires in 2020 alone (Jina, 2022).

Despite the far-ranging effects of wildfire, research tends to isolate environmental, health, and societal aspects in their effects, more so than considering their inter-linkages (D'Evelyn et al., 2022). Policy measures have been emphasizing recovery in the immediate term over measures for building resilience in the medium to long term. This research aims to bridge the research gap through the broad research question, how wildfire affects global public health through environmental, health, and societal aspects and how these effects can be reduced?

Justification for an Interdisciplinary Approach

The increasing prevalence and magnitude of wildfires reflect that fires not only have environmental but have direct as well as indirect implications on human health and on society in general. Multi-disciplinary insight from across numerous disciplines will provide an integrated vision of multidimensional implications of fires and aid in more effective mitigation measures not only for immediate but for future measures as

well. Addressing the implications of climate change on health is crucial for protecting vulnerable individuals and promoting global health resilience.

The complexity of wildfire impact on global public health requires interdisciplinary consultation: Environmental Science that would explain the cause and mechanisms of climate change and their impact on natural ecosystems. Public Health that would provide insight on how climate change affects body and mind and Social Sciences that would ascertain general societal impact.

World Health Organization project estimates that between 2030 to 2050, global warming may cause an additional 250,000 deaths annually from diseases like heat stress, malnutrition, and infectious diseases (WHO, 2023). The findings from this research will guide advice to policymakers, improve disaster preparedness, and develop context-specific interventions for affected populations. Interdisciplinary thinking is needed to bridge divides in knowledge to guide more effective, more sustained, and more inclusive public health practice in the face of a shifting climate.

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