

Section 11.03 *Wildfires*

Overview

The risk of wildfires is increasing throughout the world due to climate change, increasing many public health hazards.¹ In Durham, these hazards include the physical and mental health impacts from fires that reach homes and residents as well as smoke from fires that occur anywhere in North America. According to the 2020 North Carolina Climate Science Report, “it is likely that future severe droughts... in North Carolina will be more frequent and intense due to higher temperatures leading to increased evaporation...[and] as a result, it is likely that the frequency of climate conditions conducive to wildfires in North Carolina will increase.”² A 2023 Climate Central analysis of wildfire risk shows that North Carolina ranks fourth in the nation for total number of homes in the areas on the edges of forests and other vegetation that are greater risk if wildfires develop.¹ The Triangle Regional Resilience Assessment and the Eno-Haw Hazard Mitigation Plan both list wildfires as an increasing concern for Durham with an estimated economic damage to buildings at nearly \$406,000,000 and multiple areas at medium to high risk of property damage.^{3,4}

Secondary Data

North Carolina has experienced wildfires including two major wildfire events in the fall of 2016 near Asheville and in the summer of 2008 in the Pocosin Lakes National Wildlife Refuge.^{5,6} Additionally, smoke from wildfires occurring outside of North Carolina impacted Durham’s air quality. Since 2001, there has been a 77% increase in the daily population exposure to wildfire smoke in the United States.⁷ Wildfire projections predict that by 2050, 80 million people in the U.S. will be regularly at risk.⁷ The summer of 2023 was Canada’s worst wildfire season on record, resulting in large smoke plumes that brought poor air quality to more than a third of the U.S. population, including Durham.⁸

Wildfires pose significant risk to human health. In some cases, the proximity to the fire itself may cause immediate injury and damage to housing infrastructure. As fires move into the area between human development and open land, (i.e. the wildland-urban interface) homes and other structures burned release additional toxic chemicals into the air, land, and water that can also have impacts on human health.⁹ A majority of the risk comes from exposure to smoke or other byproducts of combustion.⁹ Wildfire smoke contains air pollutants such as carbon dioxide, carbon monoxide, nitrous oxides, other organic chemicals and particulate matter.⁹

Particulate matter is the greatest health concern related to wildfires.⁹ Fine particulates (PM_{2.5}) in wildfire smoke (wildfire PM) are associated with a range of health effects including excess deaths and respiratory outcomes such as reduced lung function, bronchitis, and the worsening of asthma.¹⁰ Exposure to wildfire PM has also been associated with cardiovascular problems.¹¹ Particulate matter associated with wildfires has been shown to be more toxic than PM from other sources.¹² The majority of wildfire-related health research evaluates the short-term (days to weeks) exposure to wildfire smoke, with limited understanding of the potential health implications of repeated exposures to wildfire smoke over both many days and multiple fire seasons.¹³

While short and long-term exposure to fine particulates and possibly other harmful, but less studied byproducts of combustion during wildfires pose significant harm. Other psychological effects may also develop following large wildfires. Recent studies have noted an increase in post-traumatic

stress disorder, anxiety, and depression among others in both adults and children following large wildfire events.^{14, 15}

NC Forest Action Plan

In December 2020, the NC Forest Service, along with numerous partners, updated the North Carolina Forest Action Plan.¹⁶ This state wide assessment, along with its accompanying strategic plan and priority maps developed a broad and collective vision for protecting and enhancing NC forest values and benefits over a ten-year period. Specifically, goals two and three of the plan focus on increasing forest resilience from wildfires.¹⁶

Air Quality

During the summer of 2023, smoke from wildfires ravaging Canada traveled hundreds of miles across the Eastern United States to North Carolina producing hazardous levels of fine particulate matter (PM^{2.5}) compared to previous years during three different events^{17,18,19} (Figure 11.3(a)). These three events produced elevated PM_{2.5} greater than or comparable to a previous Canadian smoke event at the end of July 2021.²⁰ The significant degradation in Durham’s air quality related to wildfire smoke events indicates that wildfires are a health issue for Durham even if they are located more than 1,000 miles away.²⁰

Durham, NC, Daily Average PM_{2.5}, June-July, 2021-2023

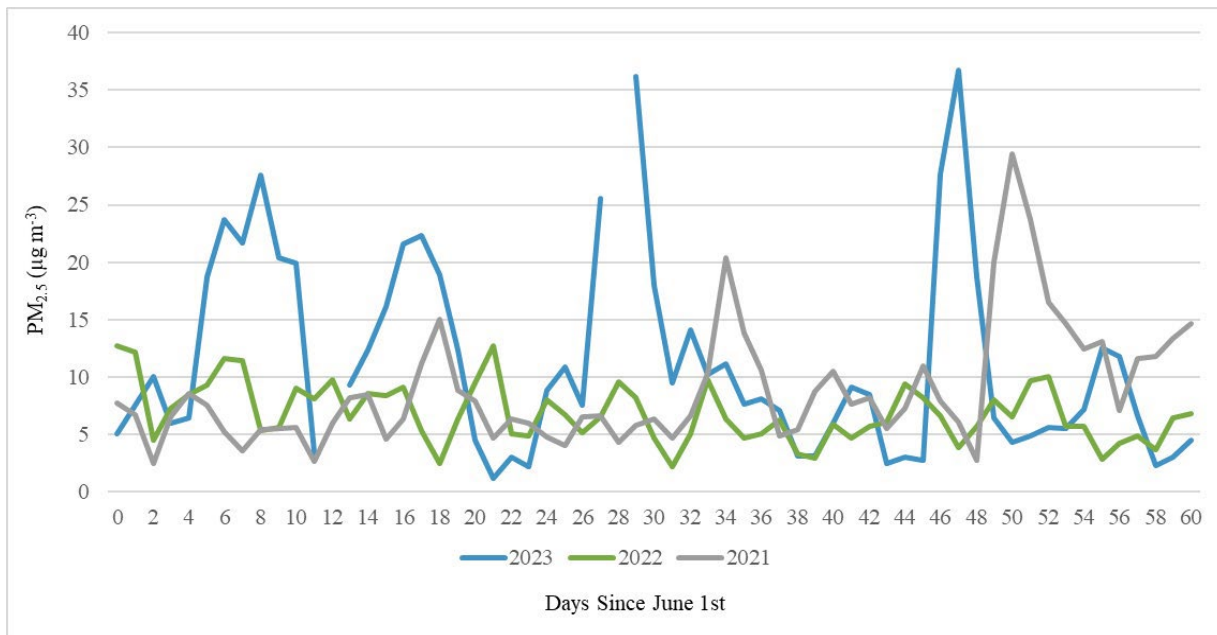


Figure 11.3 The daily average concentration of fine particulate matter during the months of June and July for 2021(wildfires), 2022 and 2023(wildfires) in Durham, NC.²¹

Interpretations: Disparities, Gaps, Emerging Issues

Several factors may make some individuals more susceptible to the effects of wildfire smoke including but not limited to age, health status, occupation, and housing status. Many studies examining wildfire smoke suggest that those living in locations with low socioeconomic status (SES) are at an increased risk of illness due to exposure to wildfire smoke. This is due to potential

increased exposure to wildfire smoke and higher prevalence of pre-existing conditions that can be worsened by wildfire-particulate matter.^{22,23} Redlining policies across the country and in Durham denied wealth-generating opportunities to communities of color and undermined their physical environments.²⁴ This makes communities of color more likely to have poor housing infrastructure that may lack air conditioning.²⁴ Having housing with air conditioning has been known to reduce particle pollution such as wildfire smoke indoors, potentially reducing a person's risk of ill health effects. Therefore, those without access to air conditioning may have greater exposure to wildfire smoke.¹³ Additionally, people of color and those living in low SES areas are also disproportionately affected by respiratory conditions, such as asthma, which may also put them at increased risk of health effects from exposure to wildfire smoke.^{25, 26, 27}

All children, even those with no pre-existing illness or chronic conditions, are considered sensitive to air pollution, including wildfire smoke." This is due to children's still developing lungs, inhaling more air, and spending more time outside engaging in more physical activity.²⁸

Recommended Strategies

- Develop a robust air monitoring system throughout the County along with a communication strategy for alerting residents.²⁹
- Provide easy access to room “high efficiency particular air” (HEPA) filter machines for residents at risk to borrow during days when wildfire smoke and other air quality issues are severe.³⁰
- Work with the Durham healthcare community to proactively develop disease management plans for patients more sensitive to the health impacts of wildfire exposure.³¹
- Establish Resilience Hubs in areas with high percentages of vulnerable populations to build physical and social resilience to air quality issues associated with wildfires.³²
- Develop a communication plan for wildfire smoke events for reducing/mitigating exposure and that addresses special needs of at-risk life stages and populations.
- Create and promote safe public spaces for impacted people to go to during wildfire or smoke events.
- Practice safe forest management strategies.

Current Initiatives & Activities

NC Department of Health and Human Services offers climate health information on wildfires in North Carolina. <https://epi.dph.ncdhhs.gov/oe/programs/climate.html>

NC Forest Service tracks daily fire activity using a database known as the "Signal 14". The data from Signal 14 is a rapid approximation of wildfire occurrence.

https://www.ncforestservice.gov/fire_control/sit_report.htm

EPA Smoke Sense App increases awareness of the known health effects associated with exposure to wildfire smoke and advances the scientific understanding of that relationship.

<https://www.epa.gov/air-research/smoke-sense-study-citizen-science-project-using-mobile-app>

Wildfire Smoke: A Guide for Public Health Officials is designed to help local public health officials prepare for smoke events, to take measures to protect the public when smoke is present, and to communicate with the public about wildfire smoke and health.

<https://www.airnow.gov/publications/wildfire-smoke-guide/wildfire-smoke-a-guide-for-public-health-officials/>

Indoor Air Quality (IAQ) Tools for Schools Action Kit shows schools how to conduct a practical plan to improve indoor air problems at little or no cost using activities and in-house staff.

<https://www.epa.gov/iaq-schools/indoor-air-quality-tools-schools-action-kit>

Climate Resilience for Frontline Clinics Toolkit provides resources for health care providers, patients, and administrators to prepare for climate-related hazards, including wildfires.

<https://www.americares.org/what-we-do/community-health/climate-resilient-health-clinics/>

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