



# Reproductive Rights in the US Wildfire Crisis

## Insights From Health Workers in Oregon State

HUMAN  
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WATCH



nurturely



# **Reproductive Rights in the US Wildfire Crisis**

Insights From Health Workers in Oregon State

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# Summary

Wildfires harm human health and well-being in myriad ways. For biological, cultural, and socioeconomic reasons, pregnant women and other pregnant people have a range of additional vulnerabilities to toxic air pollution and stress created by wildfires. Epidemiological studies have found associations with wildfire exposure and preterm birth, low birth weight, and other adverse maternal and newborn health conditions.

In recent decades wildfires have become larger, hotter, more destructive and deadly. The wildfire crisis in the US is predicted to spread and intensify over the next decades, driven by climate change together with other factors. This environmental challenge, together with other harms from the climate crisis, adds pressure to an existing maternal, newborn, and reproductive health crisis in the US.

The US is alone among high-income countries in recent increases in its maternal mortality rate and increasing rates of some serious maternal illnesses. The country has also seen a recent uptick in preterm birth rates, and continuing inequities in health outcomes between Black and Indigenous pregnant women and their white counterparts. This is all happening despite advancements in medical care and despite efforts by the US government to improve quality of care. The climate crisis and pollutants in air, water, at work and in homes, contribute to these poor newborn health outcomes and inequities.

Wildfires are a reproductive rights and reproductive justice problem. They damage reproductive health and probably do so differentially depending on how well-resourced people are and their racial and immigration status. Communities require large-scale government action to manage these conflagrations. They need greater attention and resourcing from government agencies and non-government maternal and newborn health workers, many of whom do not know about or have not paid sufficient attention to the environmental determinants of health. The growing piles of studies showing the harms of the climate crisis and pollution on maternal and newborn health and the UN General Assembly's recognition of the right to a healthy environment in 2022 should drive urgent action.

This report documents some of the impacts of increasing wildfires in Oregon on sexual and reproductive health and rights, and how these impacts intersect with disadvantages or

historical injustices and disparities. An international human rights organization, Human Rights Watch, and an Oregon-based US perinatal rights organization, Nurturely, produced this report based on more than 50 interviews with community-based birth workers like doulas and lactation consultants, midwives, doctors, social workers, community health workers, NGO workers, activists, and public health officials in Oregon, and with epidemiologists and climate experts from across the country both in the federal government and in academia. The report focuses on Oregon because it is among the states most impacted by wildfires and because Nurturely is based in the state. Our interviewees shared insights into how wildfires create and worsen reproductive harms for pregnant women and other pregnant people. They also described how pre-existing disadvantages make some pregnant people less able to take steps to protect themselves.

Our main findings include:

- **Race, immigration status, poverty, houselessness, place of work, language ability, and mental health conditions are key factors that impact who has access to knowledge and resources to protect themselves from wildfire smoke while pregnant.** In Oregon, some of these factors play out as follows:
  - **Race**: Members of communities facing structural racism, like Black communities, may be less able to manage wildfire smoke and acute stress of evacuations because they already face more stress and have fewer options to manage destabilization (like leaving to a hotel or other less smokey place, for example).
  - **Poverty**: Low-income pregnant people that are living in poverty are more likely to be unhoused or live in housing that increases exposure to wildfire smoke or otherwise lacks adequate mitigation features like air purifiers or filters--all while having less ability to temporarily evacuate during smoke events.
  - **Houselessness**: Pregnant people who do not have stable housing or are living in tents or cars are at additional risk of exposure and consequent health impacts.
  - **Place of work**: Members of immigrant communities that work in fields or farms, perform other low-income work outdoors, or work in poorly ventilated workspaces, have little choice but to continue to work, including if pregnant, regardless of exposure risks.

- Language ability: Members of communities who do not speak English are less likely to get information about the hazards of wildfire smoke in a language they can understand and are therefore at greater risk of exposure.
- **Maternal mental health impacts of wildfire exposure are a significant concern.** Interviewees discussed impacts from wildfires on the physical and mental health of their pregnant clients or patients.
- **Advice for pregnant people regarding wildfire smoke can be hard to use for low-income communities, and the pregnant person has to know that wildfire might be a risk and that these resources are available to go and find them in the first place.** Service providers working with pregnant women and other pregnant people had not been given training or information about the effects of wildfire smoke on pregnancy. Some found information online but said they still felt unsure or confused about what advice to share with pregnant patients or clients.
- **Wildfires can be an obstacle to maternal health care.** Providers described the effects of wildfire and smoke on communities as posing obstacles to maternal and newborn health, including by disrupting prenatal care or birth plans and removing the person's choice of where to give birth as well as harming the crucial early mother-baby and/or family bonding, including the ability to breastfeed.
- **Wildfires have negative impacts for providers.** Birth workers and other providers said they experienced health and other kinds of stressors on their own well-being in the midst and aftermath of the megafires of recent years. They endured both personal and professional stress. They had concerns as to whether they were providing the right advice to patients or clients.

Faced with megafires and the likelihood of more wildfires, our interviewees called for more government actions to protect pregnant people, including increasing access to information about potential harms of wildfire smoke to pregnancy health, subsidized or free air purifiers, and financial support that allows at-risk workers to take time off without undermining their income security. Efforts through trusted community-based workers or organizations in marginalized communities, like unhoused people, immigrant workers and people with mental health conditions, are especially important. Interviewees also said they want government action to tackle one of the root causes of wildfires, climate change.

Wildfire smoke over the past years has reversed some of the progress made under the Clean Air Act of 1963 (CAA). Under international human rights law, governments must take



steps to limit air pollution by addressing its causes, monitoring its impacts, and protecting people during the worst air pollution events, including wildfires. Governments cannot regulate wildfire-produced air pollution the way they can regulate factories, for example, or at least not in the short term, but smoky days have made clear inadequacies in US government protections for pregnant people from air pollution.

The US government also has an obligation to address the causes of worsening wildfire in the US. Under international human rights law, countries have a human rights obligation to adopt and implement robust and rights respecting climate mitigation and adaptation policies.

Globally, fossil fuels are the primary driver of greenhouse gas emissions, followed by changes in land use such as deforestation. Human Rights Watch and Nurturely welcome steps taken by the US government, including the passage of the Inflation Reduction Act of 2022 (IRA), to begin to reduce US greenhouse gas emissions. The IRA also dramatically increases funding for wildfire reduction programming and public health initiatives to try to address harmful air pollution from wildfire smoke.

However, the think-tank Climate Action Tracker gives the US government's overall climate policies and action an "insufficient" rating. The US needs to do more to reduce its greenhouse gas emissions, including by beginning a fair and equitable phase-out of the fossil fuel industry. The US is the world's biggest oil and gas producer and accounts for the greatest share--more than one third--of all planned global oil and gas expansion through 2050.

Human Rights Watch and Nurturely make the following recommendations in this report:

- A maternal and newborn public health response to wildfires by both government and non-governmental health actors should include community-specific, culturally appropriate, and respectful outreach to pregnant women and people who are likely additionally at risk, through trusted community-based health workers. Generalized top-down advice to "pregnant people" or "pregnant women" is an important first step but is not sufficient. Communication efforts should reach marginalized communities and individuals specifically, and make sure public health actors are listening as well to experiences and needs in a two-way communication.
- We also recommend state and federal government (and others) answer pleas from the American College of Obstetricians and Gynecologists, scientists, and advocacy

- groups, to better educate health workers on environmental determinants of health so they can provide better information, and actionable advice for pregnant women.
- Federal authorities should make voluntary reporting on air quality mandatory and more complete and consider finding new ways to reach the most at-risk pregnant people with information and advice in places with dangerously poor air quality because of wildfire smoke. This will probably mean engaging trusted local organizations that support pregnant people including by centering dignity, respect and cultural competency.
  - US federal agencies, including the Department of Health and Human Services and the Environmental Protection Agency (EPA), should work together to create an up-to-date state of the science white paper, including an action plan, on climate and other environmental harms to reproductive justice in the US.
  - The EPA should include reproductive justice expertise in its teams, including its new environmental justice office.
  - Federal public health officials should ensure there is more public health education on the environmental determinants of health. To support this effort, we recommend federal agencies officially recognize an Enviro-Natal Day of Action or Enviro-Natal Week of Action every year in the US.

# Recommendations

## Oregon State Government

- Reduce greenhouse gas emissions from the state and protect and encourage carbon sinks such as forests.
- Provide resources to pregnant people such as information, actionable advice, masks, air purifiers, mental health support, clean air spaces, and vouchers for hotels and travel, and work with trusted community-based health workers to increase knowledge about and access to these services.
- Reach pregnant women and other pregnant people who are most at-risk, because of where they live or work or because they are a member of an underserved minority group, with information and advice that is useful for them, for example through posters in the most useful languages, information events, activities by community-based organizations etc.
- Make sure heat advisories, wildfire information and all environmental health information include information on pregnant people and reach providers who work with them.
- Increase access for all people planning to get pregnant and pregnant people, especially low-income and Oregon Health Plan members, to free air purifiers, AC units, repairs, and replacement parts for protective housing improvements such as window and door sealing.
- Work with clinical and non-clinical perinatal health worker representatives to establish emergency systems that address pregnant people, postpartum people, and newborns' needs during wildfire season and evacuations, such as referrals, including for breastfeeding and other postpartum support.
- Create a position in the Oregon Health Authority to study and advise legislators on reproductive justice or otherwise ensure reproductive justice expertise informs the state's work to address the health impacts of the climate crisis, including for pregnant people, postpartum people, and newborns.
- Actively solicit and include the advice of doulas, midwives, and other birth workers, in addition to other healthcare professionals working on reproductive health, with experiences of wildfires in policy design.

- Create a taskforce involving state health workers and experts, and maternal health workers including in low-income communities, or conduct research together with perinatal health workers, on the intersection of maternal and mental health and environmental health threats in the state and make recommendations on ways forward.
- Create and fund a review of environmental harms to maternal and newborn health, including from climate impacts such as wildfires.
- Pass a law funding a reproductive justice approach to the wildfire crisis in the state, including training and education funds for workers; additional grants for maternal and newborn health workers, including doulas, lactation consultants, home visitors; and appropriate community health workers to provide education, emotional support, and wraparound services.
- Review new worker protections regarding extreme heat and wildfire smoke to make sure they are working for low-income pregnant workers and adjust them if necessary. Review housing laws to make sure they are as protective of maternal and newborn health regarding wildfire smoke as possible, for example considering requirements that reduce smoke leaking into houses.

## National Institutes of Health and Other Research Grant-making Institutions

- Provide funding for academic and community-based research on wildfire and maternal and newborn health issues, including/particularly on:
  - Impact of the climate crisis in general on maternal mental health;
  - Impact of repeated wildfires on health, including maternal mental health and breastfeeding;
  - Impact of wildfires on newborn health.
- Provide funding for pilot projects on wildfire interventions.

## Federal Government

### *Executive branch*

- Set and implement robust goals for the reduction of greenhouse gas emissions, in line with the best available science.
- Ensure reproductive justice expertise in the response to the climate crisis by the United States government (for example, in the EPA's Environmental Justice

division, the Office for Climate Change and Health Equity, and the CDC's Building Resilience Against Climate Effects (BRACE) framework.)

- Establish an interagency taskforce involving the Department of Health and Human Services and the Environmental Protection Agency and, together with community-based birth workers, conduct a national survey on the impacts of environmental health on maternal and newborn health and reproductive justice and create a white paper with recommendations on ways forward.
- Officially recognize an Enviro-Natal Day of Action or Enviro-Natal Week of Action every year in the US.

### *Legislative branch*

- Pass laws that would better fund health adaptation to the climate crisis, including maternal and newborn health initiatives/programs/efforts (for example, Protecting Moms and Babies Against the Climate Crisis).
- Pass laws to address the maternal health crisis in the US, including the Omnibus Act.

### **Maternal Health Community**

- Provide more programming and advocacy on environmental determinants of health, including in the context of the climate crisis.
- Engage in action and advocacy to push for more robust climate policies, including a fair and equitable phase-out of fossil fuels, due to the harmful impacts on maternal and newborn health.

## Methodology

This report is a joint effort by Human Rights Watch, an international human rights organization headquartered in New York City, New York, and Nurturely, a perinatal equity organization based in Eugene, Oregon. The organizations chose Oregon as the location for this research because it is an intensely wildfire-impacted area of the United States.

Most interviews were conducted by Human Rights Watch using connections made through Nurturely's links within the perinatal health community in Oregon (that is, a convenience sampling method).

Both organizations wrote this report because while the body of epidemiological science on wildfire effects on birth outcomes is growing and some sociological studies on maternal health impacts from wildfire disasters exist, little information is available that explores the impact of wildfires on sexual and reproductive health and rights and how these intersect with disadvantages or historical injustices and disparities in the US.

Human Rights Watch and Nurturely staff interviewed twenty-nine Oregon health workers, including six community health workers, six doctors, seven doulas, eight midwives and two nurses. All the interviewees often or mostly work with pregnant women and other pregnant people and gave information about how, in their experience, pregnant people were impacted by wildfire events, including the major Oregon wildfires of 2020. We also made specific efforts to interview health workers who serve low-income and minority populations. In addition, we interviewed twelve epidemiologists and other expert academics on wildfire and connected public health issues as well as five workers at non-governmental organizations (NGOs) in relevant spheres. Finally, we interviewed seven government public health workers in Oregon and four in the US federal government, in the Centers for Disease Control and Prevention, the Department of Health and Human Services, or the Environmental Protection Agency.

All interviews were conducted between 2021 and 2023, and most were conducted remotely via telephone or online technology. All interviews were in English with full, informed consent. The interviews were semi-structured and lasted approximately 30 to 45 minutes.

All interviewees were provided with an overview of the project. We told all interviewees that they could decline to answer questions or could end the interview at any time. Nurturely provided a \$50 gift card to doulas and midwives who gave interviews to either organization out of respect for their time and expertise.

# I. Background

Toxic smoke and stress associated with wildfire exposure have negative impacts on human health, with additional risks for pregnant people. Due to environmental racism and discrimination that compounds biological risk factors, wildfires are also likely to have disproportionate impacts on low income or racial minorities. Unhealthy air is already a problem for many communities, including pregnant people, near fossil fuel industry and transport infrastructure.<sup>1</sup> But wildfire smoke is significantly negatively impacting air quality in the US. Climate change creates conditions in which fires are more likely to start, have more fuel and spread more quickly. Hot, dry and windy conditions are likely to become more frequent as global warming increases.

## Overview of Wildfire

Wildfire is a necessary part of fire-adapted ecosystems in the western US, but according to US government scientists, “in recent decades, wildfires in the western United States have become larger, hotter, and more destructive and deadly due to a suite of factors, including climate change.”<sup>2</sup> Recent wildfires have moved “at a speed” and an intensity “previously unseen.”<sup>3</sup> Now, in Oregon, like elsewhere, wildfire season starts earlier and ends later than it had before.<sup>4</sup>

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<sup>1</sup> Increased risks of preterm birth, low-weight birth, miscarriage, and early infant death have been documented among people living near or working in oil and gas production sites, petrochemical plants, oil refineries and power plants burning fossil fuels. For example, see, Victoria D. Balise et al., “Systematic review of the association between oil and natural gas extraction processes and human reproduction,” *Fertility and Sterility* 106 no.4 (2016), accessed August 6, 2024, doi:10.1016/j.fertnstert.2016.07.1099. See also “Environmental Justice and Transportation,” US Environmental Protection Agency (US EPA), accessed August 6, 2024, <https://www.epa.gov/mobile-source-pollution/environmental-justice-and-transportation#:~:text=Pollution%20from%20the%20transportation%20sector,disproportionate%20exposures%20to%20this%20pollution>.

<sup>2</sup> The National Climate Assessment 5 (NCA 5), 2023 provides a good overview of the ways the climate crisis is contributing to increased wildfire. Steven M. Ostoja et al., “Focus on western wildfires” *Fifth National Climate Assessment* (2023), accessed May 6, 2024, doi:10.7930/NCA5.2023.F2.

<sup>3</sup> Federal Emergency Management Agency (FEMA) and U.S. Fire Administration, “Wildland Urban Interface: A Look at Issues and Resolutions: A Report of Recommendations for Elected Officials, Policymakers and All Levels of Government, Tribal and Response Agencies,” June 2022, <https://www.usfa.fema.gov/downloads/pdf/publications/wui-issues-resolutions-report.pdf> (accessed May 6, 2024).

<sup>4</sup> Oregon Department of Environmental Quality, “Wildfire Smoke Trends and the Air Quality Index,” May 2023, <https://www.oregon.gov/deq/wildfires/Documents/WildfireSmokeTrendsReport.pdf> (accessed May 6, 2024).



Scientists predict the increasing frequency and severity of wildfires will continue in the western US until the mid-21st century, when fires may reduce because of a lack of fuel.<sup>5</sup> At present, according to the First Street Foundation, which provides climate risk data, as many as one in six people in the US are at significant danger of wildfire burning their homes and wildfire exposure risk is spreading across the country, including to areas with little previous experience of wildfires and how to manage them.<sup>6</sup>

Recent climate-driven “mega fires” (a fire that burns more than 100,000 acres) caused massive destruction of forests, homes, and other infrastructure in the US with huge implications for human health and economic well-being.<sup>7</sup> According to one calculation, wildfires cost the US between \$394 and \$893 billion dollars a year.<sup>8</sup>

Indigenous communities have traditionally used fire to care for the land, including by reducing burnable matter in forests to make them less vulnerable to uncontrolled conflagration. The move in forest management away from Indigenous practices is, with climate change, another factor behind the current US wildfire crisis.<sup>9</sup> Wildfire damage to health and infrastructure have also increased dramatically in the past decades because of

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<sup>5</sup> Ostoja et al., “Focus on western wildfires.”

<sup>6</sup> Diana Leonard, “Wildfire risks are rising across U.S., from Hawaii to Oregon to Texas,” *the Washington Post*, August 14, 2023, <https://www.washingtonpost.com/weather/2023/08/14/us-fire-season-forecast-oregon/> (accessed May 6, 2024) and John Muyskens, et al., “1 in 6 Americans live in areas with significant wildfire risk,” *the Washington Post*, May 17, 2022, <https://www.washingtonpost.com/climate-environment/interactive/2022/wildfire-risk-map-us/> (accessed May 6, 2024).

<sup>7</sup> Ostoja et al., “Focus on western wildfires.”

<sup>8</sup> “Climate-exacerbated wildfires cost the U.S. between \$394 to \$893 billion each year in economic costs and damages” Joint Economic Committee Democrats, October 16, 2023, <https://www.jec.senate.gov/public/index.cfm/democrats/2023/10/climate-exacerbated-wildfires-cost-the-u-s-between-394-to-893-billion-each-year-in-economic-costs-and-damages> (accessed May 6, 2024).

<sup>9</sup> “Indigenous Fire Practices Shape our Land” National Park Service, March 18, 2024, <https://www.nps.gov/subjects/fire/indigenous-fire-practices-shape-our-land.htm> (accessed May 6, 2024).

increased development, including in the growing wildland-urban-interface (WUI).<sup>10</sup> People living in the WUI increases the risk of human activity starting wildfires.<sup>11</sup>

### *Wildfires in Oregon*

In Oregon, wildfires have long been part of life, including in pre-colonial times. In the past decade or so, wildfires have become larger and more severe. Recent disastrous wildfires include the:

- Almeda Fire that traveled with terrifying speed along a valley, burning 2,500 homes and 600 businesses primarily in Phoenix and Talent towns in September 2020.
- Holiday Farm Fire that burned about 170,000 acres in Lane County in 2020.
- Bootleg Fire that burned some 413,000 acres in eastern Oregon in 2021.
- Cedar Creek Fire that burned some 70,000 acres in 2022.<sup>12</sup>

Years later, the affected towns and counties are still struggling with housing, economic recovery, increases in mental health harms and other fallout from the conflagration.<sup>13</sup>

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<sup>10</sup> “What is the WUI?” U.S. Fire Administration, June 8, 2022, <https://www.usfa.fema.gov/wui/what-is-the-wui.html> (accessed May 6, 2024). FEMA defines the WUI as “areas where human development meets or intermingles with undeveloped wildland and vegetative fuels that are both fire dependent and fire prone. It is the line, area, or zone where structures and other human development transition or intermingle with undeveloped wildlands or vegetative fuels.” According to FEMA “[b]etween 2005 and 2020, wildfires have destroyed more than 89,000 structures in the United States, including homes and businesses. The most damaging wildfires have occurred in the last few years, accounting for 62% of the structures lost over the last 15 years ... America’s WUI continues to grow by approximately 2 million acres per year [and] conditions may become worse.” FEMA and U.S. Fire Administration, “Wildland Urban Interface: A Look at Issues and Resolutions: A Report of Recommendations for Elected Officials, Policymakers and All Levels of Government, Tribal and Response Agencies,” June 2022, <https://www.usfa.fema.gov/downloads/pdf/publications/wui-issues-resolutions-report.pdf> (accessed May 6, 2024). See also for increase in burned housing, Philip E Higuera et al., “Shifting social-ecological fire regimes explain increasing structure loss from Western wildfires,” *PNAS Nexus* 2, no. 3 (2023), accessed May 6, 2024, doi:10.1093/pnasnexus/pgad005.

<sup>11</sup> Ostoja et al., “Focus on western wildfires.” A FEMA report said 89 percent of wildfires are human-caused. FEMA and U.S. Fire Administration, “Wildland Urban Interface: A Look at Issues and Resolutions: A Report of Recommendations for Elected Officials, Policymakers and All Levels of Government, Tribal and Response Agencies,” June 2022, <https://www.usfa.fema.gov/downloads/pdf/publications/wui-issues-resolutions-report.pdf> (accessed May 6, 2024).

<sup>12</sup> Eden Mcall, “The Almeda Fire: Following the Flames of An Urban Wildfire to Discover How We Can Live In A New Wildfire Era” June 13, 2022, <https://storymaps.arcgis.com/stories/152aa529aa5c4dd29165bacd60422a8f> (accessed May 6, 2024).

<sup>13</sup> Jenn Chávez, “3 years later, wildfire survivors in Southern Oregon are still recovering from trauma,” *OPB*, September 8, 2023, <https://www.opb.org/article/2023/09/08/wildfire-survivors-recovery-southern-oregon/> (accessed May 6, 2024).

Many other wildfires in the past decade have caused displacement, destruction, and poor air quality for days, weeks, or even months, in both rural and urban areas.<sup>14</sup> Multiple fires at one time can create enormous pressure on responders and put many communities under disruptive and frightening immediate evacuation orders or differently stressful “be ready” orders. For example, in 2020, Oregon’s worst fire season on record, some million acres burned, 11 people were killed, 40,000 evacuated, and another half a million or so lived in anxiety under evacuation warnings.<sup>15</sup> Thousands of homes were destroyed as fires raged not only in Oregon, but also Washington (to the north) and California (to the south), stretching emergency capacity at both state and federal levels and complicating efforts to address the Covid-19 pandemic at the same time.<sup>16</sup>

2020 was an especially traumatic year for Oregonians, with both massive fires and the Covid-19 outbreak in full force, but wildfires have remained a powerful force since then. For example, in August 2023, 12 large fires burned at once in Oregon, burning 95,405 acres and requiring 3,362 firefighters to control.<sup>17</sup>

## Wildfire Smoke and Health

Wildfire smoke is a very intense congregation of air pollutants. Wildfire smoke contains “particulate matter,” including microscopic particles of 2.5 micrometers or less in size (PM<sub>2.5</sub>) that, when inhaled, causes health harms.<sup>18</sup>

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<sup>14</sup> Zach Price and Hailey Rein, “Oregon wildfires: 20 of the state's biggest since 2002,” *Salem Statesman Journal*, July 20, 2021, <https://www.statesmanjournal.com/story/news/2021/07/20/oregon-wildfires-20-biggest-since-2002/7985470002/> (accessed May 6, 2024).

<sup>15</sup> “2020 Oregon wildfires,” Wikipedia, [https://en.wikipedia.org/wiki/2020\\_Oregon\\_wildfires](https://en.wikipedia.org/wiki/2020_Oregon_wildfires) (accessed May 6, 2024).

<sup>16</sup> “FEMA Led Historic Pandemic Response, Supported Record Number of Disasters in 2020,” FEMA, January 11, 2021, <https://www.fema.gov/press-release/20210111/fema-led-historic-pandemic-response-supported-record-number-disasters-2020> (accessed May 6, 2024).

<sup>17</sup> John Ross Ferrara, “Oregon, Washington faces total of 17 ‘large’ wildfires spanning 125,000 acres,” *KOIN*, August 29, 2023, <https://www.koin.com/news/wildfires/oregon-washington-faces-total-of-17-large-wildfires-spanning-125000-acres/> (accessed May 6, 2024).

<sup>18</sup> World Health Organization (WHO), “WHO global air quality guidelines: particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide,” 2021, <https://iris.who.int/bitstream/handle/10665/345329/9789240034228-eng.pdf?sequence=1&isAllowed=y> (accessed May 6, 2024).

In late summer 2020 Oregon declared the terrible air quality from the wildfire smoke a public health emergency.<sup>19</sup> The thick smoke broke many records for poor air quality; it was so bad in some places that levels of PM<sub>2.5</sub> were “off the scale” and often the worst in the world during that period.<sup>20</sup>

### *Country-Wide Regulations of Air Pollutants*

The US Clean Air Act (CAA) is an example of how government regulations can drastically improve air quality and human health. Data show US-wide emissions of the six major air pollutants the CAA monitors trailing downward over the past 45 years.<sup>21</sup> Country-wide assessments can, however, disguise much uglier truths about the harms to certain communities, such as high-pollution areas of Texas and southern California because of industry and transportation emissions. For example, a Human Rights Watch report in 2024 documented how extreme pollution from the fossil fuel industry in Louisiana’s “Cancer Alley” devastates the health and lives of the area’s predominantly Black residents, causing higher rates of preterm birth and low birth weight than in lower-pollution areas nearby. The six major air pollutants do not include other less closely monitored toxic air pollutants in emissions in Cancer Alley.

Wildfires emit huge amounts of air pollution.<sup>22</sup> The congressionally mandated Fifth National Climate Assessment, released in November 2023, warned that wildfires threaten to offset US air quality improvements from “reduced human-caused air pollutant emissions.”<sup>23</sup> Wildfire-produced air pollution, including from prescribed fires, an important tool to reduce the chances of major wildfires, is not considered a violation of air quality

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<sup>19</sup> Daniel Uria, “HHS declares public health emergency in Oregon due to wildfire smoke,” *UPI*, September 16, 2020, [https://www.upi.com/Top\\_News/US/2020/09/16/HHS-declares-public-health-emergency-in-Oregon-due-to-wildfire-smoke/4671600299090/](https://www.upi.com/Top_News/US/2020/09/16/HHS-declares-public-health-emergency-in-Oregon-due-to-wildfire-smoke/4671600299090/) (accessed May 6, 2024).

<sup>20</sup> Monica Samayoa, “Oregon’s air is so hazardous it’s breaking records,” *OPB*, September 15, 2020, <https://www.opb.org/article/2020/09/15/oregons-air-is-so-hazardous-its-breaking-records/> (accessed May 6, 2024) and Gary A. Warner, “Wildfires created worst air in the world in Oregon,” *Oregon Capital Insider*, September 13, 2020, [https://www.oregoncapitalinsider.com/wildfires-created-worst-air-in-the-world-in-oregon/article\\_426b8a08-f5fb-11ea-90f3-13e45f616b93.html](https://www.oregoncapitalinsider.com/wildfires-created-worst-air-in-the-world-in-oregon/article_426b8a08-f5fb-11ea-90f3-13e45f616b93.html) (accessed May 6, 2024).

<sup>21</sup> U.S. Environmental Protection Agency (EPA), “Declining National Air Pollutant Emissions,” [https://www.epa.gov/sites/default/files/2019-09/2019\\_air\\_emissions\\_decline.png](https://www.epa.gov/sites/default/files/2019-09/2019_air_emissions_decline.png) (accessed May 6, 2024).

<sup>22</sup> James MacCarthy et al., “Canada’s Record-breaking 2023 Wildfires Released Nearly 4 Times More Carbon than Global Aviation,” June 27, 2024, *World Resource Institute*, <https://www.wri.org/insights/canada-wildfire-emissions> (accessed August 6, 2024). Canada’s wildfires in 2023 emitted an estimated 3 billion tons of carbon, for example, four times the carbon emissions of the global aviation sector in 2022.

<sup>23</sup> Jason West et al., “2023: Chapter 14. Air Quality,” Fifth National Climate Assessment (2023), accessed May 6, 2024, doi:10.7930/NCA5.2023.CH14.

regulations, and the EPA, in effect, allows states to exclude wildfire pollution (including prescribed burning) from their overall emissions as long as all reasonable efforts were made to prevent or contain the fire.<sup>24</sup>

### *General Health Impacts*

As mentioned, wildfire smoke contains PM<sub>2.5</sub>. When breathed in, PM<sub>2.5</sub> can enter the bloodstream from the lungs and then cause additional damage and inflammation in other parts of the body, such as the heart and brain. The health harms of PM<sub>2.5</sub> have been extensively researched, and as discussed further below, damage to maternal health has been well studied.<sup>25</sup> Larger particles called PM<sub>10</sub> can also be inhaled and deposited throughout the airways in the upper regions of the lung. Particles deposited on the lung surface can induce tissue damage and lung inflammation, impacting respiratory and cardiovascular health.<sup>26</sup> According to the EPA, “wildland fires ... now account for 40 percent of the total PM emitted in the country, making it a major source of the pollutant.”<sup>27</sup> In some parts of the western US, including Oregon, wildfires are the biggest PM<sub>2.5</sub> emitters.<sup>28</sup> Anywhere in the US, when air quality exceeds 500 on the PM<sub>2.5</sub> air quality index, which is at highest end of the “hazardous” range, it is usually because of wildfire smoke.<sup>29</sup>

In addition to particulate matter, wildfire smoke is a source of three other CAA-monitored pollutants: ground-level ozone and nitrous oxides, which both harm lung health, and carbon monoxide, which is found in wildfire smoke close to the fire itself and can be deadly.

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<sup>24</sup> Code of Federal Regulations, Title 40: Protection of Environment, § 50.14 Treatment of air quality monitoring data influenced by exceptional events, and also see Environmental Protection Agency, factsheet “Implementing the Final Rule to Strengthen the National Air Quality Health Standard for Particulate Matter – Clean Air Act Permitting, Air Quality Designations, and State Planning Requirements”, February 7, 2024, <https://www.epa.gov/system/files/documents/2024-02/pm-naaqs-implementation-fact-sheet.pdf> (accessed August 8, 2024).

<sup>25</sup> Prakash Thangavel, Duckshin Park and Young-chul Lee, “Recent Insights into Particulate Matter (PM<sub>2.5</sub>)-Mediated Toxicity in Humans: An Overview,” *International Journal of Environmental Research and Public Health* vol.19 no. 12 (2022):7511, accessed August 6, 2024, doi:10.3390/ijerph19127511.

<sup>26</sup> “Particulate Matter and Health Fact Sheet,” California Air Resources Board, accessed August 6, 2024, <https://ww2.arb.ca.gov/resources/fact-sheets/particulate-matter-and-health-fact-sheet#:~:text=PM10%20particles%20can%20be%20inhaled,impacting%20respiratory%20and%20cardiovascular%20health.>

<sup>27</sup> “The Danger of Wildland Fire Smoke to Public Health,” US EPA, January 18, 2018, <https://www.epa.gov/sciencematters/danger-wildland-fire-smoke-public-health> (accessed May 6, 2024), the figure includes prescribed fires.

<sup>28</sup> “National Climate Assessment 5,” 2023, accessed May 6, 2024, <https://nca2023.globalchange.gov/>.

<sup>29</sup> Jenny Gross, “What Happens When the Air Quality Index Surpasses 500?” *New York Times*, June 9, 2023, <https://www.nytimes.com/2023/06/09/climate/air-quality-index-500.html> (accessed May 6, 2024).

Furthermore, an extensive number of hazardous air pollutants (HAPs) have been found in wildfire smoke, including acetaldehyde, acrolein, formaldehyde, and benzene, all with known harms to human health, especially for infants and children.<sup>30</sup> Wildfire is the second-biggest producer of these volatile organic chemicals or VOCs globally.<sup>31</sup> One US-government funded study that used a laboratory plane to measure chemicals in wildfire smoke found that the VOC content of wildfire smoke was 3 – 5 times higher than previously thought and that wildfire smoke in 2018, for example, created 45 percent of the Western US’s total VOC emissions during the wildfire season that year.<sup>32</sup>

The US government focuses its efforts to monitor and provide public health information on six pollutants, including PM<sub>2.5</sub> and ozone using US national ambient air quality standards. Less information is provided about other air pollutants including ones also regulated by the CAA such as “HAPs” or hazardous air pollutants. More monitors for PM<sub>2.5</sub> and ozone are needed, however, to provide a better picture of communities’ air quality.<sup>33</sup> The US government now uses data from community air monitors to improve information during smoke events.<sup>34</sup>

The content and toxicity of wildfire smoke can vary greatly, as can the risk of human exposure, depending on many variables including proximity and burn temperature, wind speeds, geography, and how high the smoke is in the atmosphere. Smoke may also contain an even wider array of toxic substances when homes and other infrastructure burn as well as trees and other vegetative matter.<sup>35</sup> One study found evidence that wildfire smoke is sometimes more toxic than “normal” or “ambient” air pollution.<sup>36</sup>

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<sup>30</sup> AirNow, “Wildfire Smoke: A Guide For Public Health Official,” 2019, <https://www.airnow.gov/sites/default/files/2021-05/wildfire-smoke-guide-revised-2019-chapters-1-3.pdf> (accessed May 6, 2024).

<sup>31</sup> Lixu Jin et al., “Constraining emissions of volatile organic compounds from western US wildfires with WE-CAN and FIREX-AQ airborne observations,” *Atmospheric Chemistry and Physics* 23 no.10 (2023):5969–5991, accessed August 6, 2024, doi:10.5194/acp-23-5969-2023.

<sup>32</sup> Ibid.

<sup>33</sup> Human Rights Watch interview, Diana Van Vleet, American Lung Association, June 22, 2024.

<sup>34</sup> “Using AirNow During Wildfires,” AirNow, accessed August 6, 2024, <https://www.airnow.gov/fires/using-airnow-during-wildfires/>.

<sup>35</sup> US EPA, “Study Shows Some Household Materials Burned in Wildfires Can be More Toxic Than Others,” March 1, 2022, <https://www.epa.gov/sciencematters/study-shows-some-household-materials-burned-wildfires-can-be-more-toxic-others> (accessed May 6, 2024).

<sup>36</sup> Rosana Aguilera et al., “Wildfire smoke impacts respiratory health more than fine particles from other sources: observational evidence from Southern California,” *Nature Communication* 12 no. 1 (2021): 1493, accessed May 6, 2024, doi:10.1038/s41467-021-21708-0.

Short-term exposure to wildfire smoke can contribute to:

- mild discomfort, like coughing and eye irritation;
- respiratory effects, like wheezing and difficulty breathing;
- respiratory conditions, like bronchitis and severe acute asthma;
- cardiovascular effects, including heart failure, heart attack, stroke; and
- increased risk of premature death.<sup>37</sup>

Wildfire smoke can sicken even healthy people; for example, it can reduce lung function.<sup>38</sup>

Wildfires are predicted “to result in a significant health burden, especially for at-risk populations.”<sup>39</sup>

The World Health Organization (WHO) warns that wildfire smoke can lead to cognitive impairment and memory loss.<sup>40</sup> Trauma from wildfire devastation and displacement can also have long-term impacts across communities.<sup>41</sup> Studies have found post-traumatic stress disorder, anxiety and depression rates rise after wildfires.<sup>42</sup> Even people far from fires but who live under smoke, including disconcertingly orange skies and extreme haziness, can find the experience anxiety-inducing.<sup>43</sup>

Health harms can also take place beyond the duration of the fire and smoke. Wildfires can adversely affect water supplies in both the short and the long term, as the EPA has noted, wildfire can “severely affect water quality by causing soil erosion, increased flooding and debris flow. At the same time, fires can result in the resuspension of legacy mine and industrial waste that has settled in river bottoms.”<sup>44</sup> One study of several fire-affected

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<sup>37</sup> “Health Effects Attributed to Wildfire Smoke,” EPA, accessed May 6, 2024, <https://www.epa.gov/wildfire-smoke-course/health-effects-attributed-wildfire-smoke>.

<sup>38</sup> “Wildfires,” World Health Organization (WHO), accessed May 6, 2024, [https://www.who.int/health-topics/wildfires/#tab=tab\\_2](https://www.who.int/health-topics/wildfires/#tab=tab_2).

<sup>39</sup> “NCA 5.”

<sup>40</sup> “Coping with Wildfires and Climate Change Crises” University of San Francisco, accessed May 6, 2024, <https://psychiatry.ucsf.edu/copingresources/wildfires>.

<sup>41</sup> Patricia To, Ejemai Eboeime, and Vincent I. O. Agyapong, “The Impact of Wildfires on Mental Health: A Scoping Review,” *Behavioral Sciences* 11 no.9 (2021):126, doi:10.3390/bs11090126.

<sup>42</sup> Ibid.

<sup>43</sup> Stephanie Pappas, “Wildfires and Smoke Are Harming People’s Mental Health. Here’s How to Cope,” *Scientific American*, June 29, 2023, <https://www.scientificamerican.com/article/wildfires-and-smoke-are-harming-peoples-mental-health-heres-how-to-cope/> (accessed May 6, 2024).

<sup>44</sup> “Wildland Fire Research, Water Supply and Ecosystem Protection,” US EPA, accessed August 6, 2024, <https://www.epa.gov/air-research/wildland-fire-research-water-supply-and-ecosystem-protection>.

watersheds found in some places rates of toxic nitrates, arsenic, disinfection byproducts and volatile organic compounds all rose to levels beyond what regulations allow.<sup>45</sup>

Lasting loss and sadness over burned areas, including areas that might have specific cultural or personal meaning for individuals and communities, are damaging to mental health and well-being.<sup>46</sup> To try and capture these losses, new words like “eco-anxiety,” a persistent worry about ecological wellbeing and even sometimes the future of human life, and “solastalgia,” which incorporates both a sense of loss and powerlessness over environmental losses of great meaning to individuals and communities, have been created and are increasingly used in public health policy, journalism, and academia.<sup>47</sup>

Despite extensive recent research on wildfire smoke hazards, many questions remain, regarding the long-term harms of wildfire smoke exposure, how harms might change when people are repeatedly exposed (for example, for communities forced to manage a “smoke season” every year), and how much additional harm is caused by exposure to longer smoke seasons.<sup>48</sup> The EPA has warned that respiratory health harms to firefighters have been shown to accumulate over longer exposures and that generally “more caution is warranted during extended exposures.”<sup>49</sup>

Some important research has been done to better understand wildfires’ impacts on human health in Oregon. In the *Santiam Canyon Community Health Impact Assessment*, a report providing insights into community health impacts one year after the 2020 Labor Day

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<sup>45</sup> Michael J. Pennino et al., “Wildfires can increase regulated nitrate, arsenic, and disinfection byproduct violations and concentrations in public drinking water supplies manuscript,” *Science of the Total Environment* 804 (2022), accessed May 6, 2024, doi:10.1016/j.scitotenv.2021.149890

<sup>46</sup> For examples in Arizona, David Eisenman et al., “An Ecosystems and Vulnerable Populations Perspective on Solastalgia and Psychological Distress After a Wildfire,” *EcoHealth* 12 (2015):602–610, accessed August 6, 2024, doi:10.1007/s10393-015-1052-1. In California: Adreienne R. Brown, “‘Homesick for Something That’s Never Going to Be Again’: An Exploratory Study of the Sociological Implications of Solastalgia,” *Society & Natural Resources*, 36 no. 4 (2023): 349–365, accessed August 6, 2024, doi:10.1080/08941920.2023.2165205.

<sup>47</sup> The Australian philosopher, Glenn Albrecht is often credited with coining these terms. For more see, for example: Glenn Albrecht et al., “Solastalgia: the distress caused by environmental change,” *Australasians Psychiatry* 15 (2007); accessed August 6, 2024, doi:10.1080/10398560701701288.

<sup>48</sup> “Health Effects Attributed to Wildfire Smoke,” US EPA, accessed May 6, 2024, <https://www.epa.gov/wildfire-smoke-course/health-effects-attributed-wildfire-smoke>.

<sup>49</sup> Ibid.



wildfire, people most often reported mental health concerns and physical symptoms, including digestive problems, headaches, and sleep difficulties.<sup>50</sup>

### *Maternal and Newborn Health Impacts*

Women and other pregnant people undergo major biological changes during pregnancy, sometimes referred to as a natural “stress test” for the body, which can unearth underlying conditions.<sup>51</sup> For example, their brains change, their endocrine functioning is unique to pregnancy, they breathe more deeply, their blood volume almost doubles, their hearts increase in size, and their energy demands increase to a similar rate as marathon runners.<sup>52</sup> As the Ob-Gyn Marya Zlatnik and colleagues noted in an academic paper:

[C]limate change is associated with poor pregnancy outcomes that can have lasting effects on offspring and the health of subsequent generations. Pregnant people have special vulnerabilities to certain environmental exposures because of their unique physiology. Specifically, the normal physiological changes of pregnancy, including a 20% increase in oxygen consumption, 40–50% increase in minute ventilation, and a 40% increase in cardiac output, make pregnant people particularly vulnerable to air pollution and heat stress. Pregnancy is also a time of susceptibility to hypertension, including preeclampsia and gestational hypertension, which can affect both the pregnant individual and fetus.<sup>53</sup>

These changes have important implications on respiratory, cardiovascular, and mental health and make pregnant people more vulnerable to an unhealthy environment.<sup>54</sup> In the

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<sup>50</sup> Marc Braverman et al., “A Community Health Impact Assessment of the Santiam Canyon: One Year After the 2020 Labor Day Wildfires,” 2021, <https://health.oregonstate.edu/sites/health.oregonstate.edu/files/research/studies/pdf/santiam-canyon-community-health-assessment.pdf> (accessed May 6, 2024).

<sup>51</sup> Patricia D. Koman et al., “Examining Joint Effects of Air Pollution Exposure and Social Determinants of Health in Defining ‘At-Risk’ Populations Under the Clean Air Act: Susceptibility of Pregnant Women to Hypertensive Disorders of Pregnancy,” *World Medical & Health Policy* 10 no. 1 (2018): 7-54, accessed May 6, 2024, doi:10.1002/wmh3.257.

<sup>52</sup> Erika Barba-Müller et al., “Brain plasticity in pregnancy and the postpartum period: links to maternal caregiving and mental health,” *Archives of Women's Mental Health* 22 no.2 (2019): 289-299, accessed May 6, 2024, doi: 10.1007/s00737-018-0889-z. See also:

<sup>53</sup> Winnie Fan and Marya G. Zlatnik, “Climate Change and Pregnancy: Risks, Mitigation, Adaptation, and Resilience,” *Obstetrical & Gynecological Survey* 78 no. 4 (2023):223-236, accessed August 6, 2024, doi:10.1097/OGX.0000000000001116.

<sup>54</sup> AirNow, “Wildfire Smoke: A Guide For Public Health Official,” 2019, <https://www.airnow.gov/sites/default/files/2021-05/wildfire-smoke-guide-revised-2019-chapters-1-3.pdf> (accessed May 6, 2024). “During pregnancy, physiologic changes,

US, an increasing number of women start pregnancy with pre-existing respiratory, cardiovascular, and mental health conditions.<sup>55</sup>

Poor health during pregnancy has lifelong consequences for both the pregnant person and the newborn. Extreme or higher-than-normal heat exposure, which has well-established negative effects on pregnant people's health, sometimes happens at the same time as wildfire smoke exposure.<sup>56</sup> A US study in 2024 found that wildfire smoke exposure increased odds of preterm birth by 3 percent. The study also found that heatwaves were associated with preterm birth, with “stronger associations among those simultaneously exposed to wildfire smoke days.” The authors found a bigger effect size from wildfire on Black, Hispanic, Asian and American Indians/Alaskan Native (Indigenous Americans) populations than on white participants, warned “[a]s the occurrence and co-occurrence of these events increase, exposure reduction among pregnant people is critical, especially among racial/ethnic minorities.”<sup>57</sup>

However, the American Public Health Association (APHA), the leading non-governmental public health organization in the US, reported that prenatal exposures were one of the least mentioned climate hazards or areas needing more service provision.<sup>58</sup> Climate resilience plans also rarely prioritize pregnant people, especially those from Black and Brown communities, in their efforts to reduce the harm of climate exposures.<sup>59</sup> These gaps in the policy landscape do not reflect the increasingly nuanced understanding of the perinatal period as a unique window of opportunity for improving and supporting

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such as higher respiratory rates and increases in blood and plasma volumes, increase a woman's vulnerability to environmental exposures.”

<sup>55</sup> “Prevalence rate of pre-existing chronic physical and behavioral conditions prior to pregnancy in the U.S. in 2015 and 2018,” Statista, accessed May 6, 2024, <https://www.statista.com/statistics/1142832/prevalence-of-pre-existing-conditions-in-pregnant-women-us/>.

<sup>56</sup> “Climate Change and the Health of Pregnant, Breastfeeding, and Postpartum Women,” EPA, accessed May 6, 2024, <https://www.epa.gov/climateimpacts/climate-change-and-health-pregnant-breastfeeding-and-postpartum-women#:~:text=Increases%20in%20average%20and%20extreme,vulnerable%20people%2C%20including%20pregnant%20women.&text=Exposure%20to%20extreme%20heat%20can,kidney%20failure%20in%20pregnant%20women.&text=Pregnant%20women%20are%20also%20more%20prone%20to%20heat%20exhaustion%20and%20heat%20stroke>.

<sup>57</sup> Sandie Ha et al., “Impacts of heat and wildfire on preterm birth,” *Environmental Research* 252, no. 4 (2024), accessed August 6, 2024, doi:10.1016/j.envres.2024.119094.

<sup>58</sup> American Public Health Association, “Protecting Children's Environmental Health: A Comprehensive Framework,” November 7, 2017, Policy Number 201710. <https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2018/01/23/protecting-childrens-environmental-health> (accessed August 6, 2024).

<sup>59</sup> Ibid.

intergenerational environmental health equity.<sup>60</sup> The fetus undergoes dramatic and complex, finely tuned growth and development and is excruciatingly sensitive to poor environmental health.<sup>61</sup>

There is significant evidence of the multiple harms to maternal health from air pollution, including from PM<sub>2.5</sub>, ozone, and other constituents of both ambient air pollution and wildfire smoke.<sup>62</sup> PM<sub>2.5</sub> particles have been found not only in the placenta, but also in fetuses, “suggesting carbon particles can cross the placenta and might interfere with fetal development directly or alter epigenetic programming during the first 2000 days of life.”<sup>63</sup> PM<sub>2.5</sub> is associated with stillbirths and miscarriage as well as preterm birth and low birth weight, both of which have lifelong adverse impacts on mental and physical health. They are also linked with maternal hypertension, gestational diabetes, and worse maternal mental health.<sup>64</sup>

Studies on wildfire smoke are less numerous and more varied in their methodology than those on ambient air pollution, but the available evidence points to wildfire smoke being harmful to maternal health. The 2023 US National Climate Assessment summed up available evidence with: “Wildfire smoke may also affect neonatal human health, such as lower birthweights or pregnancy loss.”<sup>65</sup> Public health information from the EPA and the Centers for Disease Control and Prevention (CDC) includes pregnant women in their lists of vulnerable or additionally at-risk populations. A doctor in Australia reported on wildfire smoke visibly damaging placentas in that country.<sup>66</sup> Researchers in California have found, according to a news report, that in parts of California, “compared to years with no smoke ...

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<sup>60</sup> For a study on air pollution in this regard in particular see Jonathan Volmer and John Voorheis, “The grandkids aren't alright: the intergenerational effects of prenatal pollution exposure,” Centre For Economic Performance, October 2021, <https://cep.lse.ac.uk/pubs/download/dp1733.pdf> (accessed May 6, 2024).

<sup>61</sup> Michele Ondek and Judith Focareta, “Environmental Hazards Education for Childbirth Educators,” *The Journal of Perinatal Education* 18 no. 4 (2009): 31-40, accessed May 6, 2024, doi:10.1624/105812409X474690.

<sup>62</sup> Juan Aguilera et al., “Air pollution and pregnancy,” *Seminars in Perinatology* 47 no. 8 (2023), accessed May 6, 2024, doi:10.1016/j.semperi.2023.151838.

<sup>63</sup> Amital Bansal et al., “Heatwaves and wildfires suffocate our healthy start to life: time to assess impact and take action,” *The Lancet Planetary Health* 7 no. 8 (2023): E718-E725, accessed May 6, 2024, doi:10.1016/S2542-5196(23)00134-1.

<sup>64</sup> Jie Li et al., “Exposure and perception of PM<sub>2.5</sub> pollution on the mental stress of pregnant women,” *Environment International* 156 (2021), accessed May 6, 2024, doi:10.1016/j.envint.2021.106686.

<sup>65</sup> “NCA 5.”

<sup>66</sup> Ash Cant, “‘Horrendous’: How bushfire smoke can impact babies for DECADES,” September 16, 2020, Yahoo News, <https://au.news.yahoo.com/horrendous-how-bushfire-smoke-can-impact-babies-for-decades-132654112.html?guccounter=2> (accessed August 6, 2024).

the likelihood of a lost pregnancy during the 2020 wildfire smoke event increased by 29 percent.”<sup>67</sup>

Sandie Ha, a California-based epidemiologist who has extensively studied air pollution and human health including pregnancy health said that short-term exposure to wildfire can have health impacts and that “studies have shown that exposures can induce outcomes like preterm birth within a few days.” She added:

At the same dose of exposure, wildfire is much more toxic compared with general air pollution. Wildfires burn not only biomass, but also manmade structures that contains harmful compounds when combusted. For example, wildfire pollution contains higher levels of black carbon, which has been shown to be able to cross placental barriers. It also contains more dangerous chemicals such as heavy metals (including lead), polycyclic hydrocarbon, and flame retardants, all of which are known to be harmful, and especially in pregnancy.<sup>68</sup>

A recent review of 16 epidemiological studies, most of them conducted in the US and Australia, found “exposure to wildfire disaster may result in differences in birth weight and length of gestation.”<sup>69</sup> It found that while the exact causal factors were still being determined, the higher rates of adverse birth outcomes are likely to be a result of exposure to PM2.5 (“with a dose-response effect present in several studies”) and prenatal maternal stress responses to disaster at both a personal and population level.<sup>70</sup> The authors suggested authorities:

[B]etter support childbearing women exposed to wildfire disasters with public health interventions that promote social connectedness, foster

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<sup>67</sup> Hilary Beaumont, “How Toxic Wildfire Smoke Affects Pregnant People,” November 29, 2021, *Environmental Health News*, <https://www.ehn.org/wildfire-smoke-births-2655744649/slideshow> (accessed August 6, 2024).

<sup>68</sup> Human Rights Watch interview via email, Sandie Ha Associate Professor, Public Health, University of Merced California, April 10, 2024. See also Panmei Jiang et al., “Wildfire particulate exposure and risks of preterm birth and low birth weight in the Southwestern United States,” *Public Health* 230 (2024):81-88, accessed August 6, 2024, doi:10.1016/j.puhe.2024.02.016.

<sup>69</sup> Jo Evans et al., “Birth Outcomes, Health, and Health Care Needs of Childbearing Women following Wildfire Disasters: An Integrative, State-of-the-Science Review,” *Environmental Health Perspectives* 130 no. 8 (2022), accessed May 6, 2024, doi:10.1289/EHP10544.

<sup>70</sup> Ibid.

personal resilience, and include prompt referral to supportive health care, including midwifery-led continuity of care and mental health programs.<sup>71</sup>

Another more recent review paper, that considered 31 studies, summarized that “[t]he current evidence suggests that exposure to wildfire smoke during pregnancy is associated with significant risks concerning low birthweight and birthweight reduction, preterm birth, congenital anomalies, obstetric outcomes, and child mortality” although the authors said more research was needed to better understand associations.<sup>72</sup>

According to a study of maternal mental health impacts from a major 2016 Canadian wildfire, the pregnancy and perinatal periods are “inherently associated with extensive psychological and physiological changes, which confer an increased vulnerability to psychopathology for pregnant and postpartum women.”<sup>73</sup> Researchers in California found that mental health impacts on pregnant people from wildfire smoke lasted more than a year.<sup>74</sup>

Stress is a medico-biological phenomenon with major implications for physical and mental health including in pregnancy.<sup>75</sup> Natural disasters effect different people in highly variable ways but a growing body of evidence suggests stress from natural disasters is harmful to maternal and newborn health. One systematic review, for example, based on 22 studies, concluded: “[g]iven the high rates of anxiety, depression and PTSD among pregnant and birthing persons living through the challenges of natural disasters, obstetrician-gynecologists must be able to recognize this group of patients, and provide a greater degree of psychosocial support.”<sup>76</sup>

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<sup>71</sup> Ibid.

<sup>72</sup> Damien Foo et al., “Wildfire smoke exposure during pregnancy and perinatal, obstetric, and early childhood health outcomes: A systematic review and meta-analysis, *Environmental Research* 241 (2024), accessed August 6, 2024, doi:10.1016/j.envres.2023.117527.

<sup>73</sup> Barbara S. E. Verstraeten et al., “Maternal Mental Health after a Wildfire: Effects of Social Support in the Fort McMurray Wood Buffalo Study” *The Canadian Journal of Psychiatry* 66 no. 8 (2021): 710-718, accessed May 6, 2024, doi: 10.1177/0706743720970859.

<sup>74</sup> Human Rights Watch interview, Rebecca Schmidt, assistant professor in Public Health Sciences at UC Davis, May 2022.

<sup>75</sup> “WHO guide for integration of perinatal mental health in maternal and child health services,” WHO, accessed October 12, 2023, <https://www.who.int/publications/i/item/9789240057142>.

<sup>76</sup> Itamar D. Futterman et al., “Maternal anxiety, depression and posttraumatic stress disorder (PTSD) after natural disasters: a systematic review,” *The Journal of Maternal-Fetal & Neonatal Medicine* 36 no.1 (2023), accessed August 6, 2024, doi:10.1080/14767058.2023.2199345.

Researchers are increasingly worried about how climate stressors harm health not only during pregnancy, but also over the longer term. Preterm babies for example are far more likely to die in infancy but also have higher rates of many physical and mental health conditions.<sup>77</sup> Some studies suggest that exposure to climate-related disasters could alter “metabolic programming” of the fetus, making diseases like diabetes, obesity, and hypertension likely later in the child’s life. For example, the US Fifth National Climate Assessment references a study that showed “[i]n utero exposure to maternal stress during climate-related disasters is linked to subsequent psychiatric disorders in early childhood.”<sup>78</sup> And another scientific article published by the Lancet journal said:

Adverse environmental exposures in utero and early childhood are known to program long-term health. Climate change, by contributing to severe heatwaves, wildfires, and other natural disasters, is plausibly associated with adverse pregnancy outcomes and an increase in the future burden of chronic diseases in both mothers and their babies.<sup>79</sup>

Finally, one study on maternal mental health during and after a Canadian wildfire found that breastfeeding, important for both infant and maternal health, was negatively impacted in lactating women exposed to the wildfire.<sup>80</sup> Stress during pregnancy is known to have an impact on attachment between the mother and newborn as well as on breastfeeding.<sup>81</sup> The CDC has warned breastfeeding women to take additional steps after wildfire exposure, including to remove contaminated clothes and shoes, either promptly wash the clothes or keep them separated in a closed hamper, and promptly take a shower to prevent the absorption of any chemicals into the bloodstream.<sup>82</sup>

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<sup>77</sup> “Preterm Birth at a Glance,” Centers for Disease Control and Prevention (CDC), accessed August 6, 2024, <https://www.cdc.gov/maternal-infant-health/preterm-birth/index.html#:~:text=Unless%20there%20is%20a%20medical,before%201%20year%20of%20age>.

<sup>78</sup> Mary H. Hayden et al., “2023: Chapter 15. Human Health,” *Fifth National Climate Assessment* (2023), accessed May 6, 2024, doi: 10.7930/NCA5.2023.CH15.

<sup>79</sup> Amital Bansal et al, “Heatwaves and wildfires suffocate our healthy start to life: time to assess impact and take action.”

<sup>80</sup> Barbara S. E. Verstraeten et al, “Maternal Mental Health after a Wildfire: Effects of Social Support in the Fort McMurray Wood Buffalo Study.”

<sup>81</sup> Eivind Ystrom, “Breastfeeding cessation and symptoms of anxiety and depression: a longitudinal cohort study,” *BMC Pregnancy Childbirth* 12 no. 36 (2012), accessed May 6, 2024, doi:10.1186/1471-2393-12-36.

<sup>82</sup> “Other Environmental Exposures,” CDC, accessed May 6, 2024, <https://www.cdc.gov/breastfeeding/breastfeeding-special-circumstances/environmental-exposures/other-environmental-exposures.html>.

## Wildfires and Marginalized Communities

During hazardous air days, or on days when the air pollution is harmful to sensitive groups (which includes pregnant people), Oregon authorities advise people to stay inside or reduce outside activity, especially strenuous activity, and/or wear a high-quality and tight-fitting N95 mask. While such masks can filter out significant amounts of particulate matter if worn correctly, they do not prevent exposure to other toxic substances found in wildfire smoke, such as “VOCs” or volatile organic compounds, including ones known to be toxic, with pregnancy health impacts.<sup>83</sup> Authorities also recommend using air filters to clean indoor air.<sup>84</sup> (Again the most commonly used mechanical filters only filter particles, not toxic gases.)

People with pre-existing health conditions, older people, children, and pregnant women are all regularly included on lists of populations especially vulnerable to wildfire smoke. However, not everyone can easily implement this advice for limiting exposure to wildfire smoke, including some pregnant people, as discussed in detail below. Outdoor workers and unhoused people cannot simply “stay inside.” The Fifth National Climate Assessment has highlighted the importance of looking at risk through an intersectional lens, referencing studies showing greater risk for Indigenous and immigrant farm workers in the western US.<sup>85</sup>

Environmental racism in the US—a country where racial and ethnic minorities are disproportionately exposed to environmental hazards due to historical marginalization or institutional factors affecting where a person lives—has created conditions such that wildfires disproportionately affect communities of color.<sup>86</sup> A 2024 study found that census tracts with mostly Black Hispanic and/or Native American populations have a 50 percent greater wildfire vulnerability.<sup>87</sup> Although this study also found that some affluent groups, often white communities, may also be at an increased geographical risk of wildfires, they have greater economic resources to protect themselves from smoke, for example, through

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<sup>83</sup> Oregon Public Health Division, “Wildfire Smoke and Your Health,” <https://www.oregon.gov/oha/ph/Preparedness/Prepare/Documents/OHA%208626%20Wildfire%20FAQs-v6c.pdf> (accessed May 6, 2024).

<sup>84</sup> Ibid.

<sup>85</sup> “NCA 5,” Ostoja et al., “Focus on western wildfires.”

<sup>86</sup> Ian P. Davies et al., “The unequal vulnerability of communities of color to wildfire,” *PLOS One* (2018), accessed May 6, 2024, doi:10.1371/journal.pone.0205825.

<sup>87</sup> Ibid.

air filters and better-quality housing, unlike other demographics that have been systematically disenfranchised.<sup>88</sup>

A reproductive justice approach that considers not just a biological vulnerability from “pregnancy” but also the many intersecting ways marginalization can make one pregnancy much more at risk from wildfire smoke, or other environmental health problems, than another is critical.<sup>89</sup> As the Fifth National Climate Assessment summed up in the women’s health section (emphasis added):

Women disproportionately experience the burden of climate change because of *unique mental, sexual, and reproductive health needs that intersect with existing social, racial, and economic disparities*. Women, and particularly women of color, are more likely to live in communities with low wealth, which is associated with food insecurity and exposure to particulate matter, extreme heat, and climate-related disasters. Pregnant cisgender women are particularly vulnerable because exposure to heat, particulate matter, and disaster-associated stressors leads to *poor pregnancy outcomes, including miscarriages and low birth weight*. These factors contribute to maternal mortality, which is more prevalent in the US than in any other developed nation. *These outcomes are more likely in groups that have been marginalized, particularly Black pregnant people, exacerbating existing social inequities.*<sup>90</sup>

While the majority of “most at-risk” lists, including those in official government health communications, focus on biological vulnerability, including pregnancy, a better analysis of who is most at risk would include other factors such as income, Indigenous or minority race status, immigration status, occupation, language, or other barriers for some pregnant people and on how these intersect with biological factors.<sup>91</sup> An air pollution expert, Sandie Ha, for example noted:

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<sup>88</sup> Josie Garthwaite, “The Shifting Burden of Wildfire in the United States,” January 12, 2022, *Stanford News*, <https://news.stanford.edu/2021/01/12/shifting-burden-wildfires-united-states/> (accessed August 6, 2024).

<sup>89</sup> Jade S. Sasser, “At the intersection of climate justice and reproductive justice,” *WIREs Climate Change* (2023), accessed August 6, 2024, doi:10.1002/wcc.860.

<sup>90</sup> Mary H. Hayden et al., “2023: Chapter 15. Human Health.”

<sup>91</sup> The National Climate Assessment includes these dimensions of vulnerability.



It is not just the information about the fact that air pollution is bad—I think no one argues it is good for health. We need to move towards more actionable guidance, so people know what to do to protect themselves. Ideally, we should also tailor the information towards pregnant people’s unique needs. General messaging is not as effective for unique populations.<sup>92</sup>

## Air Pollution

The increase in large-scale wildfires, a result of climate change and other factors, including forest management and land use, is a significant and growing source of air pollution in the US.<sup>93</sup> The WHO estimates that air pollution, “the single biggest environmental threat to human health,” kills 7 million people a year, largely through heart and lung diseases, causing 12 percent of the world’s disease burden.<sup>94</sup> The climate crisis creates hot and dry conditions that increase the intensity and duration of wildfires, posing an increasing risk to human health.

### *Maternal and Newborn Health Impacts*

The severity, visual power in the form of smoke-filled air, floating ash and flame, as well as the cost of wildfires have been a “wake up call” on climate change for many.<sup>95</sup> But the fires are also a reminder that air pollution more broadly is and always has been a major, if neglected, reproductive rights issue.

Health begins in the womb, and pregnancy is a major health event with lasting impacts for the pregnant person and after birth, the baby. One group of scientists calculated that globally, in 2019, air pollution was responsible for almost 6 million preterm births and almost 3 million low birth weight babies and was partly responsible for 500,000 newborn

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<sup>92</sup> Human Rights Watch interview via email, Sandie Ha, Associate Professor, Public Health, University of Merced California, April 10, 2024.

<sup>93</sup> “NCA 5” also Marhsall Burke et al., “The contribution of wildfire to PM<sub>2.5</sub> trends in the USA,” *Nature* 622 (2023): 761-766, accessed May 6, 2024, doi:10.1038/s41586-023-06522-6.

<sup>94</sup> “WHO launches groundbreaking air pollution training for health workers on International Day of Clean Air,” WHO, September 5, 2023, <https://www.who.int/news/item/05-09-2023-who-launches-groundbreaking-air-pollution-training-for-health-workers-on-international-day-of-clean-air> (accessed May 6, 2024).

<sup>95</sup> This is both regarding wildfires generally but also their appearance and devastation in new places, previously unaccustomed to these disasters. For example, see “GMU Scientists: wildfire are climate change ‘wake-up call,’” *Culpepper Star Exponent*, April 2, 2024, [https://starexponent.com/news/local/gmu-scientists-wildfires-are-climate-change-wake-up-call/article\\_57897796-eeaf-11ee-a5c2-cb72b300afbe.html](https://starexponent.com/news/local/gmu-scientists-wildfires-are-climate-change-wake-up-call/article_57897796-eeaf-11ee-a5c2-cb72b300afbe.html) (accessed August 6, 2024).

deaths.<sup>96</sup> In-utero exposures to PM<sub>2.5</sub> are associated with higher rates of asthma, and air pollutants, including PM<sub>2.5</sub>, have been linked with other reproductive harms as well, including both male and female infertility and higher rates of hypertension during pregnancy.<sup>97</sup> Infants and young children exposed to air pollution may also suffer reproductive harms seen only later in life.<sup>98</sup>

Additionally, in the US, air pollution harms the maternal health of people of color more than white people. Epidemiologists have found that the “triple jeopardy” for pregnant people from marginalized communities of color—who (1) face greater exposure levels, (2) have greater social vulnerabilities, and (3) have biological susceptibilities because of pregnancy in addition to higher rates of pertinent pre-existing conditions—creates much worse “enviro riskscapes.”<sup>99</sup> A recent epidemiological study in a heavily fossil-fuel affected part of Louisiana found, for example:

[T]hat people living in those areas with the worst air pollution in Louisiana, which includes many parts of Cancer Alley, had rates of low birthweight as high as 27 percent, more than double the state average (11.3 percent) and more than triple the US average (8.5 percent). Preterm births were as high as 25.3 percent, nearly double the state average (13 percent) and nearly two-and-a-half times the US average (10.5 percent).<sup>100</sup>

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<sup>96</sup> Cameron Scott, “Study Links Air Pollution to Nearly 6 Million Preterm Births Around the World,” *University of California San Francisco (UCSF)*, September 28, 2021, <https://www.ucsf.edu/news/2021/09/421471/study-links-air-pollution-nearly-6-million-preterm-births-around-world> (accessed May 7, 2024).

<sup>97</sup> Damian Carrington, “Air pollution significantly raises risk of infertility, study finds,” *The Guardian*, February 17, 2021, <https://www.theguardian.com/environment/2021/feb/17/air-pollution-significantly-raises-risk-of-infertility-study-finds> (accessed May 7, 2024).

<sup>98</sup> Emily S. Barrett et al., “Associations of Exposure to Air Pollution during the Male Programming Window and Mini-Puberty with Anogenital Distance and Penile Width at Birth and at 1 Year of Age in the Multicenter U.S. TIDES Cohort,” *Environmental Health Perspectives* 131 no. 11 (2023), accessed May 7, 2024, doi:10.1289/EHP12627.

<sup>99</sup> Bonaventure S. Dzekem, Briseis Aschebrook-Kilfoy and Christopher O. Olopade, “Air Pollution and Racial Disparities in Pregnancy Outcomes in the United States: A Systematic Review,” *Journal of Racial and Ethnic Health Disparities* 11 (2024): 535-544, accessed May 7, 2024, doi:10.1007/s40615-023-01539-z, also, Rachel Morello-Frosch, Manuel Pastor and James Sadd., “Environmental Justice and Southern California’s ‘Riskscape’: The Distribution of Air Toxics Exposures and Health Risks among Diverse Communities,” *Urban Affairs Review*, 36 no.4 (2001):551-578, accessed August 6, 2024, doi:10.1177/10780870122184993.

<sup>100</sup> Kimberly A Terrell, Gianna N. St Julien and Maeve E. Wallace, “Toxic air pollution and concentrated social deprivation are associated with low birthweight and preterm Birth in Louisiana,” *Environmental Research: Health* 2 no.2 (2024), accessed August 6, 2024, doi:10.1088/2752-5309/ad3084.

## II. Factors Contributing to Inequities in Wildfire Smoke Exposure

We know that the effect of wildfire directly on the people in a neighborhood is great, it's enormous. [We need to] look at how it impacts their health, that's already impacted by racism. Racism is influencing their mental health. It's affecting other medical conditions, like pregnancy as well as other medical conditions like hypertension. Wildfire comes in and compounds the whole thing.<sup>101</sup>

—Celestine Ofori Paku, midwife and researcher, online interview, May 3, 2023.

There are important differences in pregnant people's abilities to protect themselves from wildfire smoke. All the providers interviewed for this report strongly agreed that a pregnant woman or person's socioeconomic status, immigration status, and race largely determines how much smoke they are exposed to, what they can do about it, and how it impacts their health. These factors also change how families and communities experience the stresses of evacuation and the destruction of homes, other infrastructure, and important forests and other nature by flame.

Providers highlighted how pregnant people's exposure and risks are impacted by their access, or lack thereof, to a home that protects against wildfire smoke, a place to stay in the event of an evacuation, safe work (namely, not outdoors or involving manual labor), or information about protective measures and health impacts.

### Access to Adequate Housing

Providers told Human Rights Watch how pregnant people and their families who did not have access to adequate housing faced greater risks due to wildfires and wildfire smoke. They acknowledged socioeconomic status factored into what type of housing pregnant people have.

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<sup>101</sup> Human Rights Watch online video interview, Celestine Yayra Ofori-Parku, midwife, May 3, 2023.

Celestine, a midwife and student, said that when she was pregnant, the wildfire smoke made her cough and feel breathless and instigated contractions. She was able to stay indoors as a solution:

So, for the whole week, I stayed in the room. I couldn't go out to do anything. I had to get an air purifier in the room and then be there. I kept asking myself: what about someone in my situation who can't afford to do this?<sup>102</sup>

### *Pregnant People without Housing*

Houselessness is on the rise in the US.<sup>103</sup> Oregon has one of the highest rates of houselessness in the US, has housing shortages, and is among the states with the lowest rates of affordable rental properties for low-income families.<sup>104</sup> As a result, finding safe and sustainable housing in the state can be a major challenge. “We see a lot of people who are, like, working and living in their car or, if they're lucky, sleeping on a friend's couch because housing is unattainable,” a government social services worker said.<sup>105</sup>

As mentioned, during wildfires, government agencies advise people, especially those especially at-risk from wildfire smoke, like asthmatics and pregnant women, to stay indoors, shut windows and doors, and limit outdoor activities.<sup>106</sup> However, unhoused people, including those living in cars or tents, are less able to create smoke-free or reduced spaces in the same ways as housed people. Regarding unhoused pregnant people in particular, the CEO of a nonprofit that runs programming for pregnant people experiencing houselessness in Oregon said that unhoused pregnant people may also face many other health and economic challenges that mean managing smoke—for example, by buying and correctly wearing a well-fitting and high-quality mask all the time—“may not

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<sup>102</sup> Human Rights Watch online video interview, Celestine Yayra Ofori-Parku, midwife, May 3, 2023.

<sup>103</sup> The U.S. Department of Housing and Urban Development, “The 2022 Annual Homelessness Assessment Report (AHAR) to Congress,” December 2022, <https://www.huduser.gov/portal/sites/default/files/pdf/2022-AHAR-Part-1.pdf> (accessed May 7, 2024).

<sup>104</sup> “The Gap: A Shortage of Affordable Homes,” National Low Income Housing Coalition, accessed May 7, 2024, <https://nlihc.org/gap#summary-table>; “Estimated rate of homelessness in the United States in 2022, by state,” Statista, accessed May 7, 2024, <https://www.statista.com/statistics/727847/homelessness-rate-in-the-us-by-state/>.

<sup>105</sup> Human Rights Watch online video interview, Mo Young community partnerships program supervisor for Lane County Public Health, March 28, 2023.

<sup>106</sup> “Wildfires and Smoke,” Oregon Health Authority, accessed May 7, 2024, <https://www.oregon.gov/oha/ph/preparedness/prepare/pages/prepareforwildfire.aspx>.

seem a priority.”<sup>107</sup> A midwife who works with a large group of doulas from many ethnic and cultural backgrounds said it is difficult for pregnant people to be healthy if they are not housed. “In our doula program, about 25 percent of the people that we care for are insecurely housed,” she said.<sup>108</sup>

### *People with Low-Quality Housing*

Low-income owners or renters may not be able to afford protective improvements and thus remain in houses unfit for wildfire smoke exposure. Houses that are not well-maintained leak smoke inside, for example, through small gaps in window frames, in wooden floors, or around pipes that have not been caulked or otherwise sealed. One community health worker who does home visits with pregnant people from immigrant communities, mostly engaged in seasonal farm work, described going into homes “filled with smoke.”<sup>109</sup> In Oregon, owners are not obligated to ensure buildings they rent out are resistant to smoke seeping indoors.<sup>110</sup>

A community services navigator, Julia Rojas, said that many of the birthing people among the low-income immigrant community she worked with experienced additional smoke exposure from working outside and from living in lower-quality housing that leaked smoke.<sup>111</sup> She said it was a situation where their bodies never had a rest from smoke inhalation.<sup>112</sup>

Even when renters can afford improvements, they may still struggle to negotiate with property management or the owners to allow them to make the changes to buildings they do not own. This can be especially true in Oregon and other places where housing is limited. Mariela German Hernandez said the immigrant population she works with in the

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<sup>107</sup> Human Rights Watch online video interview, Jaclyn Mahoney, Daisy CHAIN, CEO, November 23, 2022.

<sup>108</sup> Human Rights Watch telephone interview, Melissa Cheyney, midwife and medical anthropologist, March 24, 2023.

<sup>109</sup> Human Rights Watch online interview, Gabby Macedo, community health worker, April 7, 2023.

<sup>110</sup> Oregon Revised Statutes Title 10, Property Rights and Transactions; Chapter 90, Residential Landlord and Tenant, provides details of obligations on the part of the landlord, these do not include ensuring rental properties are wildfire smoke protected.

<sup>111</sup> Human Rights Watch online video interview Julia Rojas, domestic violence support advocate/community services navigator, Central Latinoamericano and Nurturely, October 14, 2022.

<sup>112</sup> Human Rights Watch interview online video interview, Julia Rojas, domestic violence support advocate/community services navigator, Central Latinoamericano and Nurturely, October 14, 2022.

Eugene area “feel powerless” against property owners because they have no leverage to negotiate.<sup>113</sup>

Loss of housing because of wildfire destruction has contributed to uncertainty and housing shortages, forcing renters to accept poor conditions. Alex Llumiquinga—director of the Olalla Center, which provides services and connections for immigrant communities in Lincoln County and runs programs for pregnant women—said fires there in 2020 burned many homes, thus worsening the already problematic housing shortage. He said that, following the fires, even more families lived in cramped conditions and with mold. “These run-down properties are not good against the smoke either,” he added.<sup>114</sup>

Oregon has seen burned housing deepen inequities and economic struggles.<sup>115</sup>

The protection afforded by a house can be limited. Generally, because many modern furniture and other possessions produce toxic chemical gases, indoor air quality is worse than outdoor air quality.<sup>116</sup> Indoor pollution during wildfire smoke events can be very bad, and even when households follow the best advice, indoor PM<sub>2.5</sub> levels have been found to be much higher during wildfire days.<sup>117</sup> Official advice includes using air filters, which cut toxic PM<sub>2.5</sub> rates, among others, inside homes.<sup>118</sup> However, air filters are highly variable in quality and some are expensive, especially if families need many rooms cleaned. In addition, air filters as well as materials to make cheaper box filters at home can, and have, quickly become unavailable during smoke seasons.<sup>119</sup> Only specialized air purifiers remove

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<sup>113</sup> Human Rights Watch interview, Mariela German Hernandez, community health worker, Springfield, Oregon, March 6, 2023.

<sup>114</sup> Human Rights Watch interview, Alex Llumiquinga, manager and director, Olalla Center, April 16, 2023.

<sup>115</sup> Jennifer Martinez-Medina et al., “Southern Oregon Housing Study: The Almeda Fire Impact on our Latinx Community,” April 10, 2024, <https://casaoforegon.org/southern-oregon-housing-study-the-almeda-fire-impact-on-our-latinx-community/> (accessed August 6, 2024).

<sup>116</sup> Christine C. Ghetu et al., “Wildfire Impact on Indoor and Outdoor PAH Air Quality,” *Environmental Science & Technology* 56 no. 14 (2022): 10042–10052, accessed May 7, 2024, doi:10.1021/acs.est.2c00619.

<sup>117</sup> Nathan Rott, “Sheltering Inside May Not Protect You From The Dangers Of Wildfire Smoke,” *NPR*, September 7, 2021, <https://www.npr.org/2021/09/07/1034895514/sheltering-inside-may-not-protect-you-from-the-dangers-of-wildfire-smoke> (accessed May 7, 2024).

<sup>118</sup> *Ibid.*

<sup>119</sup> Nicole Karlis, “As wildfire smoke chokes the West Coast, people are making DIY air purifiers. But do they work?,” *Salon*, September 16, 2020, <https://www.salon.com/2020/09/16/as-wildfire-smoke-chokes-the-west-coast-people-are-making-diy-air-purifiers-but-do-they-work/> (accessed May 7, 2024) and Janet Nguyen, “A shortage of masks and air purifiers makes wildfires more dangerous,” *Marketplace*, September 16, 2020, <https://www.marketplace.org/2020/09/16/a-shortage-of-masks-and-air-purifiers-makes-wildfires-more-dangerous/> (accessed May 7, 2024).

some toxics, like volatile organic compounds, and their efficacy is variable and in some cases the air purifiers themselves have been found to create pollutants.<sup>120</sup>

After the fire ends, homes may remain unsafe. For example, wildfire smoke and ash can leave harmful residues inside that sometimes needs intensive cleaning to remove them.<sup>121</sup>

## Access to Safe Accommodations in the Event of Evacuations

Oregon uses a three-level evacuation notification system to inform residents about fire dangers, including by messages on mobile telephone networks.<sup>122</sup> Green or “Be Ready” advises residents to prepare to evacuate and stay alert to updates. Yellow or “Be Set” tells residents they need to be ready to evacuate at a moment’s notice or should evacuate now if they would not be able to leave quickly if the situation worsens. Red or “Go now!” means staying is no longer safe and residents should immediately leave the area.

Oregon provides temporary communal shelters for families that do not have family or other alternatives and cannot afford or find hotels or other temporary lodging during evacuation orders. Shelter staff can help connect pregnant people or others to healthcare services, and sometimes at least shelters have provided pregnant people hotel vouchers. In 2020, the Oregon state government provided longer term accommodations, including in hotels, for families that could not afford new homes after theirs burned down.<sup>123</sup>

Socioeconomic, race, immigration status and whether a household has dependents, are all factors that complicate the experience of evacuating.

Despite temporary state-provided shelter, evacuation is especially stressful for people who do not have obvious alternative places to live. A community health worker described the stress felt by poor immigrant families facing evacuation: “We were trying to calm them

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<sup>120</sup> Qing Yi et al., “Real-Time Laboratory Measurements of VOC Emissions, Removal Rates, and Byproduct Formation from Consumer-Grade Oxidation-Based Air Cleaners,” *Environmental Science & Technology Letters* 8 no. 12 (2021): 1020–1025, accessed August 6, 2024, doi:10.1021/acs.estlett.1c00773.

<sup>121</sup> Josh Roten, “Research shows wildfire smoke may linger in homes long after initial blaze,” *Science Daily*, October 13, 2023, <https://www.sciencedaily.com/releases/2023/10/231013150757.htm> (accessed May 7, 2024).

<sup>122</sup> “Evacuations,” Oregon Wildfire Response & Recovery, accessed August 6, 2024, <https://wildfire.oregon.gov/evacuations>.

<sup>123</sup> There has been some problems with the sustainability of this approach, but we did not hear of any pregnancy health-related concerns.

down, but you can't because they're losing their house. They don't know where they're going to live. They won't have a place to stay. What are they going to do?"<sup>124</sup> These worries made it harder to get families or pregnant people to think about health harms from wildfire smoke or plan to reduce their exposure.<sup>125</sup>

Marginalized communities, who may not feel safe outside of a neighborhood where they share a first language and background with others, experience a special dimension of stress when they are forced to leave their homes. This can be especially true for immigrants who are afraid of deportation because they entered the US without government authorization. Gabby Macedo, a community health worker, described how undocumented immigrants find leaving home in a known location with a trusted community additionally difficult. "It's not just we're going to lose a house and our stuff," she said. "We're going to lose the place where we feel safe."<sup>126</sup> Fear of government authorities can also heighten the discomfort these communities feel about using shelters.

In addition, being forced to leave with a small baby can make families feel very vulnerable, more so if the family must worry about racism or fear other forms of violence or prejudice, according to doula Jaya Conser Lapham. She said she worked with a Black immigrant family that was told to evacuate soon after their baby was born because of a raging wildfire in 2020, when political tensions were exceptionally high in Oregon. "They faced a lot of fear about racism connected with pro-Trump rallies on the highway they needed to evacuate along," she said.<sup>127</sup>

Finally, although disasters can bring community solidarity, and wildfire-affected communities in Oregon have benefitted from volunteer assistance, people who face discrimination, because of their race or other factors, may not benefit equally.

Celestine Ofori Paku, a midwife and scholar, interviewed a Black pregnant woman whose house burned down in a wildfire. Because she was not as well connected as others, being newer to the area and from another racial background, she heard about the nearing fire late, waking during the disaster in the middle of the night. "What she said broke her heart

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<sup>124</sup> Human Rights Watch online interview, Gabby Macedo, community health worker, April 7, 2023.

<sup>125</sup> Ibid.

<sup>126</sup> Human Rights Watch online interview, Gabby Macedo, community health worker, April 7, 2023.

<sup>127</sup> Human Rights Watch online interview, Jaya Conser Lapham, doula, August 23, 2022.



was the fact that after her house burned down, she was left to her fate to find a place to sleep,” Celestine Ofori Paku said. “No one helped her.” The woman later developed pneumonia that doctors said may have been linked to the smoke and stress, she added.<sup>128</sup>

### *Low-Income Pregnant People and Families*

Temporarily leaving smoky areas is a very effective practice for those who are pregnant, worried about smoke exposure, and who can afford to do so. However, interviewees agreed this is not possible for many pregnant people, especially if they do not have friends or family in non-smoky areas with whom they can stay for free. Hotels are unaffordable for many and can become even more costly when demand is high due to heavy wildfire smoke.

One doula from an intensely wildfire-affected area said that low-income families to stay behind and try to protect their property from burning even if the danger of doing so was significant. According to her, this is especially true for people who feel they have little else to rely on financially except for a home.<sup>129</sup>

### **Access to Safe and Healthy Working Conditions**

Physical labor makes wildfire smoke more dangerous, as people breathe harder during manual work, inhaling more smoke while their cardiovascular systems are already under more strain than usual.<sup>130</sup>

If a pregnant person has to work outdoors, such as in agricultural fields, they often cannot leave a smoky area to protect their health or even stay at home on thick smoke days. “The air quality was terrible, the sky was red, ... but people continued to work throughout their pregnancy, whether at the fish factory or harvesting,” Alex Llumiquinga said, describing the immigrant community he works with in Lincoln County.<sup>131</sup>

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<sup>128</sup> Human Rights Watch online video interview, Celestine Yayra Ofori-Parku, midwife, May 3, 2023.

<sup>129</sup> Human Rights Watch online video interview, Katie Minich, doula and researcher, November 5, 2022.

<sup>130</sup> “Outdoor Physical Activity During Wildfire Smoke,” Yolo-Solano Air Quality Management District, accessed May 7, 2024, <https://www.ysaqmd.org/outdoor-physical-activity/>.

<sup>131</sup> Human Rights Watch interview, Alex Llumiquinga, manager and director, Olala Center, April 16, 2023.

Furthermore, pregnancy and the prospect of a new baby can add to financial worries, making pregnancy an incentive to work even when conditions are unhealthy, rather than a reason not to. “There’s no maternity leave for farmworkers, no one is being paid to be home with their baby,” Valentia Soares, a doula and family support specialist, said.<sup>132</sup> According to Mimi Choate, a family health doctor who works in a wildfire-affected area where many people work outdoors even in heavy smoke conditions:

No matter the conditions, whether there are wildfires, whether there is Covid-19, every end of July through September and October is grape harvesting and pear harvesting season, and cannabis comes a little later. The crops don’t care, the crops don’t wait, if you want to keep your job and income, you go to work.<sup>133</sup>

Another family doctor who works for a managed care organization that provides Medicaid healthcare insurance and services for low-income pregnant people said that she has written letters in support of pregnant people asking their managers to give them less physically demanding, hot, or smoky work but it rarely works. “I do try to talk about looking for air quality warnings,” she said. “But they say there’s no point checking: no work, no pay, they are paid every day for work, they have to make money to pay to stay in their housing.”<sup>134</sup>

Doctors and birth workers who often work with immigrants without legal residency in the US said this population is especially vulnerable, with even less to leverage than other low-income workers over their exposure to smoke at work.

## Access to Health Information

Having respectful, culturally appropriate health care providers and spaces and accessible health information are critical for empowering pregnant people to make informed decisions about how to care for themselves and their fetus or newborn, including during times of wildfires and smoke events.

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<sup>132</sup> Human Rights Watch interview, Valentia Soares, doula, April 19, 2023.

<sup>133</sup> Human Rights Watch interview, Miriam Choate, family physician, April 11, 2023.

<sup>134</sup> Human Rights Watch interview, name withheld, medical doctor and managed care organization representative, Oregon family physicians’ conference, April 12, 2023.

### *Connections to Respectful, Culturally Appropriate Health Care*

A pregnant individual who is disconnected from or has only poor connections to healthcare systems can be at greater risk; for example, missing prenatal care is associated with worse pregnancy and newborn outcomes.<sup>135</sup>

Poor knowledge of or weak connections to adequate healthcare institutions can lead to delays in accessing care for pregnant people with a range of possible harms, including not learning about health implications of wildfires. Gabby Macedo, who works to strengthen access to health care as a community health worker and is also a member of a mostly immigrant community, said she has clients that did not get prenatal care until seven months into their pregnancy because they did not know about free services. Many of the people she serves are additionally at-risk during wildfires because they do low-income physical work, including outside.<sup>136</sup>

Other barriers to health care for pregnant people can include language barriers or feeling unheard or dismissed, especially if care is not culturally congruent or if pregnant people worry about encountering racism or anti-immigrant discrimination at a clinic.

### **Lack of Domestically Competitive Wages for Community-based Health Workers**

Interviewees said ensuring that community-based perinatal health workers are properly paid is essential to link at-risk community members to services, including during or in the aftermath of disasters or smoke events. “But you need to hire people from the community to do the work, and pay them a living wage,” Gabby Macedo added.<sup>137</sup>

Valentia Soares provided an example of how, as a Spanish-speaking doula from an immigrant community, she can support birthing clients who often feel intimidated in hospital settings and would otherwise struggle to communicate with doctors and nurses. The language and expert support she provides, and allyship, can be all the more important when circumstances become even more tense because of wildfire. In 2020, she accompanied a woman who had a long and difficult birth. She remembers the skies were

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<sup>135</sup> “What is prenatal care and why is it important?”, Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), accessed May 7, 2024, <https://www.nichd.nih.gov/health/topics/pregnancy/conditioninfo/prenatal-care>.

<sup>136</sup> Human Rights Watch online interview, Gabby Macedo, community health worker, April 7, 2023.

<sup>137</sup> Human Rights Watch online interview, Gabby Macedo, community health worker, April 7, 2023.

red because of wildfires and even before they went into the hospital, her client was struggling to breathe in the thick smoky air. The fires moved closer to the hospital during the labor. “We didn’t know what was going on, if we were going to be evacuated from the hospital and if so, where to,” she said.<sup>138</sup>

Oregon was the first state where doulas could get Medicaid reimbursement for providing services to low-income pregnant people. However, low reimbursement rates (recently increased, albeit still low) and lengthy registration processes have prevented doulas from marginalized backgrounds from creating sustainable work and serving their communities.<sup>139</sup>

### Clinical Spaces

One interviewee said the US for-profit healthcare system is “pretty dialed into a clinical model of care, where, for example, [the state is] contracting a doctor to bill in 15-minute increments with a code.”<sup>140</sup> Several interviewees shared this opinion. According to these interviewees, this system is not well set up to manage immediate and long-term impacts of environmental disasters or degradation or other socioeconomic determinants of health on pregnancy health.<sup>141</sup>

Doctors and clinics can also be intimidating spaces, especially for Black people, for example who may be worried about experiencing anti-Black racism from providers.<sup>142</sup> They may also overlook other forms of prejudice, including against immigrant community members. This means, as some interviewees pointed out, birthing people who are already hurried and nervous are less likely to ask questions about wildfire smoke and receive information about how to deal with toxic air.

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<sup>138</sup> Human Rights Watch interview, Valentina Soares, doula April 19, 2023.

<sup>139</sup> Zainab Sulaiman and Melissa Mullins, “Getting Doulas Paid: Advancing Community-Based Doula Models In Medicaid Reimbursement Conversations,” February, 2023, <https://healthconnectone.org/wp-content/uploads/2023/02/Getting-Doulas-Paid-Advancing-Community-Based-Doula-Models-In-Medicaid-Reimbursement-Conversations.pdf> (accessed August 6, 2024), p. 4.

<sup>140</sup> Human Rights Watch online interview Iris Bicksler, doula and Senior Traditional Health Worker Liaison, August 17, 2022.

<sup>141</sup> The failures of the US health system to address social determinants of maternal and newborn health are highly relevant to this report but also beyond its scope. For a good overview see Joia A. Crear-Perry et al., “Social and Structural Determinants of Health Inequities in Maternal Health,” *Journal of Womens Health* 30 no. 2 (2021):230-235. doi:10.1089/jwh.2020.8882.

<sup>142</sup> For example, see Kendra L. Smith et al., “‘Ignored and Invisible’: Perspectives from Black Women, Clinicians, and Community-Based Organizations for Reducing Preterm Birth,” *Matern Child Health Journal* 26 (2022): 726–735, accessed August 6, 2024, doi:10.1007/s10995-021-03367-1.

Iris Bicksler, a doula and community healthcare expert, said:

Wildfires are making us think about new things like air filtration systems, but we know there's many other things we need to be thinking about: mental health services to address the anxiety of climate crisis, for example. We need to be able to pivot and prioritize communities in ways that make sense to them.<sup>143</sup>

### *Lack of Access to Vital Health Information*

Addressing inequities in who gets quality and timely health information is essential to the government when fulfilling the right to health “accessibility” which “includes the right to seek, receive and impart information and ideas concerning health issues.”<sup>144</sup> Little is known about how much pregnant people know about air pollution but accessing information about air pollution and other environmental determinants of pregnancy health appears difficult unless the pregnant person already knows what to learn, has English proficiency, and has the resources to locate and understand quality studies online.<sup>145</sup>

An air pollution and pregnancy health expert, Sandie Ha, said that “people often think about respiratory diseases, leaving other important health outcomes, like pregnancy complications out of the equation.” She also noted that a study has shown that “OB-GYNs are among the specialties least likely to discuss with patients about air pollution.”<sup>146</sup> This is because of, as Ha said, and as other studies show, a lack of time with patients but also

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<sup>143</sup> Human Rights Watch online interview Iris Bicksler, doula and Senior Traditional Health Worker Liaison, August 17, 2022.

<sup>144</sup> General comment no. 14 (2000), The right to the highest attainable standard of health (article 12 of the International Covenant on Economic, Social and Cultural Rights), U.N. Doc E/C.12/2000/4 (2000). The US has not ratified the ICESCR.

<sup>145</sup> Human Rights Watch asked several air pollution experts for help identifying studies on knowledge about air pollution among pregnant people and service providers. This appears to be an understudied area but what evidence is available suggests generally health providers do not often provide information about air pollution. Only 3 percent of adults say they spoke with providers about air pollution in one study, for example. Maria C. Mirabelli et al., “Air Quality Awareness Among U.S. Adults With Respiratory and Heart Disease,” *American Journal of Preventive Medicine* 54 no. 5 (2018): 679-687, accessed May 7, 2024, doi:10.1016/j.amepre.2018.01.037.

<sup>146</sup> Human Rights Watch interview via email, Sandie Ha Associate Professor, Public Health, University of Merced California, April 10, 2024. See also Maria C. Mirabelli et al., “Patient-Provider Discussions About Strategies to Limit Air Pollution Exposures,” *American Journal of Preventive Medicine* 55 no.2 (2018):e49-e52, accessed August 6, 2024, doi:10.1016/j.amepre.2018.03.018; Tricia Tan, Cornelia Junghans and Diana Varaden, “Empowering community health professionals for effective air pollution information communication,” *BMC Public Health* 23 no. 2547 (2023), accessed August 6, 2024, doi:10.1186/s12889-023-17462-1.

a lack of resources and training on how to properly advise patients.<sup>147</sup> Although there is available advice on what actions pregnant people should take to protect themselves from toxic wildfire smoke—for example, from Oregon state and federal agencies such as the Environmental Protection Agency (EPA) and the Centers for Disease Control and Prevention (CDC)—it is generally only available online and in English and Spanish. Consequently, as mentioned, not everyone can truly access this advice. Air quality information is also online from the Oregon government, which uses 40 air monitors in the state and will soon add another 30. But again, not everyone knows about these information sources and providing information about air pollution is still not common practice for OB-GYNs even though the American College of Obstetricians and Gynecologists and the American College of Nurse-Midwives recommend it.<sup>148</sup>

For people who do not speak English, accessing information is even harder. Mariela German Hernandez, a community health worker, said she felt like the Latino community in Oregon did not have information during the fires. “I had no idea about air quality, what that meant, until I did my own research about what levels were healthy, what were unhealthy, and I found it was super unhealthy,” she added.<sup>149</sup> All interviewees who work closely with immigrant communities—that, for reasons outlined above, may face additional wildfire smoke exposure—said that research-based knowledge about the harms to human health from wildfire smoke is low in these communities. A midwife and a community-based doula were among those who noted that white and better-resourced pregnant people were more likely to ask about wildfire smoke. They independently speculated that this may be because they were wealthier and had better access to some information already.

Maria Paz Aguirre said she and her colleagues faced enormous pressure during 2020 fires to translate information about both Covid-19 and wildfires encroaching on the Eugene area as the Oregon government only provided information in English. Reflecting on that time, she said: “My big learning from the experience was you have to work knowing that racism

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<sup>147</sup> Ryan, E.C., Dubrow, R. & Sherman, J.D. Medical, nursing, and physician assistant student knowledge and attitudes toward climate change, pollution, and resource conservation in health care. *BMC Med Educ* **20**, 200 (2020). <https://doi.org/10.1186/s12909-020-02099-0>.

<sup>148</sup> The American College of Obstetricians and Gynecologists (ACOG), “ACOG Issues Updated Guidance on Reducing Patients’ Exposure to Environmental Toxins Before and During Pregnancy,” June 28, 2021, <https://www.acog.org/news/news-releases/2021/06/acog-updated-guidance-reducing-patients-exposure-to-environmental-toxins-before-and-during-pregnancy> (accessed May 7, 2024).

<sup>149</sup> Human Rights Watch interview, Mariela German Hernandez, community health worker, Springfield, Oregon, March 6, 2023.

and inequities is going to stop messaging from reaching the most vulnerable.” She also noted only certain information was available: “There was a lot of information about smoke and masking and protective behavior for asthmatics, the elderly, and for people working in the fields, but we didn’t see anything on pregnant maternal health and nothing for babies.”<sup>150</sup>

A doctor who works with a managed care organization that serves low-income people outside the dominant white culture, including immigrant farm workers, said that health information, including about wildfire smoke, was most effectively passed in a “trauma-informed way” through community-based organizations made up of staff from and close to communities.<sup>151</sup>

Others also said that government public health workers have done little, including in 2020 during some of the worst of Oregon’s fires, to encourage doctors and other providers to talk to pregnant people about wildfires, including smoke. All the midwives, doulas, doctors, and other health providers interviewed said that they had never received any information specifically about pregnancy health and wildfires from state or federal authorities and that no one had ever asked them to pass on such information or advice. A few of the providers interviewed said they often talked to their patients or clients about wildfire smoke; usually, they did so after doing their own research.

Some providers said they did not raise smoke health issues with their patients or clients because they were not sure exactly what advice to give. Others felt that discussing smoke health issues fell outside their mandate and risked further worrying overstressed patients or clients. They said they knew smoke was bad and more often suggested careful masking, but it was hard for them to determine/know what levels were so bad that they should suggest pregnant people make bigger interventions, like staying home.

Additionally stressing patients or clients is especially a risk if the information is not provided using a thoughtful, trauma-informed method. One midwife told Human Rights Watch how she and her colleagues centered the pregnant person’s agency in relaying wildfire smoke health information:

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<sup>150</sup> Human Rights Watch interview, Maria Paz Aguirre, community health worker, April 17, 2023.

<sup>151</sup> Human Rights Watch interview, name withheld, medical doctor and managed care organization representative, Oregon family physicians’ conference, April 12, 2023.

The information could be shared in a way that would make people feel even more stressed out. Some of these people are already at risk for complicated pregnancies in part because of high cortisol from stress, so instead, we really tried to focus on their agency on what they could do and the simple things they could do to protect themselves and getting them connected to resources.<sup>152</sup>

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<sup>152</sup> Human Rights Watch online interview Silke Akerson, Executive Director, Oregon Midwifery Council, September 26, 2022.



### III. Maternal Health Harms from Wildfire Exposure

I feel like it's much harder for folks to just have a normal pregnancy now: there's a lot more anxiety, you might have to evacuate at any moment. Pregnant people must worry: what if I go into labor when I'm trying to evacuate? A lot of things are more uncertain, things we used to take for granted.<sup>153</sup>

—Katie Minich, doula, and researcher, online interview, November 5, 2022.

Providers interviewed shared their varied insights into how the wildfires impacted the health and well-being of their pregnant clients, patients, or communities. The most frequently mentioned concern was the negative impacts of wildfire on maternal mental health. Interviewees also worried about physical health harms from air pollution to pregnant people, including the fetus, and to postpartum people. Some reported that their clients or patients had disrupted birth plans and reduced access to health care because of the fires.

#### Harms to Maternal Mental Health

Poor maternal mental health is linked with poorer lifelong health for the pregnant woman or other pregnant person, worse fetal development, and negative health outcomes for newborns.<sup>154</sup> Depression and anxiety are common during and after pregnancy, and being pregnant in the US increases the likelihood of poor mental health.<sup>155</sup> About one in five pregnant women in the US will experience a mental health condition or substance use disorder; in fact, these conditions are the main cause of maternal morbidity in the country.<sup>156</sup>

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<sup>153</sup> Human Rights Watch online interview, Katie Minich, doula and researcher, November 5, 2022.

<sup>154</sup> Stacey Weiner, "The toll of maternal mental illness in America," *Association of American Medical Colleges (AAMC) News*, December 5, 2023, <https://www.aamc.org/news/toll-maternal-mental-illness-america> (accessed May 7, 2024).

<sup>155</sup> Mohsen M.A. Abdelhafez et al., "Psychiatric illness and pregnancy: A 44 literature review," *Heliyon* 9 no. 11 (2023), accessed May 7, 2024, doi:10.1016/j.heliyon.2023.e20958.

<sup>156</sup> Stacey Weiner, "The toll of maternal mental illness in America," *AAMC News*, December 5, 2023, <https://www.aamc.org/news/toll-maternal-mental-illness-america> (accessed May 7, 2024).

Wildfires are known to contribute to poor mental health, including anxiety, depression, and post-traumatic stress disorder (PTSD).<sup>157</sup>

Maternal stress can be detrimental to fetal development and newborn health and is associated with lifelong consequences for the pregnant person and, later, their child.<sup>158</sup> Studies on maternal health in the context of, for example, hurricanes and flooding have found that exposure to disasters correlates with increased risk of miscarriage, preterm birth, and low birth weight, possibly partly because of mental health complications.<sup>159</sup> Human Rights Watch was able to find almost no research on climate impacts, including wildfire and chronic problems like increases in extreme heat, on maternal mental health, suggesting that this is urgently needed. Several providers interviewed for this report worried about the additional stress from wildfires exacerbating maternal mental health and fetal development.<sup>160</sup> “Mothers’ stress and anxiety does impact their pregnancies,” one midwife said. “It is impossible not to feel stressed even if you weren’t in the line of the wildfire or somebody who was evacuated.”<sup>161</sup>

### *Maternal Mental Health in Oregon is a Pre-existing Vulnerability*

Oregon has high rates of poor mental health conditions, including reported depression and suicide at higher rates than the national level.<sup>162</sup> In Oregon, in 2010, the most recent government data available on the Oregon Health Authority webpage on maternal mental health, 24 percent of new mothers reported that they were depressed during and/or after

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<sup>157</sup> For a useful overview with links to various US studies see Stephanie Pappas, “Wildfires and Smoke Are Harming People’s Mental Health. Here’s How to Cope,” *Scientific American*, June 29, 2023, <https://www.scientificamerican.com/article/wildfires-and-smoke-are-harming-peoples-mental-health-heres-how-to-cope/> (accessed May 6, 2024); Nicolas Cherbuin et al., “Bushfires and Mothers’ Mental Health in Pregnancy and Recent Post-Partum,” *International Journal of Environmental Research and Public Health* 21 no.1 (2024), accessed May 7, 2024, doi:10.3390/ijerph21010007 and Barbara S. E. Verstraeten et al., “Maternal Mental Health after a Wildfire: Effects of Social Support in the Fort McMurray Wood Buffalo Study.”

<sup>158</sup> Mary E Coussons, “Effects of prenatal stress on pregnancy and human development: mechanisms and pathways,” *Obstetric Medicine* 6 no.2 (2013): 52-57, accessed May 8, 2024, doi:10.1177/1753495X12473751.

<sup>159</sup> Irene Lafarga Previdi et al., “The Impact of Natural Disasters on Maternal Health: Hurricanes Irma and María in Puerto Rico,” *Children (Basel)* 23;9 no. 7 (2022): 940, accessed May 8, 2024, doi:10.3390/children9070940.

<sup>160</sup> “Stress and Pregnancy,” March of Dimes, accessed May 8, 2024, <https://www.marchofdimes.org/find-support/topics/pregnancy/stress-and-pregnancy#:~:text=During%20pregnancy%2C%20stress%20can%20increase,increase%20risk%20for%20health%20problems.>

<sup>161</sup> Human Rights Watch online video interview, Jessica “Veege” Ruediger, midwife, October 07, 2022.

<sup>162</sup> “Mental Health in Oregon,” KFF, accessed May 8, 2024, <https://www.kff.org/statedata/mental-health-and-substance-use-state-fact-sheets/oregon/>.

pregnancy (12 percent during, 5 percent after and 7 percent both). Forty-eight percent of these women were still depressed when their child was 2 years old. More recent research suggests one in four women in Oregon report symptoms of postpartum depression.<sup>163</sup> An Oregon-based study found evidence that being Black, Asian Pacific or “Indian American” (Indigenous) made it more likely that someone would face perinatal mental health conditions.<sup>164</sup>

Social workers, doulas, midwives, and managed care organization staff who worked with low-income communities said they worried wildfires were aggravating high rates of pre-existing mental health concerns among some communities.

One health system worker said that during wildfire periods, she worried most about her pregnant clients whose baseline health needs are high, especially those with mental health conditions like anxiety and depression, already worsened by “unstable housing, unstable employment and histories of trauma.” This is based on her experience working with “a fair number of clients” who are bipolar, have schizophrenia and schizoaffective conditions, and have PTSD.<sup>165</sup>

A midwife, Missy Cheyney, who also oversees a doula program said that mental health concerns are so prevalent in the communities her organization serves, which includes low-income and communities of color, that her organization cross-trains doulas to support people with problematic drug use and mental health conditions.<sup>166</sup> She said they observed significant pressure from wildfires, especially in 2020 when wildfires raged during uncertainty-filled early days of the Covid-19 pandemic, on the well-being of pregnant people and those who serve them.<sup>167</sup>

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<sup>163</sup> “Perinatal Mental Health,” Oregon Health Authority, accessed May 8, 2024, <https://www.oregon.gov/oha/ph/healthypeoplefamilies/women/maternalmentalhealth/pages/index.aspx#:~:text=One%20in%20four%20Oregon%20women,first%20few%20weeks%20after%20delivery>.

<sup>164</sup> Angie Docherty et al., “Oregon PRAMS 2012–2018: Revealing racial inequity in postpartum depression,” *Research in Nursing & Health* 45 no. 2 (2022): 163-172, accessed August 6, 2024, doi:10.1002/nur.22214.

<sup>165</sup> Human Rights Watch online video interview Chelsea Whitney, public health nursing supervisor, January 6, 2023.

<sup>166</sup> Human Rights Watch telephone interview, Melissa Cheyney, midwife and medical anthropologist, March 24, 2023. In the US, experiencing racism, both interpersonal and systemic, is known to lead to poorer health for individuals, including mental health. See, for example, “Racism and Health,” CDC, accessed August 6, 2024, [https://www.cdc.gov/minority-health/racism-health/?CDC\\_AAref\\_Val=https://www.cdc.gov/minorityhealth/racism-disparities/index.html](https://www.cdc.gov/minority-health/racism-health/?CDC_AAref_Val=https://www.cdc.gov/minorityhealth/racism-disparities/index.html).

<sup>167</sup> Human Rights Watch telephone interview, Melissa Cheyney, midwife and medical anthropologist, March 24, 2023.

One birth assistant and registered nurse said that pre-existing anxiety, uncertainty about how best to protect their fetus or baby, and loss of control resulting from wildfire was a problematic mix for some pregnant patients:

For sure, wildfire is worse for patients with anxiety, and it's a legitimate concern for them too.... People want to make the best decisions and do everything right. But you can't control wildfire, and especially if you can't get away from the smoke, it adds to anxiety. People were messaging us very frequently, looking for reassurance that they are doing everything they can short of leaving.<sup>168</sup>

### *Mental Health Harms from Displacement, Smoke, and Fear*

Displacement, dealing with preparing to evacuate, and the aftermath of fire damage to communities were all identified as potentially harmful to maternal mental health by interviewees. Anxiety and stress over wildfires continue year to year, including into summers without nearby fires, especially for communities with a history of wildfire. A doula and massage therapist told Human Rights Watch that her clients and community in Lincoln County, where thousands were evacuated and hundreds of homes destroyed because of the 2020 wildfire, still has higher levels of anxiety to date.<sup>169</sup>

Interviewees said its wildfire impacts on mood were worse when thick, white, horrible-smelling air sits on communities for many days or even many weeks in a row. One provider described the smoke itself as “traumatizing.”<sup>170</sup> “It is so intense,” one doula said. “It looks like a war outside. You walk outside and it's like you can barely see the sun sometimes.”<sup>171</sup>

Existing research supports what country- and state-level public health officials interviewed for this report said they had seen over the past years in Oregon: that wildfires had lasting impacts on the well-being and mental health of individuals and communities.<sup>172</sup> Several

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<sup>168</sup> Human Rights Watch online interview, Sophia Hiron, birth assistant and registered nurse, Our Community Birth Center, February 6, 2023.

<sup>169</sup> Human Rights Watch online interview, Jaya Conser Lapham, doula, August 23, 2022.

<sup>170</sup> Ibid.

<sup>171</sup> Human Rights Watch online video interview, Jessica “Veege” Ruediger, midwife, October 07, 2022.

<sup>172</sup> See for example “Wildfires,” Substance Abuse and Mental Health Services Administration, accessed May 8, 2024, <https://www.samhsa.gov/find-help/disaster-distress-helpline/disaster-types/wildfires>.

providers interviewed said that even news about relatively distant fires or a faint smell of smoke aggravated stress among clients or patients and communities in an easily noticeable way. “For the last several years, there really has been a developing seasonal trauma,” a public health worker said. “It’s like a PTSD response. People are getting very anxious at the smallest hint of fire.”<sup>173</sup>

Feelings of fear, despair, anxiety, and other mental health consequences are community-wide problems. But some interviewees wondered if there might be additional dimensions for pregnant people. Silke Akerson, the executive director of the Oregon Midwifery Council, told Human Rights Watch how stress about everything from air quality to displacement has had a “big impact” on pregnant people.<sup>174</sup> “Pregnant people are built to be aware of our surroundings and aware of our safety and our babies,” Rosemary Campbell, a doula said. I feel like even just in the last three years, anxiety in pregnant folks and early postpartum is much more acute,” which she believes the fires contributed to.<sup>175</sup>

Doula care in the US reduces maternal stress and anxiety and improves maternal health and birth outcomes.<sup>176</sup> In the US, where communities of color, immigrants without legal status, or people who do not speak English well cannot easily access medical providers from within their own community, doulas can also provide culturally congruent care, which is an important element of quality of care.<sup>177</sup>

Medicaid compensation is available for doula care in Oregon, and rates are better than in most of the other states that compensate.<sup>178</sup> However, as elsewhere, doulas can only bill

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<sup>173</sup> Human Rights Watch telephone interview, Sam Engles, Social Determinants of Health Director at AllCare Health, November 1, 2022.

<sup>174</sup> Human Rights Watch online video interview Silke Akerson, Executive Director, Oregon Midwifery Council, September 26, 2022.

<sup>175</sup> Human Rights Watch interview, Rosemary Campbell, doula, January 5, 2023.

<sup>176</sup> Committee on Obstetric Practice, “ACOG Committee Opinion No. 766: Approaches to Limit Intervention During Labor and Birth,” *Obstetric Gynecology* 129 no. 2 (2017): e20-e28, accessed May 8, 2024, doi:10.1097/AOG.0000000000001905 and also Alexandria Sobczak et al., “The Effect of Doulas on Maternal and Birth Outcomes: A Scoping Review,” *Cureus* 15 no. 5 (2023): e39451, accessed May 8, 2024, doi: 10.7759/cureus.39451.

<sup>177</sup> Hye-Kung Kang, “Influence of Culture and Community Perceptions on Birth and Perinatal Care of Immigrant Women: Doulas’ Perspective,” *The Journal of Perinatal Education* 23 no.1 (2014): 25–32, accessed May 8, 2024, doi:10.1891/1058-1243.23.1.25.

<sup>178</sup> Amy Chen, “Current State of Doula Medicaid Implementation Efforts in November 2022,” *National Health Law Program*, November 14, 2022, <https://healthlaw.org/current-state-of-doula-medicaid-implementation-efforts-in-november-2022/> (accessed May 8, 2024). The state has increased its reimbursement rate twice, from \$75 to \$350 in 2017, and then from \$350 to \$1500 in 2022.

for a pre-arranged number of contacts before and after the birth. In addition, as doulas interviewed for this report noted, doulas cannot easily get compensated for texting additional resources or providing additional emotional or other support to their clients in wildfire or smoke events.

### *Lack of Information During Smoke Events*

While the local government issues clear evacuation orders when flames or burning are a risk, this is not the case for smoke. Instead, interviewees told Human Rights Watch, the onus is on residents to decide how worried they should be about smoke and whether and when they should leave if it is deemed unhealthy for sensitive populations or even hazardous by the governmental partnership-run site, *Airnow.gov*. Even deciding to stay indoors is difficult, especially since staying indoors can be limiting or come with penalties like lost work. For pregnant people in particular, the lack of clarity about the smoke's negative impact on the fetus could undermine pregnant women's sense of agency and understanding of what they need to do to protect their pregnancies, potentially increasing anxiety in an already fraught period. Anxiety is a "peripartum psychological disturbance" that is common among pregnant people.<sup>179</sup>

This can be especially true for people who do not have the resources to leave their home or the ability to work from home or from a relatively safe place indoors, even during pregnancy. Julia Rojas, who works with a low-income community in the Eugene area, which has many members who work outdoors, including as farmworkers, said pregnant women are always wondering "Is my developing baby OK?" She added, "It takes a toll on mental health."<sup>180</sup>

### *Loss and Solastalgia*

Interviewees mentioned having patients or clients struggle with various types of losses associated with wildfires. Each kind of loss can have mental health or broad well-being impacts on pregnant people or new mothers.

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<sup>179</sup> Sandra Nakić Radoš, Meri Tadinac and Radoslav Herman, "Anxiety During Pregnancy and Postpartum: Course, Predictors and Comorbidity with Postpartum Depression" *Acta Clinica Croatica* 57 no. 1 (2018): 39–51, accessed May 8, 2024, doi: 10.20471/acc.2018.57.01.05.

<sup>180</sup> Human Rights Watch online video interview Julia Rojas, domestic violence support advocate/community services navigator, Central Latinoamericano and Nurturely, October 14, 2022.

Amanda Maitland, a midwife, talked about the loss of homes, communities, even the state of residence:

I've known pregnant clients who have had to leave either because their houses burned down or because they just couldn't be in the smoke. I had one patient in particular whose asthma was too bad, so she moved to Idaho. Other clients lost their homes and had to go and live with their families.<sup>181</sup>

Some people are unable to rebuild and thus return home after wildfires, often because of cost, creating a loss of community.

According to some interviewees, even the wildfire-damaged landscapes created a significant sense of loss for the people and communities they work with. This sense of loss and sadness can extend to smoke too. "Folks are getting bitter about every summer being ruined," doula Katie Minich explained. "All of a sudden, the smoke is there and it's there for months."<sup>182</sup> The concept of solastalgia, "the distress that is produced by environmental change impacting on people while they are directly connected to their home environment" is relevant here.<sup>183</sup>

### *Climate "Forgetting"*

Three interviewees noted that while they and their colleagues fielded many questions and anxiety from pregnant people about health impacts from fires during smoky days, such concerns disappeared once the wildfire or smoke event ended. According to one provider:

A wildfire is a huge emergency, and everyone is running around crazy and not leaving their homes for two weeks. And then it's kind of like: if your house didn't burn down, then it's over. People move on and are not seeing wildfire as something that's going to continue to happen and continue to get worse.<sup>184</sup>

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<sup>181</sup> Human Rights Watch online video interview, Amanda Maitland, midwife, November 4, 2022.

<sup>182</sup> Human Rights Watch online video interview, Katie Minich, doula and researcher, November 5, 2022.

<sup>183</sup> Glen Albrecht et al., "Solastalgia: the distress caused by environmental change," *Australasian Psychiatry* 15 no.1 (2007), accessed May 8, 2024, doi: 10.1080/10398560701701288.

<sup>184</sup> Human Rights Watch online video interview, Heidi Donahue, childbirth educator and doula, December 1, 2022.

Another respondent talked about “dread” of the fires but also a sense of powerlessness among her clients: “The attitude is: if the smoke is going to come, it’s going to come.”<sup>185</sup>

Unwillingness of individuals and communities to deal with a new reality of increased climate disaster is likely to be a barrier to community preparedness. All interviewees, when asked, said that they did not feel that they, or maternal health systems, were especially well-prepared to manage another major fire near or in the communities they served.

Mariela German Hernandez, who works for and is from a low-income immigrant community in the Eugene area, explicitly said as much: “If we did have a fire this year, I’m pretty sure our community wouldn’t be ready again.”<sup>186</sup>

## Poor Maternal Health from Lack of Exercise and Isolation

Interviewees told Human Rights Watch that not being able to go outside, either because of poor quality air or by choice because clients were worried about fetal health impacts, can reduce how much exercise clients or patients get during their pregnancy.<sup>187</sup> This is important since reduced exercise during pregnancy is linked to poorer pregnancy health.<sup>188</sup>

Like others, midwife Veege Ruediger noted that “fire season” is unfortunately concomitant with many spring and summer months when communities in Oregon have historically taken advantage of being outdoors for health and recreational purposes, with all the mental and physical health benefits these activities can bring.<sup>189</sup>

Interviewees also worried about mental health consequences for clients or patients confined inside a house or even one room with an air purifier. Sophia Hirons said she was concerned that wildfire smoke made her patients feel “trapped inside,” adding that this

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<sup>185</sup> Human Rights Watch online interview, Amanda Maitland, Midwife, November 4, 2022.

<sup>186</sup> Human Rights Watch online video interview, Mariela German Hernandez, community health worker, Springfield, Oregon, March 6, 2023.

<sup>187</sup> Human Rights Watch interview, Jessica “Veege” Ruediger, October 07, 2022. Fei Qin et al., “Exercise and air pollutants exposure: a systematic and meta-analysis,” *Life Sciences* 218 (2019): 153-164, accessed May 8, 2024, doi:10.1016/j.lfs.2018.12.036; and see for the importance of exercise in pregnancy

<sup>188</sup> Stamatis P Mourtakos et al., “Maternal lifestyle characteristics during pregnancy, and the risk of obesity in the offspring: a study of 5,125 children,” *BMC Pregnancy Childbirth* 15 no. 66, (2015), accessed May 8, 2024, doi:10.1186/s12884-015-0498-z and Judith Stephenson et al., “Before the beginning: nutrition and lifestyle in the preconception period and its importance for future health,” *The Lancet* 391 no. 10132 (2018): 1830-1841, accessed May 8, 2024, doi:10.1016/S0140-6736(18)30311-8.

<sup>189</sup> Human Rights Watch online video interview, Jessica “Veege” Ruediger, midwife, October 07, 2022.



can increase anxiety. “If someone is feeling cooped up and high anxiety, the number one advice is: take a walk,” she said. “If that’s not advisable, then that’s frustrating.”<sup>190</sup>

Having to stay inside and feeling so isolated extends into the postpartum period too. Another provider remembered one client who felt anxious and isolated from staying inside during heavy wildfire smoke:

She didn’t feel safe going outside with her baby because of the smoke, afraid that her baby would get damaged. I know that it is an actual concern, but the damage I was witnessing was her emotional health. [She] needed to get outside, and I couldn’t really reassure her, ’cause it was, like, ... yeah, you’re right. It’s not healthy. It’s not like something you can just kind of talk away or, like, soothe her through or give her tools to manage. I couldn’t say: ‘don’t breathe.’<sup>191</sup>

Veege Ruediger said that in addition to worrying about wildfire limiting exercise, she was concerned about patients eating poorly during wildfire periods because of reduced access to healthy foods and eating high energy and low nutrient food as a stress response.<sup>192</sup>

## Other Maternal Health Concerns, Including Fetal Development

As described in the Background section, studies show wildfire exposure is associated with preterm birth and low birth weight. Preterm birth, low birth weight, and stillbirth are complex birth outcomes and can result from multiple causes—sometimes more than one at a time—and as a result, identifying any particular birth outcome as the result of wildfire exposure is not possible. However, clinical and doula interviewees did worry about smoky air and fetal development generally, and some said they had wondered if smoky air had caused or contributed to a poor birth outcome for some individuals. One respondent reflected: “I know one mama who had her baby at 22 weeks, and he’s in the NICU

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<sup>190</sup> Human Rights Watch online video interview, Sophia Hirons, birth assistant and registered nurse, Our Community Birth Center, February 6, 2023.

<sup>191</sup> Human Rights Watch interview, Rosemary Campbell, doula, January 5, 2023.

<sup>192</sup> Human Rights Watch online video interview, Jessica “Veege” Ruediger, midwife, October 07, 2022.

[neonatal intensive care unit] right now. Is it because of the fires? I mean, I don't know, but ... it's really smoky up there."<sup>193</sup>

Three interviewees said they have seen changes in placental structure or health over the past years and wondered if wildfire exposure was partly to blame. One birth assistant and trainee midwife told Human Rights Watch about the complications she has seen in recent years:

I have seen more retained placentas and more postpartum bleedings. I don't know if that's related to the wildfire smoke, cardiovascular changes from Covid, or if it's a weird fluke, but there have been a lot more complications.... I assume in 10 or 20 years we will know.<sup>194</sup>

Two midwives who worked in northern California but had experienced many of the same intense wildfire periods as birth workers in Oregon said they had seen damaged placentas in deliveries by birthing people exposed to wildfire during their pregnancy.

Doula and researcher Katie Minich saw a higher prevalence of high blood pressure and anxiety, which she believes was related to stress and possibly wildfire and environmental issues. "I feel like we're seeing more preeclampsia, like, I did not have any clients with preeclampsia until the last few years," she said. "And now, I have a number."<sup>195</sup>

## Complications for People with Pre-Existing Health Conditions

Individuals with pre-existing health conditions, especially poor respiratory health, are particularly affected by exposure to wildfire smoke. One doctor who worked with community members in Oakridge, a mostly white and low-income community, expressed concerns about the additional pressures on health in the community from major wildfires on top of its pre-existing vulnerabilities. According to the doctor, community members already faced "higher than average rates of asthma and chronic respiratory disorders as

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<sup>193</sup> Human Rights Watch online interview Jen Cisneros, Head Start Lane County, October 4, 2022.

<sup>194</sup> Human Rights Watch online video interview, Sophia Hirons, birth assistant and registered nurse, Our Community Birth Center, February 6, 2023.

<sup>195</sup> Human Rights Watch online interview, Katie Minich, doula and researcher, November 5, 2022.

well as many wood burning stoves and a high proportion of tobacco smoking.”<sup>196</sup> When wildfire smoke from fires near the town arrived in 2022, the air quality became extremely bad. An NGO worker there said:

We had a weekend evacuation, and then we went into about five weeks of heavy smoke, and most days, we had the worst air quality in the world. Seattle got up to 400 parts per million and got like a bunch of news stories. But we’re sitting at 600 to 1,000 regularly.<sup>197</sup>

A doula and childbirth educator, Heidi Donahue, said she was especially concerned for asthmatics, as well as people with mental health conditions, among her client pregnant population, doubly so if they were low-income. “They are already feeling like they’re struggling to breathe,” she said. “And here’s this bad air quality and no access to air purifiers.”<sup>198</sup>

Interviewees who work with communities near farming areas observed that clients who worked outdoors were more likely than those who worked inside to complain about physical health impacts from wildfire smoke. A nurse midwife, Amanda Maitland said farmworker patients in particular often complained about sore throats and coughs from wildfire smoke exposure.<sup>199</sup>

### **Heat and Wildfires: Compounding Harms**

Wildfires are more likely to begin and spread in dry and hot weather, and communities are often forced to manage high temperatures, wildfires, and smoke at the same time. Heat and smoke create cumulative pressures on health, and “recent studies show that exposure to heat and particle pollution together can be far more dangerous than exposure to either alone.”<sup>200</sup> People in poor quality housing, without cooling or air

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<sup>196</sup> Human Rights Watch interview, name withheld, medical doctor, Oregon family physicians’ conference, April 12, 2023.

<sup>197</sup> Human Rights Watch online video interview, Sarah Altemus-Pope, Director of Oakridge Air, December 22, 2022.

<sup>198</sup> Human Rights Watch online video interview, Heidi Donahue, childbirth educator and doula, December 1, 2022.

<sup>199</sup> Human Rights Watch online video interview, Amanda Maitland, Midwife, November 4 2022.

<sup>200</sup> Liza Gross “Converging Climate Risks Interact to Cause More Harm, Hitting Disadvantaged Californians Hardest,” *Inside Climate News*, February 2, 2024, <https://insideclimatenews.org/news/02022024/extreme-heat-and-wildfire-smoke-hits-disadvantaged-californians->

filtration, experiencing houselessness, or who work outdoors are especially exposed to both heat and smoke. Many interviewees said they had seen families struggle to decide whether to keep the windows closed during hot, smoky days or open them for some cooling despite the poor air quality. People without air conditioning in their cars face the same problem. When fires burn all the trees, they remove the shade, making formerly forested areas hotter in the summer.

Extreme heat causes more deaths every year than any other climate-related hazard and is especially dangerous for older people, people with pre-existing conditions (like some mental health conditions or heart or lung diseases), children, and pregnant people.<sup>201</sup> It also has negative impacts on maternal health and birth outcomes. For example, a significant body of epidemiology shows associations between higher-than-normal temperatures and higher rates of preterm birth and stillbirth, with a larger effect size on Black women.<sup>202</sup> A growing body of research also suggests that heat may contribute to increased rates of hypertensive disorders in pregnancy and gestational diabetes, both serious and potentially deadly for the pregnant person, including the fetus.<sup>203</sup>

Heat is increasingly understood to be a social justice problem. Low-income communities of color, including in urban neighborhoods, have often suffered racist government housing policies, some of which contribute to hotter neighborhoods.<sup>204</sup> These poorer neighborhoods have fewer resources like expensive air conditioning to manage heat than in lush, richer neighborhoods that can be at least 10 degrees Fahrenheit cooler. Likely in part for these reasons, studies in the US disaggregated by

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hardest/#:~:text=Exposure%20to%20extreme%20heat%20and,communities%20face%20the%20highest%20risks (accessed May 8, 2024).

<sup>201</sup> For example, see David Pogue, “Extreme heat, the most lethal climate disaster,” *CBS News*, August 6, 2023, <https://www.cbsnews.com/news/extreme-heat-the-most-lethal-climate-disaster/> (accessed August 6, 2024).

<sup>202</sup> Gulcan Cil and Jiyeon Kim, “Extreme temperatures during pregnancy and adverse birth outcomes: Evidence from 2009 to 2018 U.S. national birth data,” *Health Economics* 31 no. 9 (2022), accessed May 8, 2024, doi:10.1002/hec.4559.

<sup>203</sup> Anqi Jiao et al., “Analysis of Heat Exposure During Pregnancy and Severe Maternal Morbidity,” *JAMA Network Open* 6 no. 9 (2023), accessed May 8, 2024, doi: 10.1001/jamanetworkopen.2023.32780.

<sup>204</sup> Jeremy S. Hoffman, Viveka Shandas and Nicholas Pendleton, “The Effects of Historical Housing Policies on Resident Exposure to Intra-Urban Heat: A Study of 108 US Urban Areas,” *Climate 2020* 8 no. 12 (2020), accessed August 6, 2024, doi:10.3390/cli8010012.

race show bigger effects of heat on Black women than white women.<sup>205</sup> Heat injustice intersects with reproductive health inequities too, as these neighborhoods may already have higher rates of pre-existing conditions and preterm birth.

Both heat and wildfire smoke add pressure on biological systems already taxed more than usual by pregnancy, but how these pressures interact or cumulate is unclear.<sup>206</sup> One academic paper worried: “[e]xposures to usually hot days and heat waves may increase the risk of preterm birth, especially during a wildfire.”<sup>207</sup> A recent study has found that hospitalizations in general, not just of pregnant people, in California were disproportionately high on days when high temperatures and wildfire smoke were both hazards compared to days when just one was. The effect was worse for communities that were poorer and had less education, lower health insurance coverage rates, and less tree cover.<sup>208</sup>

## Disruption in Birth Plans and Access to Care

Giving birth in a place chosen by the birthing person that feels safe to them is important for their physical and mental health, including their sense of personal power and control. Birth is a major health event that, partly because of deep cultural, emotional, and for many, spiritual elements, has the potential to be both greatly empowering or disempowering for the birthing woman, or other person.<sup>209</sup> Wildfire can undermine this. As one provider said:

Giving birth during a wildfire can be a very scary and disempowering situation and at such a vulnerable time in the patient’s life. Someone is up

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<sup>205</sup> Bruce Bekkar et al., “Association of Air Pollution and Heat Exposure With Preterm Birth, Low Birth Weight, and Stillbirth in the US: A Systematic Review,” *JAMA Network Open* 3 no. 6 (2020):e208243 accessed May 8, 2024, doi:10.1001/jamanetworkopen.2020.8243.

<sup>206</sup> Amital Bansal et al., “Heatwaves and wildfires suffocate our healthy start to life: time to assess impact and take action.”

<sup>207</sup> Sandie Ha, “The Changing Climate and Pregnancy Health,” *Current Environmental Health Reports* 9 (2022): 263–275, accessed May 8, 2024, doi:10.1007/s40572-022-00345-9.

<sup>208</sup> Chen Chen et al., “Exploring spatial heterogeneity in synergistic effects of compound climate hazards: Extreme heat and wildfire smoke on cardiorespiratory hospitalizations in California,” *Science Advances* 10 no. 5 (2024), accessed May 8, 2024, doi:10.1126/sciadv.adj7264.

<sup>209</sup> Katie Cook and Colleen Loomis, “The Impact of Choice and Control on Women’s Childbirth Experiences,” *The Journal of Perinatal Education* 21 no. 3 (2012): 158-168, accessed May 8, 2024, doi:10.1891/1058-1243.21.3.158.

to their elbow in your privates and the sky is on fire: that is not going to be the most empowering time of your life. All the ecological and financial impacts are bad, and all of this can be psychologically devastating.<sup>210</sup>

Several birth workers provided examples of clients or patients who could not give birth where they wanted because of wildfires. One provider described how a carefully planned homebirth was moved to a hospital because the smoke was too bad. “In the end, she felt like it was a good decision for her baby, but a bad decision for herself because she did not have the type of birth that she wanted.”<sup>211</sup>

Wildfires can create obstacles to health care for pregnant or post-partum people. Interviewees told Human Rights Watch about times when clinics temporarily closed because of wildfire or when staff were absent because they needed to manage their own family’s safety.

Interviewees also described how both encroaching flames and heavy smoke days caused clients and patients to miss appointments.

“We did struggle to keep up with patients who were evacuated or moved because of the fires,” a nurse midwife said, adding that efforts to contact patients who had missed appointments were not always successful. She suspected that after escaping fires, “getting their prenatal care was way down on their priority list of things that needed to happen.”<sup>212</sup>

A doula and childbirth educator said she assumed that the smoke and concerns about exposure to ash and toxics were responsible for her clients missing their prenatal appointments.<sup>213</sup> Similarly, another midwife said: “people miss chunks of prenatal care because the valley is covered in smoke, and so they leave, they don’t want to be here because of the health risks of the smoke.”<sup>214</sup> She added that she had or knew of lower-

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<sup>210</sup> Human Rights Watch online video interview, Sophia Hiron, birth assistant and registered nurse, Our Community Birth Center, February 6, 2023. (CHECK)

<sup>211</sup> Human Rights Watch online video interview Iris Bicksler, doula and Senior Traditional Health Worker Liaison, August 17, 2022.

<sup>212</sup> Human Rights Watch online video interview, Amanda Maitland, Midwife, November 4, 2022.

<sup>213</sup> Human Rights Watch online video interview, Heidi Donahue, childbirth educator and doula, December 1, 2022.

<sup>214</sup> Human Rights Watch online video interview, Jessica “Veege” Ruediger, midwife, October 07, 2022.

income clients using their money on travel to escape thick smoke that they otherwise might have used for healthcare or other pregnancy needs.

## Harms to Postpartum and Postnatal Well-being and Health

Improving postpartum care has been identified as a crucial element of addressing maternal mortality in the US.<sup>215</sup> But according to providers interviewed for this report, the loss of access to health care because of wildfires sometimes extended to the postpartum period. One doula said she could not visit a client who had a C-section three to four weeks before her due date because the client was driving to Washington to escape the fires.<sup>216</sup>

Doula Rosemary Campbell remembered worrying about a baby-mother dyad whom she could not help with their difficulties initiating breastfeeding because of wildfire:

One couple’s baby was born about three days before the huge wildfire that we had up in McKenzie River. They didn’t receive any postpartum follow up from me because they took one look outside and there was so much smoke and ash that they just got in the car and drove. I think they made it all the way to Idaho. They just drove for days with their newborn baby just to get away.<sup>217</sup>

Significant financial and emotional costs regarding property lost to the flames can greatly impact families struggling to set up with a new baby, as they can lose their post-partum community support system if they are forced to leave. “I had one client: she was newly pregnant, and her house did burn down, and they ended up leaving for good,” one provider said. “She herself didn’t even go back to the site of their home because she was worried about the smoke and toxicity.”<sup>218</sup>

Interviewees reported that many new mothers worried about the impacts of poor-quality air on their babies. Maternal anxiety about smoke harming newborn health is well-placed, as

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<sup>215</sup> See for examples the “HEAR HER Campaign: Pregnant and Postpartum People,” CDC, <https://www.cdc.gov/hearher/pregnant-postpartum/index.html> (accessed August 6, 2024).

<sup>216</sup> Human Rights Watch online interview, Jaya Conser Lapham, doula, August 23, 2022.

<sup>217</sup> Human Rights Watch online video interview, Rosemary Campbell, doula, January 5, 2023.

<sup>218</sup> Human Rights Watch online interview, Heidi Donahue, childbirth educator and doula, December 1, 2022.

a newborn’s lungs are still developing and are even more sensitive to air pollution than an older child’s.<sup>219</sup> Information and advice on health harms to children usually does not provide specific advice for babies despite their unique needs; for example, unlike older children, babies cannot wear masks. Cigarette smoke (both smoking during pregnancy and parents who smoke around infant) is a risk factor for Sudden Infant Death Syndrome “SIDS”, but as far as Human Rights Watch was able to ascertain there is no information available on wildfire smoke as a risk.<sup>220</sup> Studies have been done however that suggest that children exposed to wildfire smoke in utero are therefore “likely to be more vulnerable to infections and disease, as well as at higher risk of any health consequences resulting from being born with congenital defects, particularly in the respiratory and nervous systems.”<sup>221</sup>

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<sup>219</sup> “An Amazing Journey How Young Lungs Develop,” *American Lung Association*, <https://www.lung.org/blog/how-young-lungs-develop> (accessed August 6, 2024).

<sup>220</sup> “Secondhand smoke and your baby,” March of Dimes, October 20, 2021, <https://www.marchofdimes.org/find-support/blog/secondhand-smoke-and-your-baby> (accessed August 6, 2024).

<sup>221</sup> “Wildfire Smoke,” UNICEF, accessed August 6, 2024, <https://ceh.unicef.org/spotlight-risk/wildfire-smoke#:~:text=Children's%20unique%20vulnerability,-Infants%20are%20rapidly&text=Children%20exposed%20to%20wildfire%20smoke,the%20respiratory%20and%20nervous%20systems>.



## IV. Wildfire Impacts on Maternal Healthcare Providers

It took me a long time. I avoided it. I would go any way around it, to not have to drive through. [I would cry] massive tears, tears over the devastation of people's homes ... to see the whole town is gone: trees, rivers, fish. Now it's just ugly, black, and burned.<sup>222</sup>

—Jen Cisneros, Online video interview, October 4, 2022

Interviewees for this report were primarily concerned with how wildfire devastation and heavy smoke days impacted the health of their patients or clients. However, doulas, midwives, and others also talked about several ways that days of wildfire and thick smoke disrupted their own work, health, and well-being. Like others, perinatal health workers reported personally experiencing acute terror and months of stress from dealing with smoke and constant readiness for evacuation in both their personal and professional capacities. Interviewees often referred to the late summer of 2020—when massive wildfires in Oregon and much of the western US blazed amid the Covid-19 pandemic, which gripped the country and put clinics, hospitals, and social services under intense pressure—as a period of hideous stress and discombobulation.

Providers also talked about sometimes feeling underprepared by their training to talk about wildfire smoke with patients or clients, especially low-income people with few resources to reduce exposure. Some expressed anger at how the climate crisis was adding further pressure to providers trying to work in a for-profit health system that already struggles to serve marginalized patients. Interviewees also shared their fears for a future that includes even worse climate disruption.

Human Rights Watch also asked interviewees for their ideas for how policymakers could better prepare and protect maternal health. They suggested that the government provide free or low-cost air filters, masks, clear and actionable health information and advice, and mental health support for communities affected or likely to be affected by wildfire. And they expressed wanting to see solidarity from the government. In addition, providers wanted to see climate mitigation action, including serious cuts to fossil fuel use in the US.

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<sup>222</sup> Human Rights Watch online interview Jen Cisneros, Head Start Lane County, October 4, 2022.

## Stress and Health Harms from Smoke

Some interviewees said they and their colleagues experienced chronic stress during wildfire seasons, also sharing how this impacted their work with pregnant people. “It’s hard trying to maintain good patient care while worrying: will my house go up in smoke, is my health going to be damaged?” a nurse said.<sup>223</sup> Periods of intense and acute stress included evacuations and when family members lost homes to fire. One midwife, Veege Ruediger, said she still felt guilty that she was unable to take more items from her mother’s house, which burned soon after the town was evacuated, because she had to make sure she saved medical records.

Several interviewees described months of constantly being ready to evacuate and fearing for their home, community, and family. Seeing wildfires raging on the TV or on nearby mountains was upsetting, as were other visual experiences such as orange skies filled with drifting ash, which one interviewee said looked “like the world was ending.”

A family doctor described a desperate drive around and then through burning forests to evacuate her family, adding that she still feels traumatized by that experience. “We had fires on all sides, getting closer,” Katie Minich, a doula said. “There wasn’t even a clear evacuation route that I felt would be that safe because it was literally a circle around us.”<sup>224</sup>

Like pregnant people, providers experienced smoke events as being stressful. For providers, smoke was even more so when added to a hectic schedule of seeing clients or patients, especially when the smoke lasted for days or even weeks and affected all outdoor activities, including driving. Heidi Donohue remembered the 2021 wildfire season: “I think we had smoke for about two months after that fire and it was terrible. We were driving on the freeway going 40 miles an hour because you can’t see in front of you.”<sup>225</sup>

“I think it really definitely took a toll on the staff,” one nurse midwife said about the fires in her area. “We were hearing people coming in one after another saying, ‘I lost everything.’”

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<sup>223</sup> Human Rights Watch interview, Sophia Hiron, birth assistant and registered nurse, Our Community Birth Center, February 6, 2023

<sup>224</sup> Human Rights Watch online interview, Katie Minich, doula and researcher, November 5, 2022.

<sup>225</sup> Human Rights Watch interview, Heidi Donahue, childbirth educator and doula, December 1, 2022.

It was hard to be able to feel we could make a difference when the issue was at such a big scale.”

Some described experiencing coughs and headaches because of the smoke they breathed while at work, driving, or visiting families in smoky homes or in poorly ventilated clinics or other locations. Amanda Maitland, a nurse midwife, described how smoke infiltrated her hospital:

Just the amount of smoke in the area around that time was intense, even in the operating room, which is supposed to be a totally clean, sterile place. You could see smoke in the room, way in the depths of the hospital ... it was impossible to get away from.<sup>226</sup>

Because of work and other commitments, providers were unable to leave smoky areas and protect their health even if they had wanted to. Two respondents grimly noted that in 2020, the wildfire smoke was so extensive that even if they had been able to leave, there was nowhere safe within easy reach.

## Loss and Solastalgia

Grief over devastating losses of homes, family members’ homes, and communities and feelings of solastalgia and other changing experiences of the natural world extend to maternal health workers and not just the communities they serve. Pediatrician Miranda Lanning moved to Oregon during a wildfire, and described her shock:

When we moved up here, the skies were filled with smoke, it felt like the sun was in total eclipse. Our source of joy was the woods and going outside, but it burned up in front of us and flooded our homes with smoke.<sup>227</sup>

Another provider said she had loved summer thunderstorms as a child in Oregon, but now, she feels dread when there is lightning. “People call it the smoke season now, instead of summer,” she said.

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<sup>226</sup> Human Rights Watch online video interview, Amanda Maitland, nurse-midwife, November 4, 2022.

<sup>227</sup> Human Rights Watch online interview, Miranda Lanning, pediatrician, July 6, 2022.

Some interviewees said they felt a specific sense of loss from wildfires that was connected to their vocation. For example, they could no longer rely on the air being safe enough for themselves and for pregnant people they serve, fueling additional worries and uncertainty regarding the future for their patients or clients, fetuses, and newborns.

## Feeling Underprepared to Discuss Wildfire Smoke Harms

All respondents said they did not feel well-prepared by their formal training to provide information and advice about climate-related harms, including wildfire smoke harms, on maternal health or on environmental determinants on health more broadly. One midwife explained that maternal health providers receive little to no training on environmental health issues.<sup>228</sup>

Some interviewees had done research and felt confident providing information and advice to pregnant people like, for example, masking correctly with a high-quality mask and staying indoors as much as they could. Others preferred to wait to discuss air pollution until patients or clients brought it up. One interviewee said providers were all trying to navigate the fires and find the best sources of information. She added that she changed her usual advice to walk every day for both physical and mental health benefits because of the wildfires, which she felt had a definite downside.<sup>229</sup>

Some birth workers, including at least three doulas, said they felt it was better not to provide information or advice about the harms of wildfire smoke unless explicitly asked, especially as some clients do not have the resources to reduce their exposures; for example, if they live in smoky homes or cannot stay at home during heavy smoke days because they need to work. These interviewees worried that sharing information about potential harm from wildfire smoke could just add stress without yielding benefits for their clients.

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<sup>228</sup> Human Rights Watch interview Jessica “Veege” Ruediger, October 07, 2022.

<sup>229</sup> Human Rights Watch interview Silke Akerson, Executive Director, Oregon Midwifery Council, September 26, 2022.

## V. Providers' Recommended Ways Forward

Given their first-hand experiences and expertise, Human Rights Watch asked the perinatal health workers interviewed for their thoughts on improving protections for maternal health during wildfires and smoke events. The “Recommendations” section of this report endorses many of their suggestions.

Moving forward, they said they needed the following to better serve their clients or patients:

- Additional research by government agencies and universities on the harms of wildfires, including smoke events, on maternal and newborn health, including on maternal mental health.
- Additional epidemiological studies looking at population-level impacts from wildfires and smoke events on birth outcomes.
- Additional intervention studies, currently largely missing in literature, on ways to protect different populations.
- Increased training on environmental determinants of health in the medical and public health education system including intersections with racism and anti-immigration prejudice.
- More formal opportunities, perhaps organized by government agencies or reproductive health or environmental health organizations, to learn and discuss best practices on public health responses to wildfire and other climate health impacts on pregnancy and newborn health.
- Channels to be able to provide feedback and ideas to public health officials.
- Outreach by emergency responders and disaster preparedness officials into the maternal health community, especially for those working with low-income communities.
- More easily accessible information and in relevant languages (not just English) from local health authorities for pregnant people and parents of young babies that is actionable and conveyed by trusted community health workers or similar actors.
- Easy access for all pregnant people, including those in low-income communities, to air purifiers and home improvements, including through financial assistance from the government so everyone can afford them.
- Government requirements for, or at least incentives to, homeowners and landlords to make homes safer from wildfire, including smoke.

- A pilot program that provides pregnant people the financial resources and accommodations to leave extremely smoky areas if they otherwise cannot afford to leave.
- Increased access to doula care and more resources for perinatal community health workers from the government, for example, to help provide solidarity and mental health resilience programs. This care should be culturally congruent.

Moreover, several interviewees pointedly stated that the most important intervention and protection was for the US to address the roots of the climate crisis. Interviewees felt that pregnant people, and their communities more broadly, cannot protect themselves with interventions, including those listed above, from the scale of wildfires and the multiple harms they cause. Silke Akerson, a midwife, summed up this stance:

The key intervention is a massive federal climate emergency response, including reduction of emissions, major tree planting efforts and restrictions on industrial emissions. We need a major restriction on industrial emissions. I want a systems-level, high-up response to this as an emergency.<sup>230</sup>

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<sup>230</sup> Silke Akerson, Executive Director, Oregon Midwifery Council, September 26, 2022.

## VI. US Efforts to Address Air Pollution and the Climate Crisis

Fiercer wildfires are partly a consequence of the climate crisis and, in the US, a major source of air pollution. Addressing the causes of wildfires importantly includes, among other steps, addressing the causes of the climate crisis. And addressing the smoke impacts of wildfires means making sure air pollution protections work effectively during major air pollution events.

### Federal Policies to Address the Causes of Air Pollution

Air pollution in the US is monitored and regulated under the Clean Air Act (CAA). The EPA sets National Ambient Air Quality Standards (NAAQS) for six major air pollutants in the country. Using the best available science, the standards are meant to set bars high enough to “protect human health with adequate margin of safety” and “protect public welfare from any known or anticipated adverse effects.”<sup>231</sup> States are responsible for creating and implementing plans that ensure they meet NAAQS, and the federal government can sanction states that allow too-high emissions by withholding federal funding and/or imposing a plan to reduce emissions on non-compliant states.<sup>232</sup> Areas that fail to meet standards are called “non-attainment” areas. The withholding of highway funding can be used to incentivize states that do not fulfill obligations to submit plans to clean up air pollution or for states with too much air pollution, but it is a rarely used stick.

US standards are laxer than those recommended by the WHO. Although the PM<sub>2.5</sub> standard in the US was partly strengthened in 2024, US health and medical associations, including the American Lung Association, have said the available science requires even more stringent standards than what the US is using now.<sup>233</sup>

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<sup>231</sup> Congressional Research Service, “Clean Air Act: A Summary of the Act and Its Major Requirements,” September 13, 2021, <https://crsreports.congress.gov/product/pdf/RL/RL30853> (accessed May 8, 2024).

<sup>232</sup> Ibid.

<sup>233</sup> “Final Reconsideration of the National Ambient Air Quality Standards for Particulate Matter (PM),” US EPA, accessed May 8, 2024, <https://www.epa.gov/pm-pollution/final-reconsideration-national-ambient-air-quality-standards-particulate-matter-pm>.

Although the CAA has led to large reductions in air pollutants in the US, these decreases are not spread equally and air pollution remains a major environmental and social justice issue.<sup>234</sup> For example, Black and other communities of color remain exposed to greater rates of regulated CAA air pollutants than white people.<sup>235</sup> Air pollution in these areas also often consists of other hazardous air pollutants aside from the better-monitored six regulated by the NAAQS. Human Rights Watch and Amnesty International have both recently reported on impacts, including reproductive health impacts, on majority Black communities in Louisiana and Texas respectively because of the underregulated fossil fuel industry.<sup>236</sup>

States do not have to address wildfire smoke, which is considered the result of exceptional events and outside states' direct control (as opposed to, for example, industry, which needs to be regulated), as part of their compliance with the NAAQS.<sup>237</sup> However, because wildfires emit regulated air pollutants the CAA does create some explicit responsibilities regarding public health actions, including providing information for the public.

## Federal Efforts to Monitor and Provide Accessible Information on Air Quality

No matter the source of air pollution, governments are required to protect public health by providing information when it is dangerous.

In the US, air pollution levels are translated to the public using the Air Quality Index (AQI), a scale of six colored categories from green or “good” (index values of 1-50) to maroon or “hazardous” (index values of 301-500).<sup>238</sup> An AQI of over 100 means one of the six

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<sup>234</sup> “Progress Cleaning the Air and Improving People's Health,” US EPA, accessed May 8, 2024, <https://www.epa.gov/clean-air-act-overview/progress-cleaning-air-and-improving-peoples-health#:~:text=Clean%20Air%20Act%20programs%20have,well%20as%20numerous%20toxic%20pollutants.> For inequities in benefits see “Disparities in the Impact of Air Pollution,” American Lung Association, accessed May 8, 2024, <https://www.lung.org/clean-air/outdoors/who-is-at-risk/disparities> and also Mercedes A. Bravo et al., “Where Is Air Quality Improving, and Who Benefits? A Study of PM<sub>2.5</sub> and Ozone Over 15 Years,” *American Journal of Epidemiology* 191 no. 7 (2022): 1258-1269, accessed May 8, 2024, doi:10.1093/aje/kwac059.

<sup>235</sup> American Lung Association State of the Air report 2023. See also Abdulrahman Jbaily et al., “Air pollution exposure disparities across US population and income groups,” *Nature* 601 (2022): 228-233, accessed May 8, 2024, doi:10.1038/s41586-021-04190-y.

<sup>236</sup> Human Rights Watch, “We Are Dying Here: The Fight for Life in a Louisiana Fossil Fuel Sacrifice Zone,” January 2024; Amnesty International, “USA: the Cost of Doing Business: The Petrochemical Industry's Toxic Pollution in the USA” January 25, 2024, <https://www.amnesty.org/en/documents/AMR51/7566/2024/en/> (accessed May 8, 2024).

<sup>237</sup> Congressional Research Service, “Wildfire Smoke and Air Quality,” July 7, 2023, <https://crsreports.congress.gov/product/pdf/IN/IN12194> (accessed May 8, 2024).

<sup>238</sup> “Air Quality Index (AQI) Basics,” AirNow, accessed May 8, 2024, <https://www.airnow.gov/aqi/aqi-basics/>.



monitored pollutants is present at levels above the EPA’s safety standards.<sup>239</sup> If a value of 101 or over happens several days in a row, the EPA can call an Air Pollution Action Day and sensitive populations, like people with heart or lung disease, older people, children, people with diabetes, and people of lower socioeconomic status should reduce exposure by decreasing prolonged or heavy exertion outdoors.<sup>240</sup> During wildfire events, the Interagency Wildland Fire Air Quality Response Program (IWFAQRP) contributes air quality monitoring and communication.<sup>241</sup>

The US EPA defines environmental justice as “the just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, Tribal affiliation, or disability, in agency decision-making and other Federal activities that affect human health and the environment so that people.”<sup>242</sup> The federal government under President Joe Biden, who has touted an environmental justice agenda, has spent significant funds on increasing air pollution monitoring.<sup>243</sup> This has long been considered a weak spot in US efforts to improve air quality, especially in low-income communities.<sup>244</sup> About two-thirds of US counties do not have a monitor.<sup>245</sup> In addition, sometimes the areas with the worst air quality do not have a local monitor, including some communities situated next to heavy industry.<sup>246</sup> “The focus [in air quality monitoring] is always on the average across a large area. The policy makers are not thinking about peak or max

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<sup>239</sup> Shelia Hu, “What Is the Air Quality Index?,” *the Natural Resources Defense Council*, September 27, 2023, <https://www.nrdc.org/stories/what-air-quality-index> (accessed May 8, 2024).

<sup>240</sup> “Particle Pollution and Your Patients’ Health,” US EPA, accessed May 8, 2024, <https://www.epa.gov/pmcourse/patient-exposure-and-air-quality-index>.

<sup>241</sup> Congressional Research Service, “Wildfire Smoke and Air Quality,” July 7, 2023, <https://crsreports.congress.gov/product/pdf/IN/IN12194> (accessed May 8, 2024).

<sup>242</sup> “Environmental Justice,” US EPA, <https://www.epa.gov/environmentaljustice> (accessed August 6, 2024). In addition, under this vision, all people “are fully protected from disproportionate and adverse human health and environmental effects (including risks) and hazards, including those related to climate change, the cumulative impacts of environmental and other burdens, and the legacy of racism or other structural or systemic barriers; and have equitable access to a healthy, sustainable, and resilient environment in which to live, play, work, learn, grow, worship, and engage in cultural and subsistence practices

<sup>243</sup> US EPA Press Office, “Biden-Harris Administration announces nearly \$83 million in funding to expand air quality monitoring across the nation as part of Investing in America agenda,” February 16, 2024, <https://www.epa.gov/newsreleases/biden-harris-administration-announces-nearly-83-million-funding-expand-air-quality-o> (accessed August 6, 2024).

<sup>244</sup> US EPA Press Office, “Biden-Harris Administration Announces \$53 Million for 132 Community Air Pollution Monitoring Projects Across the Nation,” November 3, 2022, <https://www.epa.gov/newsreleases/biden-harris-administration-announces-53-million-132-community-air-pollution> (accessed August 6, 2024).

<sup>245</sup> “Mapping Soot and Smog Pollution in the United States,” Earth Justice, accessed August 6, <https://earthjustice.org/feature/soot-smog-air-map-united-states-county#:~:text=Many%20urban%20and%20rural%20areas,critical%20for%20protecting%20public%20health.>

<sup>246</sup> Human Rights Watch interview, Diana Van Vleet, American Lung Association, May 22, 2024.

exposures. Some communities face air pollution that is far worse than the recorded average and extremely hazardous to health and especially for pregnant people,” Rupa Basu, an air pollution and climate epidemiologist, said.<sup>247</sup>

Despite some positive changes, as mentioned, health professionals and clean air advocates believe the standards are too lax. In addition, only cities with populations over 350,000 are required to report on air quality; this reporting is voluntary for ones with fewer people.<sup>248</sup> The American Lung Association and other medical associations have called for mandatory AQI reporting everywhere, reporting to be current and forward-looking rather than based on readings that are 24 hours old (as is the case for the current AQI, which is backward-looking), and more publicly available information on what pollutants are high and known to be dangerous (even if it is only for some populations).<sup>249</sup>

The US government has recently taken important steps to address wildfire smoke impacts on human health. In 2022, the US Congress passed the Inflation Reduction Act (IRA), a wide-ranging and multi-billion dollar bill to address the climate crisis and reduce carbon emissions.<sup>250</sup> The law allocated almost \$6 billion in “wildfire protection and sustainable forest management projects.”<sup>251</sup> The IRA has funded large-scale programming to reduce fuels for wildfires in forests in the WUI and to improve forest management.<sup>252</sup> The US government has also created new health information products and advice for health workers and has funded research into health harms from wildfires.<sup>253</sup>

Human Rights Watch conducted interviews with public health experts in two agencies in the US federal government, the Centers for Disease Control and Prevention, and the

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<sup>247</sup> Human Rights Watch interview, Rupa Basu, Chief of Air and Climate Epidemiology Section, Cal EPA/OEHHA, May 22, 2024.

<sup>248</sup> American Lung Association letter, on file with Human Rights Watch, 2023.

<sup>249</sup> Ibid.

<sup>250</sup> Senate Democratic Majority, “Summary: The Inflation Reduction Act of 2022,” [https://www.democrats.senate.gov/imo/media/doc/inflation\\_reduction\\_act\\_one\\_page\\_summary.pdf](https://www.democrats.senate.gov/imo/media/doc/inflation_reduction_act_one_page_summary.pdf) (accessed May 8, 2024).

<sup>251</sup> Juliet Grable, “How the Inflation Reduction Act Helps Forests Help Us: The landmark climate law is also good news for trees,” *Sierra*, September 21, 2022, <https://www.sierraclub.org/sierra/how-inflation-reduction-act-helps-forests-help-us> (accessed May 8, 2024).

<sup>252</sup> Juliet Grable, “How the Inflation Reduction Act Helps Forests Help Us: The landmark climate law is also good news for trees,” *Sierra*, September 21, 2022, <https://www.sierraclub.org/sierra/how-inflation-reduction-act-helps-forests-help-us> (accessed May 8, 2024).

<sup>253</sup> See for example “Wildland Fires and Smoke,” US EPA, accessed May 8, 2024, <https://www.epa.gov/air-quality/wildfires-and-smoke>.

Environmental Protection Agency. Aside from documents providing wildfire health advice to pregnant people and funding for academic research into epidemiology, officers were not able to provide examples of any other effort to protect pregnancy health specifically from wildfire harms, such as financial support for health workers or community-based organizations to develop programming for especially at-risk communities of pregnant people. All, however, expressed interest in doing so and could point to many other government-led initiatives to increase overall public health understanding of wildfire harms to human health. While health harms are increasingly well-understood, government officials, NGO representatives, physicians and epidemiologists interviewed all noted a major paucity in intervention studies regarding wildfire exposure and maternal and newborn health, including immediate and longer-term impacts on very young babies, an especially worrying population because their lungs are still in development.

Every government official, NGO representative and epidemiologist Human Rights Watch spoke to said that public knowledge of the harms of maternal health presented by air pollution, and the knowledge of health providers was far too low, especially given the new challenges created by contemporary wildfires.

## **Federal Efforts to Address the Climate Crisis and Health Harms**

The Biden administration has made some important commitments to begin to reduce US greenhouse gas emissions. However, the US continues to expand fossil fuel operations, undermining its own objectives to reduce pollution and risking retrogression of the realization of the right to health.

## **Better Including Reproductive Rights in Federal Environmental Justice Policy**

The IRA has provided billions of dollars, an unprecedented amount, in environmental justice grants, including some \$2 billion specifically for community-based organizations in areas with unjust levels of climate or pollution hazards.<sup>254</sup> Since taking office in 2021, President Biden has issued several environmental justice-oriented executive orders. However, a Human Rights Watch review found that none of these executive orders mentioned reproductive health vulnerabilities, although they included other

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<sup>254</sup> “Inflation Reduction Act Environmental and Climate Justice Program,” US EPA, accessed May 8, 2024, <https://www.epa.gov/inflation-reduction-act/inflation-reduction-act-environmental-and-climate-justice-program>.

vulnerabilities. Nor did they mention how environmental justice is relevant to racial inequities in maternal health. These executive orders and 30 other policy documents on environmental justice written by federal agencies, such as the Department of Health and Human Services (HHS) and the EPA, often provided important information about how race and income level, among other factors, intersected with pollution and climate-related harms creating injustices; but again, gendered and reproductive vulnerabilities were not included. In fact, the term “reproductive justice” was not in any these documents reviewed by Human Rights Watch even though it is in other policy documents from the Biden administration’s reproductive health and rights agenda. Furthermore, across the HHS and EPA climate and environmental health policy documents reviewed by Human Rights Watch, we found only a few short mentions of links between adverse birth outcomes and pollution. These key environmental justice guidelines have unfortunately said very little about reproductive rights issues. Nothing we found suggests that the government, as part of the new emphasis on environmental justice, has prioritized protecting reproductive health and reversing environmental harms that have created injustices in who gets a healthy pregnancy and newborn. Human Rights Watch also reviewed all of the Tweets or “X”s of Michael Regan while in position as EPA Administrator. Administrator Regan has tweeted consistently, to his credit, about the importance of environmental justice and disparate impacts on communities because of environmental racism, but as far as the review could find, Regan has not mentioned reproductive justice or even pregnancy health concerns as part of US environmental health injustices at hand at all.

The US federal government funds important work to improve children’s environmental health (for example, through the Office of Child Health Protection at the EPA) and through a network of universities funded to provide support across the US on children’s environmental health. Conducting research, writing reports, and doing policy work by these entities includes fetal health, because of its relevance to child health, and maternal health by extension, because fetal exposures are maternal exposures. But despite obvious and important connections, children’s environmental health is different from maternal health, including fetal health. A reproductive justice perspective, in contrast, centers the rights, needs, and interests of the pregnant woman. Pregnant women very often prioritize having a healthy pregnancy and newborn but need support and actionable information from trusted providers, and opportunities to provide feedback and demands to authorities. Top-down advice on the Internet may be hard to access and follow for low-income people, and risks just adding to the burdens pregnant people face in protecting their health,

including the developing fetus, from environmental harms. Alone this approach is not a rights-respecting path forward.

## Oregon State Efforts

The Oregon legislature has funded efforts to reduce wildfire and improve preparedness, especially through a big spending bill the body passed in the wake of the 2020 disasters. In 2020, Governor Kate Brown issued an executive order demanding that government agencies act on climate change, a precursor to wildfires.<sup>255</sup> In August 2022, the government issued a wildfire risk assessment map, which showed much of the state under significant risk; however, Oregon officials hastily withdrew it after homeowners complained that the map had hiked up their home insurance.<sup>256</sup>

Oregon has made efforts to address human health impacts, including through producing and communicating public health information and advice, albeit mainly in English. Oregon authorities tried to mandate healthcare providers to use federal health funds to buy air conditioners, air purifiers, and other assets to protect low-income people on government-funded health insurance from climate-related health harms, but according to news reports, have faced federal resistance.<sup>257</sup> Health plans have provided some air purifiers to some communities in an ad hoc manner; for example, they did in Oakridge, Eugene County, in 2023 when the community was blanketed in thick smoke.

While some vulnerable populations have benefitted, government efforts have not treated pregnant people as a vulnerable category. A 2020 bill told health plans and insurance companies to prioritize vulnerable populations for air purifiers (and air conditioners to address health harms from extreme heat), only specifically mentioning older people and

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<sup>255</sup> Office of the Governor, State of Oregon, “Executive Order 20-04: Directing State Agencies to Take Actions to Reduce and Regulate Greenhouse Gas Emissions,” March 10, 2020, [https://www.oregon.gov/gov/eo/eo\\_20-04.pdf](https://www.oregon.gov/gov/eo/eo_20-04.pdf) (accessed May 8, 2024).

<sup>256</sup> Joe Raineri, “Meet Oregon’s new wildfire map. Will it be the same as the old wildfire map?,” *KGW8*, July 12, 2023, <https://www.kgw.com/article/news/local/wildfire/oregon-wildfire-risk-hazard-map-odf-osu/283-bf83decf-ad83-4ea1-be57-3f9e2eed3cab> (accessed May 8, 2024).

<sup>257</sup> “Senate Bill 762,” Oregon Department of Forestry, accessed May 8, 2024, <https://www.oregon.gov/odf/Pages/sb762.aspx> and Nick Budnick, “Oregon’s climate benefit for low-income residents is shrinking,” *OPB*, December 5, 2023, <https://www.opb.org/article/2023/12/05/oregon-climate-benefit-air-conditioner-heater-health-authority-extreme-heat-cold/#:~:text=OHA%20initially%20proposed%20introducing%20climate,however%2C%20the%20Centers%20for%20Medi> care (accessed May 8, 2024).

people with pre-existing health conditions as vulnerable, not pregnant people.<sup>258</sup> The same bill also directed the Oregon Health Authority to report on climate-related harms to public health with a focus on ethnic minorities. Thus, its report in 2023 positively included health impacts on ethnic minorities; unfortunately, it did not include information on pregnancy health impacts.

Finally, Oregon health and safety officials have issued stricter rules for workplace safety during wildfires, including an instruction that workplaces delay outdoor work or otherwise provide respirator masks if the AQI is above 150.<sup>259</sup>

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<sup>258</sup> Global Warming Solutions, “Governor Kotek signs major bill package to address climate change, invest in clean energy,” *Environment Oregon*, August 1, 2023, <https://environmentamerica.org/oregon/updates/governor-kotek-signs-major-bill-package-to-address-climate-change-invest-in-clean-energy/> (accessed May 8, 2024).

<sup>259</sup> Oregon State University, “Wildfire Smoke and Outside Work Activities,” [https://ehs.oregonstate.edu/sites/ehs.oregonstate.edu/files/pdf/oregon\\_oshawildfiresmokeguidance.pdf](https://ehs.oregonstate.edu/sites/ehs.oregonstate.edu/files/pdf/oregon_oshawildfiresmokeguidance.pdf) (accessed May 8, 2024).

## VII. Obligations under International Human Rights Law

### Rights to Life, the Highest Attainable Standard of Physical and Mental Health

International human rights law protects the rights to life and health of all people without discrimination.

The International Covenant on Civil and Political Rights (ICCPR), which the US has ratified, protects the right to life, which requires that states act to address “reasonably foreseeable threats and life-threatening situations that can result in loss of life.”<sup>260</sup> The UN Human Rights Committee, which provides authoritative interpretations of the ICCPR, has also noted that to protect the right to life, states should develop “contingency plans and disaster management plans designed to increase preparedness and address natural and man-made disasters... such as hurricanes, tsunamis, earthquakes”<sup>261</sup>

The US has also ratified the International Convention on the Elimination of All Forms of Racial Discrimination (ICERD), which, like the ICCPR, prohibits discrimination on the basis of race.<sup>262</sup> Under ICERD, states must act affirmatively to prevent or end policies with unjustified discriminatory impacts.<sup>263</sup>

The US has signed, but not ratified, the International Covenant on Economic, Social and Cultural Rights (ICESCR), the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW), the Convention on the Rights of the Child (CRC), and the Convention on the Rights of Persons with Disabilities (CRPD).<sup>264</sup> Though not formally bound

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<sup>260</sup> International Covenant on Civil and Political Rights adopted December 16, 1966, G.A. Res. 2200A (XXI) entered into force March 23, 1976. Art. 6.

<sup>261</sup> UN Human Rights Committee, General Comment 36 on Article 6, ICCPR, Right to Life, U.N. Doc. CCPR/C/GC/36 (2019), paras. 7, 26.

<sup>262</sup> International Convention on the Elimination of All Forms of Racial Discrimination (ICERD), adopted March 7, 1966, G.A. Res. 2106 (XX), 660 U.N.T.S. 195, entered into force January 4, 1969, ratified by the United States October 21, 1994, art. 1, ICCPR, art 26.

<sup>263</sup> ICERD, arts. 1-2.

<sup>264</sup> ICESCR; Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW), adopted December 18, 1979, G.A. Res. 34/180, 1249 U.N.T.S. 13, entered into force September 3, 1981; signed by the United States July 17, 1980; Convention on the Rights of the Child (CRC), G.A. Res. 44/25, 1577 U.N.T.S. 3, entered into force September 2, 1990; signed

by the provisions of these four treaties, as a signatory, the US has an obligation to refrain from taking steps that undermine their “object and purpose.”<sup>265</sup>

The ICESCR guarantees the “right of everyone to the enjoyment of the highest attainable standard of physical and mental health.”<sup>266</sup> The right to health includes access to affordable health care that is of acceptable quality, and this includes provision of information and cultural competence.<sup>267</sup> The right to health includes the right to availability of services, accessibility of services and non-discrimination in services, including access to information.<sup>268</sup>

The ICESCR also protects the right to healthy work environments, including “reduction of the population’s exposure to harmful substances such as radiation and harmful chemicals or other detrimental environmental conditions that directly or indirectly impact upon human health.”<sup>269</sup> Environmental degradation and climate change are major obstacles to the realization of the right to health.<sup>270</sup>

The ICESCR directs states parties to take steps needed for “the reduction of the stillbirth-rate and of infant mortality and for the healthy development of the child” and to recognize that “[s]pecial protection should be accorded to mothers during a reasonable period before and after childbirth.”<sup>271</sup> “Access to information as well as

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by the United States February 16, 1995; Convention on the Rights of Persons with Disabilities (CRPD), adopted December 13, 2006, G.A. Res. A/RES/61/106, 2515 U.N.T.S. 3, entered into force May 3, 2008; signed by the United States July 30, 2009.

<sup>265</sup> See Vienna Convention on the Law of Treaties, opened for signature May 23, 1969, 1155 U.N.T.S. 331, entered into force January 27, 1980, art. 18(a). The United States is not a party to the Vienna Convention, but the US Department of State has taken the position that, “[t]he United States considers many of the provisions of the Vienna Convention on the Law of Treaties to constitute customary international law on the law of treaties.” US Department of State, “Vienna Convention on the Law of Treaties,” <https://2009-2017.state.gov/s/l/treaty/faqs/70139.htm> (accessed January 9, 2023.)

<sup>266</sup> ICESCR, art. 12.

<sup>267</sup> UN Committee on Economic, Social and Cultural Rights (CESCR), General Comment No. 14: The Right to the Highest Attainable Standard of Health, (Twenty-second session, 2000), U.N. Doc. E/C.12/2000/4 (2000), <https://www.ohchr.org/en/documents/general-comments-and-recommendations/ec1220004-general-comment-no-14-highest-attainable> (accessed May 8, 2024), para. 12. For further information on cultural competence in the US context see “Cultural Competence in Health Care: Is it important for people with chronic conditions?” Health Policy Institute, accessed May 8, 2024, <https://hpi.georgetown.edu/cultural/>.

<sup>268</sup> CESCR General Comment 14: The Right to the Highest Attainable Standard of Health (Art. 12 of the Covenant), U.N. Doc. E/C.12/2000/4 (2000), art. 15.

<sup>269</sup> *Ibid.*

<sup>270</sup> See UN General Assembly, Human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment, (Seventy-fourth session, 2019), Note by the Secretary-General, U.N. Doc. A/74/161, 2019.

<sup>271</sup> ICESCR, arts. 12 and 10.



resources to act upon that information” is a key component of the right to maternal, child and reproductive health.<sup>272</sup> Relatedly, the Committee on Economic, Social and Cultural Rights concluded that the “realization of women’s right to health requires the removal of all barriers interfering with access to health services, education and information, including in the area of sexual and reproductive health.”<sup>273</sup> The committee affirmed the need for states to develop and implement comprehensive strategies to promote women’s right to health with interventions aimed not only at treating, but also at preventing diseases affecting women.<sup>274</sup>

Under these standards, states, including the US, have an obligation to tackle air pollution, which threatens people's lives and health. Governments are required to take steps to limit air pollution and protect people during the worst air pollution events, which can include those that result from wildfires. To do so, states need to adequately assess and reduce sources of air pollution, monitor air quality, enforce rigorous air quality standards, and assess, communicate, and mitigate risks to human health, including for at-risk groups. Access to information is a prerequisite for the exercise of various other rights, including the rights to health and a healthy environment.

## The Right to a Healthy Environment

The United Nations General Assembly adopted a resolution on July 28, 2022, declaring access to a clean, healthy, and sustainable environment a universal human right.<sup>275</sup> The resolution, which followed recognition of the right by the UN Human Rights Council in October 2021, affirms “the importance of a clean, healthy and sustainable environment for the enjoyment of all human rights.”<sup>276</sup> The United States voted in favor of the resolution.

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<sup>272</sup> CESCR General Comment 14: The Right to the Highest Attainable Standard of Health (Art. 12 of the Covenant), U.N. Doc. E/C.12/2000/4 (2000), art. 14.

<sup>273</sup> CESCR, General Comment No. 14: The Right to the Highest Attainable Standard of Health, U.N. Doc. E/C.12/2000/4 (2000), para. 21.

<sup>274</sup> *Ibid.*

<sup>275</sup> UN General Assembly, “The Human Right to a Clean, Healthy and Sustainable Environment,” Resolution 76/300, A/RES/76/300, header <https://documents-dds-ny.un.org/doc/UNDOC/GEN/N22/442/77/PDF/N2244277.pdf?OpenElement> (accessed October 25, 2023)

<sup>276</sup> *Ibid.*

The US has not recognized the right to a healthy environment in its constitution or national legislation. However, the constitutions of six states—Pennsylvania, Montana, Massachusetts, Illinois, Hawaii, and New York—now recognize the right.<sup>277</sup>

UN Special Rapporteur on Human Rights and the Environment, David Boyd, identified the ability to breathe clean air as one of the constituent elements of the right to a healthy and sustainable environment and noted that air pollution can violate this right.<sup>278</sup> In a joint statement issued in 2017, a group of UN experts said: air pollution “can no longer be ignored. States have a duty to prevent and control exposure to toxic air pollution and to protect against its adverse effects on human rights.”<sup>279</sup>

## Human Rights Obligation to Address Climate Change

All states, including the US, have international human rights obligations to address climate change, including by adopting and implementing robust and rights-respecting climate mitigation and adaptation policies that are consistent with the best available science. The Paris Agreement, of which the US is a member, recognizes “[p]arties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights ... the rights of indigenous peoples, local communities ... and people in vulnerable situations.”<sup>280</sup>

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<sup>277</sup> John Dernbach, “The Environmental Rights Provisions of US State Constitutions,” Widener Law Commonwealth Research Paper No. 2305, June 8, 2023. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=4390853](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4390853) (accessed October 25, 2023).

<sup>278</sup> UN Human Rights Council, Report of the Special Rapporteur on human rights and the environment, John Knox, “Issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment,” A/HRC/40/55, January 8, 2019, <https://documents.un.org/doc/undoc/gen/g19/002/54/pdf/g1900254.pdf?token=QYCQyTApZaisrkt8Jb&fe=true> accessed (May 8, 2024), para. 17.

<sup>279</sup> *Ibid.*

<sup>280</sup> Paris Agreement, adopted December 12, 2015, XXVII-7-d, entered into force November 4, 2016.

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Nurturely staff used their extensive contacts in Oregon to find interviewees for this report. The report was drafted by Skye Wheeler, senior researcher in the Women's Rights Division, with support from Susanné Bergsten, officer in the Women's Rights Division, and the senior editor in the Women's Rights Division, at Human Rights Watch. Travis Carr, publications officer, helped produce the report. Aver Yakubu from Nurturely edited and improved the report at multiple stages of the process. Nurturely held a series of workshops and together with partners developed accessible factsheets for pregnant people, and both processes informed this report.

The following Human Rights Watch staff also reviewed this report: Cristina Becker, associate director for the US program, Matt McConnell, researcher in the Economic Justice and Rights division and for the Global Health Initiative, and Richard Pearshouse, director of the Environment and Human Rights division. Tom Porteous, deputy program director, provided program review. Maria McFarland Sánchez-Moreno, senior legal advisor, provided legal review.



## Reproductive Rights in the US Wildfire Crisis

### Insights From Health Workers in Oregon State

Driven by climate change, wildfires are set to intensify in the US and wildfire smoke is now a major source of air pollution in the US. Pregnant women and other pregnant people have a range of particular vulnerabilities to toxic air pollution and stress created by wildfires. Exposure is associated with preterm birth, low birth weight, and other adverse maternal and newborn health conditions. But knowledge of health harms from toxics in the smoke, including to pregnant people, is low among both health providers and the public.

*Reproductive Rights in the US Wildfire Crisis*, based on 50 interviews with maternal health providers, including doctors, doulas and midwives, as well as public health officials, scientists and activists, documents the impact of recent wildfires in Oregon on maternal health. The report examines how socio-economic status, place of work, housing quality, immigration status, language and race all impact access to information concerning health issues and actions pregnant people can take to prevent exposure, such as staying inside and using air filters. The report also finds maternal mental health is a key concern, and that wildfires can obstruct access to care and adversely impact providers.

Maternal health indicators in the US are worsening or stagnating, and deep racial inequities persist. Wildfires and other climate-related harms exacerbate these problems. The report calls on the US and Oregon governments to adopt and implement robust, rights-respecting climate mitigation and adaptation policies. This should include a reproductive justice approach to pregnancy and newborn health that centers the rights, experiences and needs of socially and economically marginalized communities. Public health officials should also resource trusted community health workers to ensure culturally competent care and two-way communication between communities hit hardest by wildfire smoke and public officials.

*Above: A helicopter flies between the Bedrock Fire and nearby Fall Creek to get a load of water as the wildfire burns east of Eugene, Oregon, July 24, 2023. © 2023 Chris Pietsch/The Register-Guard via AP*

*Cover: A woman walks her dog at an evacuation center in Oak Grove, Oregon, after evacuating from near Mollalla, Oregon, which was threatened by the Riverside Fire, September 13, 2020. © 2020 AP Photo/John Locher*