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Preview

Inequities in wildfire risk distribution to people and their communities

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As wildfires worsen across the globe, there is increased attention on the inequitable distribution of the risks to people. Pre-existing risks and vulnerabilities compound the risk to many populations. Those who bear the worst of these risks are usually underserved and ethnic/racial minority communities.

In recent years, a new wildfire regime has emerged that is characterized by longer seasons and larger and more severe wildfires. A history of fire suppression has led to a buildup of vegetation, while the continued expansion of the wildland-urban interface (WUI) has meant a substantial increase in the number of buildings and people in this area. Climate change has induced changes to precipitation and an increase in temperatures that are responsible for much of this increased fire activity.[1] These climate-change-induced effects will continue to increase in the future, thereby also changing wildfire risk. This will be felt through both increased risk in areas already prone to wildfire as well as an expansion into geographical areas that currently have low risk. To date, most of the literature on the socio-economic effects of wildfire is centered around human populations and their communities. However, physical infrastructure will also come under increased risk from wildfire but does not appear to be as well represented in literature. This category includes roads, water treatment plants, hospitals, cellular towers, and energy facilities. Wildfire threats and damage to this infrastructure creates additional risks for human populations in this area.

González et al.[2] provide an important and timely analysis of how changes in wildfire activity are increasing the risks to oil and gas wells and nearby human communities. They find that this risk is not distributed equitably across the landscape, as is the case for wildfire itself. Instead, for most communities, extreme weather events such as wildfire (both the event itself and risk to) exacerbate pre-existing issues and inequalities. Unequal risk to wildfire starts with differences in exposure to wildfire, with exposure highest in the wildlands area of the WUI (Figure 1). This area is traditionally populated by white and higher-income communities, although in recent years, these areas are becoming more ethnically and racially diverse. Populations of non-white racial and ethnic groups mostly live in the more urbanized portions of the WUI where the risk of wildfire is substantially lower. The exception to this pattern is Native American communities, as a disproportionate number of their reservations are in areas of high wildfire risk.[3] However, wildfires are increasingly affecting more suburban areas—the urban portion of the wildland-urban interface and thus, different socio-demographic populations.[4]

Yet, the risk from wildfire is shaped by multiple factors other than exposure. Income plays a large role in how wildfire affects a population, from pre-event exposure to recovery after a fire.[5] At the household level, there are a suite of recommended wildfire risk mitigation actions, but once again, the ability to do so is inequitable and many populations face substantial barriers. Many recommended actions to "harden" a house have a financial cost, sometimes even quite substantial for actions like replacing the roof with more fire-resistant materials. These financial costs mean that many people, especially lower-income populations, cannot afford to complete these actions.[6] This is especially important since lower-income housing is usually less disaster resistant due to age. Socio-economic factors also influence one's ability to safely and promptly evacuate when their location is threatened by wildfire.[5] Lack of and/or insufficient space in a vehicle, not being able to take paid time off work, and insufficient funds for renting a hotel room if evacuated are some of the ways in which income contributes to the disparities around wildfire risk through evacuation challenges.

Language barriers also play a critical role in risk management efforts as countries become more racially and ethnically diverse. More of the population will speak the non-dominant languages, so multilingual information is essential, especially in communities with high percentages of such residents.[7] For example, in the US, information on defensible space and home mitigation actions is not always available in non-English languages. In addition, this material can be quite technical, making translation efforts more complicated. Similarly, many websites discussing emergency preparedness, such as evacuation plans and emergency/go bags, are only in English or select other languages, limiting their ease of access and usefulness for many people.

Another area where language ability influences wildfire risk is around severe weather communication. In the US, agencies are increasingly issuing wildfire (and other severe weather) warnings in languages besides English; although, this varies across geographies and agency. Advance notice of weather conductive to rapid wildfire growth (fire weather watches and red flag warnings) are a crucial tool used to alert people to these times of heightened wildfire risk when they are advised to both pay extra attention and complete additional preparation actions. Similarly, evacuation warnings and orders are often issued only in

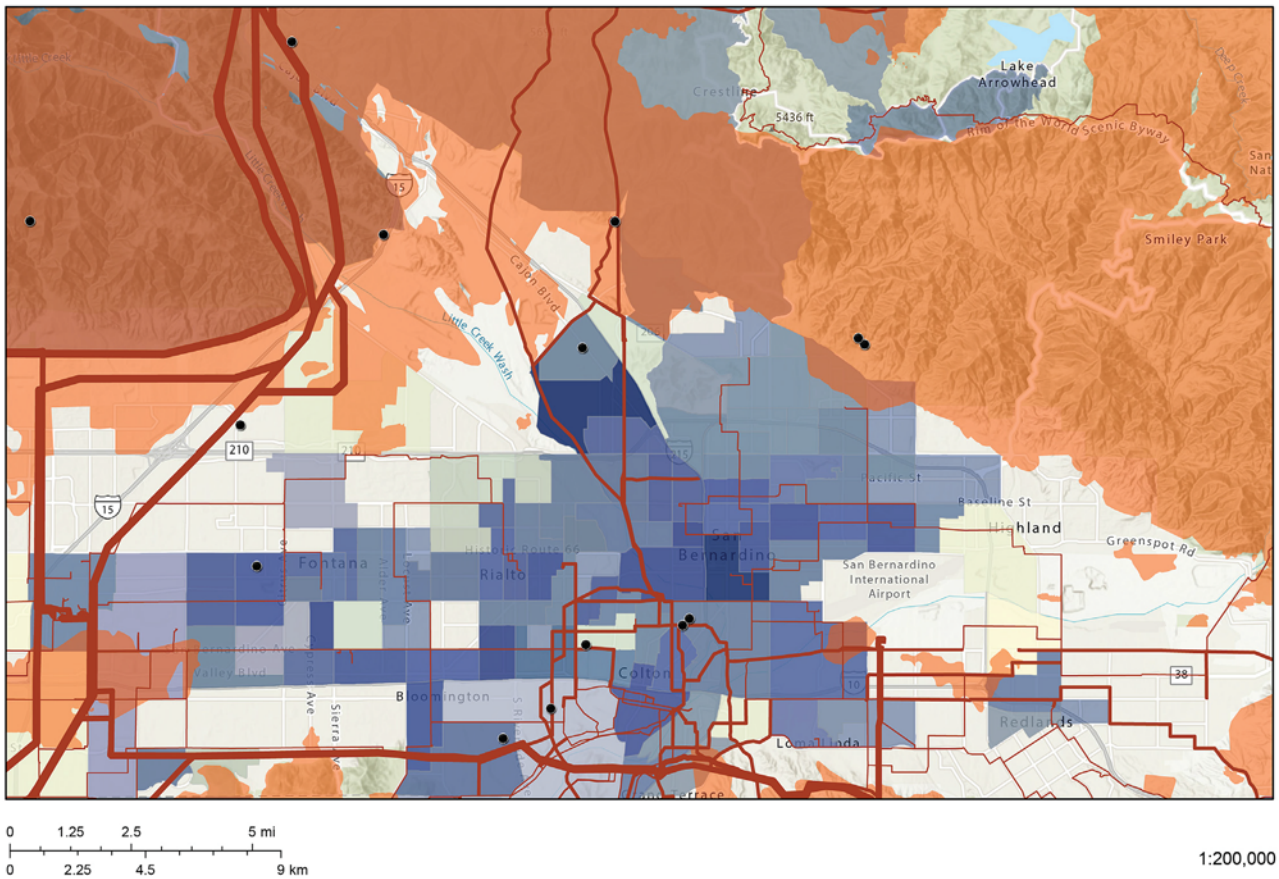

Figure 1. Wildfire risk across a landscape

This map shows the wildland urban interface gradient around San Bernardino, California, USA, and the associated social vulnerability of the population. The area in orange shows fire perimeters since 1950. Shades of blue indicate relative levels of social vulnerability (the darker, the more socially vulnerable): non-white areas, areas with more linguistic isolation, and lower income areas. Physical infrastructure is shown by power lines in orange, and oil/gas wells are gray dots.

the predominant language. However, it is important to note that translation itself is not sufficient. Instead, the translations need to be consistent (to limit confusion) and accurately convey the intended meaning (instead of literal translations).[7] In many areas of the US, many messages are now issued in both English and Spanish. However, many immigrants are from Central and South American indigenous communities and do not speak English or Spanish.[8]

This compounds the risks already faced by these groups, as they are often undocumented (so they worry about deportation) and have economic challenges in daily life.[8] They are also more likely to be farmworkers who are at high risk from wildfire smoke, as they often continue working (either required or by choice). These compound risks or injustices are not unique, as many of the most socially vulnerable populations and communities face additional challenges in trying to lower or mitigate their wildfire risk. Higher income, predominantly white communities are usually more successful in lobbying for fuels reduction work from governments, even though communities of color will likely be more affected in the event of a wildfire. Underserved rural communities can have limited financial capacity to afford adequate home insurance, yet in the event of a wildfire, they will face more challenges in recovering.

The article by González et al.[2] in this issue delves into this topic of compounding risks and environmental justice around wildfire risk. The authors note that it was already established that racial and ethnic minorities have a disproportionately high exposure to environmental hazards, in this case, oil and gas wells. Their analyses found that these wells were increasingly (5 times) located within wildfire perimeters between 1984 and 2019. Overall, there was a doubling of the population located within 1 km of these wells, but Hispanic, Asian, Black, and Native American populations had disproportionate exposure. As the authors note, although the public health effects of exposure to wildfire-damaged wells requires further research, fire (not wildfire) at these sites is already documented to cause a suite of problems, including exposure to high levels of radiant heat, explosions, and poor air quality due to the emission of toxic substances. This is especially problematic as these racial and ethnic minority populations are more likely to have pre-existing conditions such as asthma, and to lack health insurance and/or adequate healthcare. The increasing exposure of populations to harmful wildfire smoke and its multiple health effects is already receiving more attention,[9] and the authors note that wildfire damage to the wells could also increase emissions. Furthermore,

resources are often limited during wildfire suppression efforts, requiring choices in what to protect. Oil and gas wells, as critical physical infrastructure, would be given a high priority, which could force diversion of resources from home protection efforts. Given that research has shown that wildfires are more likely to be suppressed closer to more expensive homes,[10] disadvantaged populations will face an increased risk.

In conclusion, González et al.[2] add to the growing body of literature documenting the unequal impacts of wildfire and the uneven distribution of risk. Their findings raise environmental and social justice concerns around wildfire and its inequitable impacts on public health. The scale of wildfires in recent years has increased the risk to populations, sometimes in new areas or the corresponding socioeconomic characteristics, but findings suggest that wildfire risks to critical physical infrastructure and its potential health effects is an important area of research. As governments increase their investments in wildfire risk reduction activities (e.g., fuel treatments, defensible space assistance programs), they would benefit from giving serious consideration to environmental justice concerns and ensuring that the investments address these inequities, especially as planning often doesn't account for the most vulnerable members of a community. As climate change effects and the population living in the WUI increase, the inequities will also continue to grow. This makes addressing the issue of unequal wildfire risk a pressing and timely issue at all levels of society.

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DECLARATION OF INTERESTS

The author declares no competing interests.

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