



Rising Temperatures, Rising Threats: The Impact of Climate Change on Maternal Health

BY: LAKSHYA ALAGAN

In 2024, the global surface temperature was 2.32 °F above the 20th-century average. This ranks as the highest global temperature in the 1850–2024 period, surpassing 2023 by 0.18°F.^{1,2} Although seemingly small, this 18-degree difference is alarming because the average rate of temperature increase since 1850 has only been 0.11°F per decade. This means that the past year alone saw a jump equivalent to nearly two decades of historic warming.¹

While it is generally understood that rising global temperatures are primarily caused by human activities such as burning fossil fuels and industrial processes, scientists are working to understand what ramifications the continuing temperature rise will have on the environment and human population.

In 2025, records show more severe storms occurring in several regions.^{3,4,5} Rising temperatures and greater water evaporation increase rainfall, which creates disastrous flooding, community displacement, and economic burden for regions with annual storm seasons.⁵

On the opposite end, increased temperatures also exacerbate drought conditions, aggravating regions with pre-existing water scarcity. As a result of increased drought and reduced water availability in rural areas, smaller agricultural yields fail to feed low-income communities and

agricultural workers.⁷

THE OVERLOOKED POPULATION: PREGNANT WOMEN

While these issues have begun hitting populations around the world, often overlooked are the experiences of the

most vulnerable in these communities: pregnant women. Reduced water availability, increasingly severe storms, and agricultural distress take a large toll on communities, but holistic climate discourse lacks an in-depth understanding of how these climate events disproportionately affect reproductive health

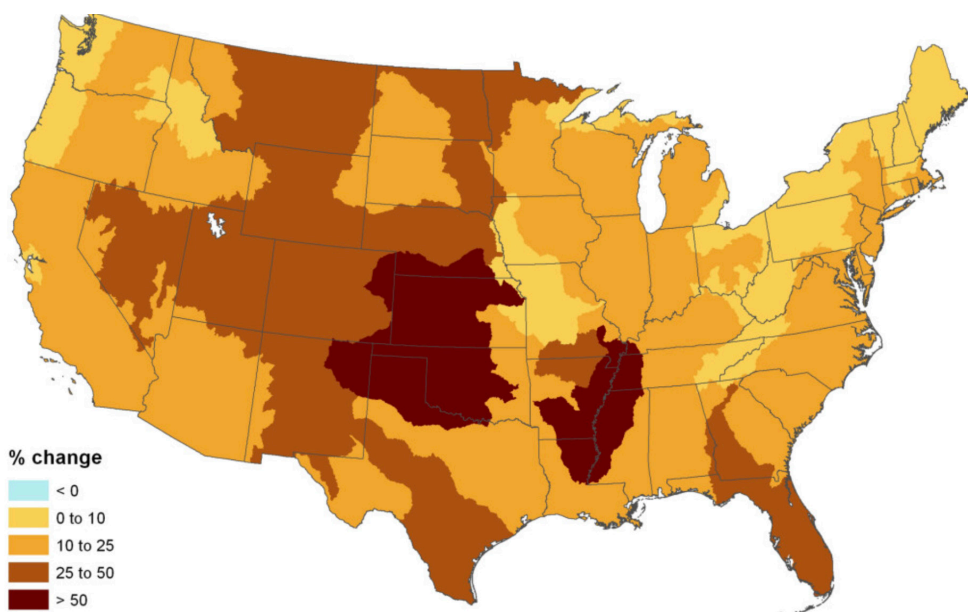


Figure 1: Large predicted changes in water availability in the United States by 2060 via U.S. Geological Survey water use data. Such changes were predicted under the A1B scenario, which expects a high level of technological change and rapid spread of new and efficient technologies, with a balanced emphasis on all energy sources—this is most consistent with historic population and economic growth patterns.

and healthcare for pregnant women globally.

Pregnant women, especially those with underlying health complications, low socioeconomic backgrounds or living in developing countries, often face the brunt of impacts from foreseeable temperature.⁸ For example, in certain water-scarce regions, women are in charge of getting water for the house. With increased drought and less water availability, these women, even when pregnant, have to travel longer distances in hotter temperatures to provide for their families.^{9,10} Such circumstances increase the physical strain on mothers and pose potential health risks for the baby. Furthermore, in regions where food scarcity is a prevailing issue, pregnant women often do not receive sufficient nutrition for themselves, let alone enough to support both their own needs and those of their developing baby. As a result, pregnant mothers develop health issues such as anemia and mental health conditions such as depression.¹¹

The physical effects that pregnant women face then pose health risks to the fetus as well. Babies born to food-insecure mothers are at higher risk for low birth weight, preterm birth, and developmental



Figure 2: Women in Nyanza province, Kenya, walk each day to collect water.

problems.¹¹

Where food scarcity is already of major humanitarian concern, rising global temperatures are predicted to make it difficult to get the water needed to maintain crop yields. Thus, scientists predict rising temperatures will only exacerbate the food scarcity problem in threatened regions. Research shows that water and food insecurity have an intricate relationship with the mental well-being of pregnant women. In a study of low-income pregnant women in urban Mozambique, researchers

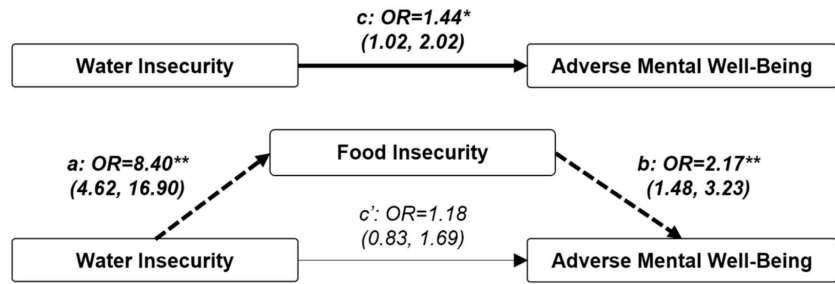


Figure 3: The Relationship Between Water Insecurity, Food Insecurity, and Mental Well-Being of low-income pregnant women of Mozambique, Africa. The arrows display the strong correlations present between water insecurity, food insecurity, and adverse mental well-being, as well as the correlation between water insecurity and adverse mental well-being alone.

found that while water scarcity was linked to mental well-being, it is likely that food insecurity mediated these negative effects.¹² Thus, the adverse effects of water scarcity on mental health were largely driven by food insecurity. This is particularly important for pregnant women, as agricultural drought can negatively impact their overall well-being. As rising temperatures worsen crop yields and water shortages, food insecurity is expected to increase, further endangering the physical and mental health of pregnant women and their babies. It is also important to note that mental health conditions and food insecurity co-occur disproportionately among women.¹³

As a result, women, especially pregnant women, are at a higher risk of mental and physical distress.

MALARIA TRANSMISSION

In addition to food and water insecurity, it is also important to address how rising climate temperatures impact the spread of disease. For example, malaria disproportionately affects pregnant women and fetuses, and can pose greater risks as temperatures rise. While there is currently a limited display of increasing transmission, scientists worry that hotter temperatures will favor the survival of such viruses. The World Health Organization reports that elementary modeling suggests temperature increase will enhance the transmission rates and geographic distribution of mosquito-borne diseases, particularly. However, the discourse varies regarding this topic: while some studies report an increase in the spread of the disease in the current malaria-endemic areas, or a reemergence in areas that have controlled or eliminated transmission, other studies report no association between malaria and climate change.¹⁴

Nonetheless, from a biological perspective, malaria and rising temperatures create a dangerous combination. Malaria is caused by the *Plasmodium* parasite. When an *Anopheles* mosquito carrying this parasite bites a human, the parasite is transmitted into the human bloodstream and results in Malaria. So how does increased heat exactly affect this parasite? In a 2024 study in Chennai, India, it was found that the extrinsic incubation period (EIP) of *Plasmodium vivax* and *P. falciparum* (the malaria parasites) has decreased over time, comparing data from 2012–2013 and 2021–2022.¹⁵

The EIP is the length of time required for the malaria parasite (*Plasmodium*) to develop inside a mosquito after the mosquito has bitten an infected person; thus, a decreased EIP suggests that the parasites now develop faster inside mosquitoes compared to a decade ago. In turn, *Plasmodium's* elevated reproduction rate increases infection rates when infected mosquitoes bite humans. Furthermore, the *Anopheles* mosquitoes thrive in warmer temperatures, likely increasing mosquito populations in warmer regions, leading to further infection in humans. Thus, warmer global regions are disproportionately affected by Malaria transmission, and a further rise in global temperatures by climate change can exacerbate these issues.

While malaria transmission disproportionately impacts warmer climates, it also disproportionately impacts pregnant women.^{16,17} It was found that pregnant women attracted twice the number of *Anopheles* mosquitoes compared to their non-pregnant counterparts. This differed attractiveness may in part result from pregnant women releasing greater amounts of mosquito attractants like CO₂ due to the higher metabolic rate and heat production observed during pregnancy.¹⁶ Furthermore,



Figure 4: *Anopheles* mosquito biting a human, posing the human at risk of infection if the mosquito is carrying the *Plasmodium vivax* malarial parasite.

behavioral aspects of pregnancy likely impact this statistic; pregnant women may suffer from more mosquito bites because they more often have to leave their mosquito nets during the night to urinate.¹⁶ When a pregnant woman is infected with malaria, her quality of health, as well as her fetus, is threatened. The disease commonly causes severe anemia in pregnant African women, causing about 10,000 maternal deaths annually. With mothers who make it to delivery, malaria infections result in about 75,000–200,000 low-birth-weight babies each year—this is often due to combinations of preterm delivery and fetal growth restriction.¹⁷

LOOKING AHEAD: TACKLING CLIMATE CHANGE AND MATERNAL HEALTH

It is important to understand, then, how rising temperatures exacerbate food insecurity, water scarcity, and disease transmission in threatened regions, and how these select foreseeable effects disproportionately impact the physical and psychological well-being of pregnant women, and thereby, their children. Furthermore, this highlights the importance of putting efforts into understanding the impact overlaying crises will have on pregnant women, many of whom don't have convenient access to healthcare, and are often forced to relocate for resources. While aid services like Red Cross help give accessible reproductive healthcare to pregnant women in humanitarian settings such as Africa, without also addressing the climate crisis, we fail to take preventative measures in the exacerbation of reproductive struggles.

Thus, the climate crisis, particularly rising temperatures, demands urgent collaboration between climate scientists,

public health workers, and policy-makers on the local and global levels. By addressing this interdisciplinary issue, these fields can establish long-term strategies to mitigate the effects of climate change on maternal and adolescent health, ensuring that vulnerable populations in humanitarian settings are protected. Immediate action, rooted in cross-sectoral coordination, is essential to protect the mental and physical well-being of pregnant women and their children worldwide, building a future where communities can thrive despite the challenges of rising temperatures.

ACKNOWLEDGMENTS

I would like to extend my sincere gratitude to Dr. Sandie Ha, Professor of Public Health at the University of California, Merced, for her invaluable insights and review of my project. Her expertise and dedication have been instrumental in shaping this article, and I am grateful for her support.

REFERENCES

1. National Oceanic and Atmospheric Administration. (n.d.). Climate Change: Global Temperature. NOAA Climate.gov. <https://www.climate.gov/news-features/understanding-climate/climate-change-global-temperature>
2. National Aeronautics and Space Administration. (2024, January 12). Temperatures Rising: NASA Confirms 2024 Warmest Year on Record. NASA. <https://www.nasa.gov/news-release/temperatures-rising-nasa-confirms-2024-warmest-year-on-record/>
3. Ocko, I. (2000). Extreme weather gets a boost from climate change. Environmental Defense Fund. <https://www.edf.org/climate/climate-change-and-extreme-weather>
4. Sasaki, O., Schuster, C., Wales, C., Scott, C., Seigerman, K., Senaratna, S., Shah, R., Shamsudduha, M., Shrestha, G., Siddiqui, A., Singh, B., & Singh, A. (2022). Aditi Mukherji (India) Lead Authors: Md Arfanuzzaman. <https://doi.org/10.1017/9781009325844.006>
5. Aumann, H. H., Ruzmaikin, A., & Teixeira, J. (2008). Frequency of severe storms and global warming. *Geophysical Research Letters*, 35(19). <https://doi.org/10.1029/2008gl034562>
6. C2ES. (2018, November 9). Drought and Climate Change. Center for Climate and Energy Solutions. <https://www.c2es.org/>

7. National Integrated Drought Information System. (2025). Agriculture. Drought.gov. <https://www.drought.gov/sectors/agriculture>
8. Ha S. (2022). The Changing Climate and Pregnancy Health. *Current environmental health reports*, 9(2), 263–275. <https://doi.org/10.1007/s40572-022-00345-9>
9. “I have spent my whole life fetching water.” (n.d.). [www.unicef.org](https://www.unicef.org/nigeria/stories/i-have-spent-my-whole-life-fetching-water). <https://www.unicef.org/nigeria/stories/i-have-spent-my-whole-life-fetching-water>
10. Tomberge, V. M. J., Shrestha, A., Meierhofer, R., & Inauen, J. (2022). Understanding safe water-carrying practices during pregnancy and postpartum: A mixed-methods study in Nepal. *Applied psychology. Health and well-being*, 14(2), 691–711. <https://doi.org/10.1111/aphw.12325>
11. Agho, K.E., van der Pligt, P. BMC pregnancy and childbirth - ‘screening and management of food insecurity in pregnancy.’ *BMC Pregnancy Childbirth* 23, 862 (2023). <https://doi.org/10.1186/s12884-023-06062-x>
12. O’Brien LA, Snyder JS, Garn JV, Kann R, Júnior A, McGunegill S, et al. (2024) Water, food, and mental well-being: Associations between drinking water source, household water and food insecurity, and mental well-being of low-income pregnant women in urban Mozambique. *PLOS Water* 3(6): e0000219. <https://doi.org/10.1371/journal.pwat.0000219>
13. Martin, M. S., Maddocks, E., Chen, Y., Gilman, S. E., & Colman, I. (2016). Food insecurity and mental illness: disproportionate impacts in the context of perceived stress and social isolation. *Public health*, 132, 86–91. <https://doi.org/10.1016/j.puhe.2015.11.014>
14. Fernando, S. D. (2015). Climate change and malaria - A complex relationship | united nations. [un.org; United Nations. https://www.un.org/en/chronicle/article/climate-change-and-malaria-complex-relationship](https://www.un.org/en/chronicle/article/climate-change-and-malaria-complex-relationship)
15. Kripa, P.K., Thanzeen, P.S., Jaganathasamy, N. et al. Impact of climate change on temperature variations and extrinsic incubation period of malaria parasites in Chennai, India: implications for its disease transmission potential. *Parasites Vectors* 17, 134 (2024). <https://>

doi.org/10.1186/s13071-024-06165-0

16. Ellwanger, J. H., Cardoso, J. D. C., & Chies, J. A. B. (2021). Variability in human attractiveness to mosquitoes. *Current research in parasitology & vector-borne diseases*, 1, 100058. <https://doi.org/10.1016/j.crpvbd.2021.100058>
17. Rogerson SJ, Mwapasa V, Meshnick SR. Malaria in Pregnancy: Linking Immunity and Pathogenesis to Prevention. In: Breman JG, Alilio MS, White NJ, editors. *Defining and Defeating the Intolerable Burden of Malaria III: Progress and Perspectives: Supplement to Volume 77(6) of American Journal of Tropical Medicine and Hygiene*. Northbrook (IL): American Society of Tropical Medicine and Hygiene; 2007 Dec. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK1710/>

maladies-malaria-is-more-prevalent-in-the-rainy-season-5-ways-to-stay-safe/articleshow/111343719.cms?from=mdr

IMAGE REFERENCES

1. [Banner Image] Jubb, J. (2022, May 18). How is climate change affecting maternal and fetal health? The Health Policy Partnership. <https://www.healthpolicypartnership.com/how-is-climate-change-affecting-maternal-and-fetal-health/>
1. [Figure 1] Brown, T. C., Foti, R., & Ramirez, J. A. (2013). Projected freshwater withdrawals in the United States under a changing climate. *Water Resources Research*, 49(3), 1259–1276. <https://doi.org/10.1002/wrcr.20076>
1. [Figure 2] Water for Life: an African Photo Exhibit - Our World. (2011). Unu.edu. <https://ourworld.unu.edu/en/water-for-life-an-african-photo-exhibit>
1. [Figure 3] O'Brien, L. A., Snyder, J. S., Garn, J. V., Kann, R., Júnior, A., McGunegill, S., Bacelar Muneme, João Luís Manuel, Rassul Nalá, Levy, K., & Freeman, M. C. (2024). Water, food, and mental well-being: Associations between drinking water source, household water and food insecurity, and mental well-being of low-income pregnant women in urban Mozambique. *PLOS Water*, 3(6), e0000219–e0000219. <https://doi.org/10.1371/journal.pwat.0000219>
1. [Figure 4] ET Online. (2024, June 28). Monsoon Maladies: Malaria is more prevalent in the rainy season, 5 ways to stay safe. The Economic Times; Economic Times. [FEATURES](https://economictimes.indiatimes.com/magazines/panache/monsoon-</div><div data-bbox=)