

# Increasing severe maternal morbidity linked to heat exposure

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Research led by the University of California at Irvine provides strong evidence linking maternal heat exposure during pregnancy to an increased risk of severe maternal morbidity, with potential implications for public health strategies and interventions.

In a paper, "Analysis of Heat Exposure During Pregnancy and Severe Maternal Morbidity," published in *JAMA Network Open*, the team explored the potential association between maternal environmental [heat](#) exposure and severe maternal morbidity (SMM).

The study included 403,602 pregnancies, with a mean age of 30.3 years, with data collected from Kaiser Permanente Southern California, a large integrated health care organization. Within the cohort, there were 3,446 cases of SMM (0.9%) over 10 years (2008 to 2018). Temperature values during pregnancy were assigned to individuals based on their geocoded home addresses.

Long-term heat exposure was measured by the proportions of heat days during pregnancy, categorized as moderate, high, and extreme heat days. The study observed significant associations between long-term heat exposure during pregnancy and SMM, particularly related to environmental heat exposure in the third trimester.

Short-term heat wave exposure during the last gestational week was assessed using nine different heat wave definitions based on temperature thresholds and durations. Short-term associations were significant under different heat wave definitions. The magnitude of associations generally increased from the least severe to the most severe heat wave exposure, with more significant associations observed with more severe heat exposure.

According to the Centers for Disease Control and Prevention, SMM "...includes unexpected outcomes of labor and delivery that result in significant short- or long-term consequences to a woman's health. Using the most recent list of indicators, SMM has been steadily increasing in recent years."

The UC Irvine study authors point out that the rate of SMM in 2014 was

almost three times that of 20 years ago, and while some explanations have been proposed, the proposed factors cannot fully explain the upward trend.

The researchers found an association between when pregnancies begin (the season of conception) and severe maternal morbidity (SMM). The authors mention that mothers who started pregnancy in the cold season (November through April) were more vulnerable to heat exposure and had higher associations between heat exposure and SMM compared to those who started pregnancy in the warm season (May to October).

This suggests that the timing of conception, leading to the stage of pregnancy during the hottest months, may influence the relationship between heat exposure and SMM.

The study concludes that both long-term and short-term maternal heat exposure during pregnancy is associated with a higher risk of severe maternal morbidity. These results have important implications for SMM prevention, especially considering climate change's current and future impacts.

The World Meteorological Organization and the European Copernicus Climate Change Service announced that August 2023 was the hottest August ever recorded, the second hottest month measured behind July 2023. The implications for heat-related [pregnancy](#) outcomes are urgent, especially in areas most affected by prolonged increases.

The study also highlights the health disparities among mothers with different education levels. This suggests the need for targeted interventions to reduce SMM risk, particularly among mothers with low socioeconomic status.

**More information:** Anqi Jiao et al, Analysis of Heat Exposure During

Pregnancy and Severe Maternal Morbidity, *JAMA Network Open* (2023).  
[DOI: 10.1001/jamanetworkopen.2023.32780](https://doi.org/10.1001/jamanetworkopen.2023.32780)

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