

# Increased Ambient Temperature Increases Risk of Poor Pregnancy Outcomes

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## CLINICAL QUESTION

Is increased ambient temperature associated with increased risk of preterm birth, placental abruption, and stillbirth?

## EVIDENCE-BASED ANSWER

Physicians should counsel pregnant patients that heat exposure may increase the risk of poor pregnancy outcomes. (Strength of Recommendation [SOR]: B, two systematic reviews and meta-analyses of observational studies, one case-crossover study.) Increased ambient temperature (year on year increase of 1°C) is associated with increased risk of preterm birth, stillbirth, and placental abruption at term. The magnitude of risk varies, but overall, risk of preterm birth and stillbirth increases by 4% to 6% per 1°C rise in temperature. The association is stronger for pregnant patients with lower income status as estimated from country-based demographic data.

## EVIDENCE SUMMARY

A 2025 systematic review and meta-analysis of 198 observational studies (individual patient counts not reported) across 66 countries examined associations between heat exposure and pregnancy outcomes. Most studies were from Asia, Europe, and North America, and some were from Africa, Australia, and South America. Most studies were conducted in the temperate climate zone.<sup>1</sup>

Despite variation in heat exposure measures and study designs, the meta-analysis identified increased risks of preterm birth with a 1°C increase in heat exposure (odds ratio [OR] = 1.04; 95% CI, 1.03-1.06; n = 12) and during heatwaves (OR = 1.26; 95% CI, 1.08-1.47; n = 10). Increases in ambient heat exposure were also associated with higher risks of congenital anomalies (OR = 1.48; 95% CI, 1.16-1.88; six studies), gestational diabetes (OR = 1.28; 95% CI, 1.05-1.74; four studies), and obstetric complications (OR = 1.25; 95% CI, 1.09-1.42; 11 studies).<sup>1</sup>

A 2020 systematic review and meta-analysis of 70 observational studies that were performed in 27 countries, seven of which were low or middle income, focused on preterm birth, birth weight, and stillbirth. Individual patient counts were not reported, and the meta-analysis used four different heat exposure metrics. Compared with the 2020 systematic review and meta-analysis, the 2025 systematic review and meta-analysis included data from three new (10 total) 1°C-increase studies and added data from six new (12 total) heatwave studies.<sup>2</sup>

This review and meta-analysis found that the risk of preterm birth increased with each 1°C temperature increase (OR = 1.05; 95% CI, 1.03-1.07) and during heatwaves (OR = 1.16; 95% CI, 1.10-1.23). Heatwaves were defined as 2 or more days with temperatures higher than a predefined threshold. Exposure to high temperatures was associated with low birth weight in 18 of 28 studies. All eight studies that assessed stillbirth showed an association between higher temperatures and stillbirth with a year-over-year temperature increase of 1°C (OR = 1.05; 95% CI, 1.01-1.08). These associations were more pronounced for pregnant people of lower socioeconomic status (based on income and education levels) and at older and younger age extremes.<sup>2</sup>

A systematic review of 11 observational studies in 31 low- and middle-income countries from 2010 to 2023 focused on preterm births, low birth weight, miscarriages, and stillbirths. Four of six studies showed an association between heat exposure and preterm births; four of five studies found an association between heat exposure and low birth weight; one of two studies found a significant association between heat and miscarriages; three of four studies showed an association between heat exposure and stillbirths. A meta-analysis could not be performed due to differences in definitions of heat exposure. None of the six studies that examined heat exposure and preterm birth was included in the two previously discussed meta-analyses.<sup>3</sup>

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A case-crossover study included 17,172 pregnant patients with placental abruption at hospitals in Quebec, Canada. A collection of FPIN's Clinical Inquiries published in AFP is available at between 1989 and 2012. It found that a maximum weekly temperature of 86°F (30°C) was associated with a higher rate of placental abruption at term (OR = 1.12; 95% CI, 1.02-1.24) compared with a maximum weekly temperature of 59°F (15°C). This was not true for preterm placental abruption (OR = 0.96; 95% CI, 0.83-1.10). The association was stronger for term pregnant patients who were younger than 35 years, nulliparous, or socioeconomically disadvantaged (as estimated from a composite index of neighborhood income, education levels, and employment). The association between heat and placental abruption was not significant in preterm pregnant patients regardless of demographics.<sup>4</sup>

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