

RESEARCH

Exposure to Heat and Cold During Pregnancy Associated with Changes in Foetal Growth

The research team observed changes in head circumference size and growth, identifying the first trimester of pregnancy, an important period for foetal brain development, as particularly vulnerable to cold temperatures

24.04.2024



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A new study led by the Barcelona Institute for Global Health (ISGlobal), a centre supported by the "la Caixa" Foundation, has investigated the relationship between **exposure to ambient air temperature and foetal size and growth during pregnancy**. The results, published in *Environment International*, show that cumulative exposure to heat and cold is associated with **changes in foetal head circumference**, a measure linked to brain development.

The study used data from **23,408 pregnant women** from three European birth cohorts: the English **Born in Bradford** cohort, the Dutch **Generation R** study, and the Spanish **INMA - Environment and Childhood** project. The UrbClim™ model was used to calculate weekly exposure to ambient temperature at the mothers' homes during pregnancy. Foetal measures from ultrasound examinations at mid and late pregnancy, including estimated foetal weight, head circumference, and femur length, were analysed. Foetal growth from mid to late pregnancy was calculated and weight, head circumference, and length at birth were also analysed.

The results showed an association between exposure to **hotter temperatures** and **larger head circumference** at late pregnancy. **Colder temperatures** were associated with **smaller head circumference** at late pregnancy and a **slower growth in head circumference** from mid to late pregnancy.

The team observed **specific periods of vulnerability to cold** during **the first trimester of pregnancy**, when several foetal brain development processes take place. Specifically, susceptibility periods for exposure to cold were identified during pregnancy weeks 1 to 7 for a smaller head circumference at late pregnancy and weeks 4 to 12 for a slower head circumference growth.

Long-term implications

The team found no associations between **ambient air temperature** and **birth outcomes**, suggesting that the effects observed during pregnancy may recover at birth. "However, the identified effects of temperature on foetal development may become more prominent in magnitude and duration, especially in the context of worsening climate change" says **Esmée Essers**, ISGlobal researcher and first author of the study.

The results of this study highlight the importance of further research into the link between temperature exposure and foetal size and growth by replicating this study in different climatic regions.

"This work is important because we need to better understand how and when temperature can affect the foetus, to identify the underlying biological mechanisms and to provide a basis for **climate change mitigation strategies** for pregnant women and their future children," says **Mònica Guxens**, ISGlobal researcher and last author of the study.

Reference

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Doi: [10.1016/j.envint.2024.108619](https://doi.org/10.1016/j.envint.2024.108619)