

Study finds that working in extreme heat puts strain on fetuses of pregnant women

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A new study reveals that the fetuses of women working in the fields in extreme heat can show signs of strain before their mothers are affected, new research has shown.

The study, which involved 92 pregnant subsistence farmers in The Gambia, is the first to measure the impacts of heat stress on the fetuses of manual workers. The research is published in *The Lancet Planetary Health*.

Findings include that for every degree Celsius increase in heat stress exposure, there was a 17% increase in fetal strain, as indicated by raised fetal heart rate and slower blood flow through the umbilical cord.

Overall, the team led by researchers at the Medical Research Council (MRC) Unit The Gambia at the London School of Hygiene & Tropical Medicine (LSHTM) and LSHTM found that even a modest rise in body temperature from performing manual tasks in extreme heat produced evidence of physiological strain in both mother and fetus.

Dr. Ana Bonell, Wellcome Trust Global Health Clinical Ph.D. Fellow at LSHTM and lead author, said, "Climate change has led to increasingly [extreme temperatures](#) worldwide and Sub-Saharan Africa is particularly vulnerable to climate impacts. Our study found that pregnant subsistence farmers in The Gambia commonly experience levels of extreme heat above recommended outdoor working limits, and that this can have significant effects on their health and the health of their babies. The results suggest we have to find effective interventions to protect these women and reduce adverse birth outcomes."

Study author Jainaba Badjie, from MRC The Gambia at LSHTM, noted, "Despite the growing scientific evidence linking maternal heat exposure to adverse birth outcomes, including [premature birth](#), [low birth weight](#), and stillbirth, up until now there has been little research into the physiological mechanisms responsible for these outcomes. We urgently need to understand these mechanisms so that we can find better ways to support mothers and babies in these conditions."

For the study, participants in West Kiang, The Gambia, were encouraged to perform their usual daily tasks during field visits and were fitted with a wearable device to record maternal heart rate, skin temperature and estimated energy expenditure.

Portable ultrasound devices were used to record fetal heart rate, umbilical artery blood flow at the start of each visit (used as the baseline), at a midpoint during a worker's shift, and then at the end of the shift.

Maternal symptoms of heat illness were also collected. Nausea, vomiting, headache, dizziness, weakness, muscle ache, fatigue, and dry mouth were common among participants, with over half of the women reporting that they experienced at least one symptom during field visits.

Analysis of the data showed strong links between heat stress exposure and maternal heat strain, which was also found to be associated with fetal strain. Maternal heat stress was also strongly linked to fetal strain even when controlling for maternal heat strain, indicating that other biological factors must be considered.

The researchers suggest that an important physiological factor to consider in future work is the diversion of blood from the placenta to the skin, which appears to occur at lower core temperatures than those highlighted by previous studies. The findings also highlight the need for further work to identify and evaluate interventions that will help pregnant agricultural workers in Sub-Saharan Africa to adapt to working in [extreme heat](#).

The authors noted several limitations to the study, including the impact of the COVID-19 pandemic on the sample size, potential acclimatization of the participants to high levels of heat stress, and the fact that the population has poorer birth outcomes than the [global average](#), which may

impact on the generalizability of the findings.

The study builds on [previous work](#) led by Dr. Bonell which involved interviews with twelve subsistence farmers in The Gambia who were either pregnant or had recently delivered, to understand their lived experiences of working in the heat.

More information: A cohort study assessing the effect of environmental heat stress on maternal physiology and fetal blood flow in pregnant subsistence farmers in The Gambia, West Africa, *The Lancet Planetary Health* (2022). [doi.org/10.1016/S2542-5196\(22\)00242-X](https://doi.org/10.1016/S2542-5196(22)00242-X) , [www.thelancet.com/journals/lan ... \(22\)00242-X/fulltext](https://www.thelancet.com/journals/lan ... (22)00242-X/fulltext)

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