

# Researchers find flooding stress impacts unborn children

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NDSU researchers have discovered differences in child development based on how close mothers are to flooding during their pregnancies. The new study found that being pregnant near flooding has an impact on child development similar to the impact of PTSD symptoms during pregnancy.

"Prenatal traumatic stress and offspring hair cortisol concentration: A nine year follow up to the Red River flood pregnancy study" was recently published in *Psychoneuroendocrinology*.

"We followed up on a study that began 11 years ago in which we found that the [major flooding](#) of 2009 in the F-M area had an impact on [pregnant women](#), specifically leading to smaller birth weight babies," said Clayton Hilmert, associate professor of psychology. "In this new study we re-recruited the mothers from the original flood study and their now 9-year-old children to see if there were any lasting effects of the floods on the children's development."

During the study, data were collected from 56 of the mothers who took part in a study of flood-related pregnancy outcomes in 2009 and their children. Data included distance of the maternal home from evacuation areas, maternal stress hormone assessments during pregnancy and child hair samples to assess production of the stress hormone, cortisol, over the past month.

The researchers found that the influence of maternal prenatal cortisol on child cortisol nine years later depended on how close mothers were to flooding during pregnancy. These effects were found after accounting for maternal age, gestational age at cortisol sampling, sex of the child, current socioeconomic status and current maternal stress.

"At greater distance from flooding and lower stress conditions, there was a [positive association](#) between maternal cortisol and child cortisol. In contrast, living closer to flooding, with higher stress conditions, produced a significant negative association between maternal and [child](#) cortisol," Hilmert said.

The study concluded that experiencing a traumatic stressor during pregnancy may alter maternal-fetal programming of the hypothalamic-

pituitary-adrenal axis, which produces cortisol in response to stress. The direct threat of flooding led to offspring cortisol concentrations that resembled [cortisol](#) production seen in mothers with symptoms of PTSD and their offspring.

**More information:** Anna M. Strahm et al. Prenatal traumatic stress and offspring hair cortisol concentration: A nine year follow up to the Red River flood pregnancy study, *Psychoneuroendocrinology* (2020). [DOI: 10.1016/j.psyneuen.2019.104579](https://doi.org/10.1016/j.psyneuen.2019.104579)

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