

In-utero exposure to magnetic fields associated with increased risk of obesity in childhood

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In-utero exposure to relatively high magnetic field levels was associated with a 69 percent increased risk of being obese or overweight during childhood compared to lower in-utero magnetic field levels, according to a Kaiser Permanente study that appears in the current online version of Nature's *Scientific Reports*.

Researchers conducted the [prospective cohort study](#), in which participating women in Kaiser Permanente's Northern California region carried a meter measuring magnetic field levels during pregnancy and 733 of their children were followed up to 13 years, to collect clinically recorded information on growth patterns. On average, 33 weight measurements per child were collected.

Researchers noted a dose response relationship with increasing in-utero magnetic field levels being associated with further [increased risk](#) of obesity or being overweight. The observed association and supporting evidence provide the first epidemiologic findings that link increasing exposure to environmental magnetic fields, especially in-utero exposure, over the last few decades with the rapid rise in [childhood obesity](#) during the corresponding decades, according to the authors.

"Pregnancy is a critical [developmental stage](#) that is among the most vulnerable periods to [environmental exposures](#)," said De-Kun Li, MD, PhD, a perinatal epidemiologist with the Kaiser Permanente Northern

California Division of Research in Oakland, Calif., and the lead author of the study. "These findings indicate that electromagnetic fields, from microwave ovens to countless wireless devices, may be contributing to childhood obesity risk. This finding could have implications for possibly reducing childhood obesity and better understanding the [obesity epidemic](#). Like any [scientific discoveries](#), the results need to be replicated by other studies."

After controlling for a child's age at each weight measurement, [child gender](#), maternal age at delivery, pre-pregnancy BMI, race, education level, [smoking during pregnancy](#) and breastfeeding, researchers reported a 50 percent increase of participants being obese or overweight for medium in-utero levels (1.5-2.5 mG), and an 84 percent increased risk for high in-utero levels (>2.5mG). An mG, or milligauss, represents a unit of [magnetic field](#) level or strength as measured using a gaussmeter.

This study follows previous work from Dr. Li (and others) that showed electromagnetic fields may impact pregnancy outcomes and childhood diseases including asthma. Higher EMF levels have also been associated with diabetes in humans, being overweight and high glucose levels in animals, and ADHD in mice offspring, explained Dr. Li.

In the current study, among those children with longer follow-up time (to the end of the study), the observed association was stronger (2.35 times the risk of childhood obesity/overweight for in-utero MF level > 1.5 mG vs. ≤ 1.5 mG). Similarly, if the study only considered those who were persistently obese/overweight through childhood during the follow-up, the association was also much stronger (almost 5 fold increased risk of obesity/overweight for in-utero MF level > 1.5 mG vs.

"EMF exposure during pregnancy could impact the fetal development, including endocrine and metabolic systems, predisposing offspring to higher risk of obesity," Dr. Li said. He added that environmental impacts

tend to be amplified during fetal development both in terms of affecting multiple organ systems and having long-lasting changes to physiology, such as to the endocrine systems and hormone receptors.

Researchers examined maternal factors, prenatal factors, childhood factors, outcome measures, and other factors that could be confounders. Among 18 factors examined, only family income and [childhood](#) habits of eating fruits and vegetables varied among the three maternal MF exposure groups. However, there was not consistent pattern of MF exposure with family income: women with either low or high family income had lower MF exposure level than women with medium family income. Children eating more fruits and vegetables tended to have a mother who had higher MF exposure during pregnancy. There was no difference among the three MF [exposure](#) groups in the average number of weight measurements per child. The proportion of children who remained in the Kaiser Permanente Northern California integrated care delivery system at the end of the study (11 years and older) was almost identical in all three groups. None of the 18 factors examined could explain the observed association.

"Expectant mothers should take this new research into account, but they should not panic," said Ruth Shaber, MD, medical director of the Center for Healthcare Delivery at the Kaiser Permanente Care Management Institute. "We still have a lot more to learn about the impact of the environment on pregnancy and young children."

Provided by Kaiser Permanente

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