Supporting childbearing women to maintain a healthy weight could reduce the risk of pregnancy complications, study finds

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Supporting women of childbearing age to have a healthy weight could reduce the risk of several pregnancy complications, new research led by

the University of Bristol has found. The international collaborative study is published in *BMC Medicine*.

In the last decades, people across the world have become more obese, including women of child-bearing age. Research has already identified correlations between a mother's weight and pregnancy complications.

However, in some instances, it was unclear whether these correlations are because being heavier causes them, or because of something else that influences body weight and pregnancy complications. For example, education or lifestyle factors could be linked to mother's weight and pregnancy complications, confounding researchers into thinking there might be a causal relationship between the two. The new research addresses previous confounding issues and identifies clearer causal links between increased maternal weight and pregnancy complications.

Dr. Carolina Borges, Vice-Chancellor's Fellow at the University of Bristol and one of the study's corresponding author, said, "Understanding the impact of a mother's pre-pregnancy weight on pregnancy and perinatal health is key to advising future policies and ensuring women of childbearing age live healthy lives."

Dr. Janine Felix, Associate Professor and Epidemiologist in the Department of Paediatrics at Erasmus MC, added, "It is important to better understand this, because being overweight occurs frequently in women of childbearing age and this work shows that having a healthy weight may improve health outcomes of mothers and children."

The aim of the study was to try and better understand the effect of higher mothers' weight on a wide range of pregnancy-related complications. The researchers used mothers' body mass index (BMI) as it is the most common way of measuring a healthy weight because it adjusts weight for a person's height.

To improve current evidence, the investigators used three different methodologies, with different strengths and weaknesses, and combined data from more than 400,000 mothers from 14 studies in Europe and North America. The different methods included analyses similar to previous studies, which might be limited by confounding factors.

In addition, researchers compared results from that method to results of the correlation of father's BMI with the pregnancy complications. If the results in mothers are truly causal, the researchers would not expect to see a corelation in fathers. If they do, then it suggests both mothers and fathers' results are confounded. Lastly, genetic analyses, called Mendelian randomization, which are unlikely to be affected by confounding, were used.

The study found higher mothers' BMI has an impact in 14 out of 20 pregnancy complications studied, including the risk of high blood pressure in pregnancy, pre-eclampsia, pregnancy diabetes, and complications of delivery, such as needing a cesarean section or induction of labor, having heavier babies and neonatal intensive care unit admission. For example, for each one kg/m^2 increase in maternal BMI, there was a 10% increased risk of pre-eclampsia.

However, mothers with a higher BMI had a lower risk of having anemia during pregnancy or low birthweight babies. For example, for each one kg/m^2 increase in maternal BMI, there was a 4% decreased risk of having a low birthweight baby.

Deborah Lawlor, Professor of Epidemiology, MRC Investigator and BHF Chair at the University of Bristol and corresponding author on the study, said, "By comparing results from different methods that have different limitations we have more confidence when all three agree that we have the causal effect."

Contrary to previous studies, the research suggests that mothers' higher BMI did not seem to influence depression. The study also observed conflicting results for miscarriage, stillbirth and preterm births between the different methodologies, indicating that these require further investigation in future studies.

Dr. Gemma Clayton, Research Fellow in Health Data Science at the University of Bristol, said, "It has been amazing to be a part of an international collaboration where we have been able to use data from different countries and apply methods with different limitations that focus on the same research question. This has helped us to make robust and reliable inferences to hopefully impact future policies and improve public health."

Dr. Rachel Freathy, Associate Professor and Wellcome Trust Senior Research Fellow at the University of Exeter, explained, "A lot of research has identified correlations between a mother's weight and health conditions in pregnancy, but these can make it very difficult to determine what is cause and what is effect, creating a confusing picture for mothers, clinicians and health care workers. We used a range of more robust approaches, giving clear evidence of where the mother's weight caused the health condition and where it did not."

Dr. Maria C. Magnus, Senior Researcher at the Centre for Fertility and Health at the Norwegian Institute of Health, highlighted, "It is fantastic to be able to combine data from several cohorts to produce robust scientific evidence regarding this important research question."

Dr. Carolina Borges from the University of Bristol added, "The world is facing a serious rise in obesity. Our modern environments often make it really challenging for people to keep a healthy weight. This is partly because we have easy access to high-calorie, low-nutrient foods, but limited access to healthy food and physical activity. We need

governments to implement comprehensive public policies, addressing food systems, physical activity promotion, urban planning, and advertising regulations, to enable people, including mothers-to-be, to live healthier lives."

Next steps for the research are to carry out larger studies for rare complications and include women from different populations outside of Europe and North America.

This research has been undertaken with collaboration from a large number of scientists and the involvement of participants from several countries.

More information: Maria Carolina Borges et al, Integrating multiple lines of evidence to assess the effects of maternal BMI on pregnancy and perinatal outcomes, *BMC Medicine* (2024). DOI: 10.1186/s12916-023-03167-0

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