

Obesity in pregnant women associated with a 3.5-times increased risk of type 2 diabetes in the child

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Obesity during pregnancy is associated with a 3.5-times increased future risk of type 2 diabetes (T2D) in the child, concludes new research published in *Diabetologia* (the *journal of the European Association for the Study of Diabetes*). If the pregnant woman is overweight rather than obese, the increased risk of T2D in the child is 40%. The study says strategies to reduce obesity and overweight in women of reproductive age are urgently required.

The short-term complications of maternal obesity are well recognised—including [gestational diabetes](#) (diabetes in the mother during [pregnancy](#)); pre-eclampsia; larger infants and higher likelihood of Caesarian delivery. In addition, there is now an increasing awareness that there are longer term health problems for infants born to obese mothers; for example, increased risk of premature cardiovascular disease and premature mortality.

Previous studies have indicated a link between maternal obesity and diabetes in the offspring, but have been limited in scope—for example by being based on diabetes diagnosis via medication use (thereby excluding individuals who control the condition using diet alone); or by age range.

This study, conducted by Professor Rebecca Reynolds, University of Edinburgh, UK and colleagues, examined the link between maternal body mass index (BMI) and the risk of the offspring developing a clinically confirmed diagnosis of diabetes (however treated) right up to adulthood.

The study linked birth records of 118,201 children from 1950 to 2011 in the Aberdeen Maternity and Neonatal Databank (AMND), a unique databank of diverse obstetric information, with data from Scottish Care Information (SCI)-Diabetes, the

national register for diagnosed diabetes in Scotland. The analysis adjusted for potential confounding factors, including maternal history of diabetes before pregnancy, maternal age at delivery, area-based [socioeconomic status](#), parity (number of full-term pregnancies for a particular mother), the stage of the pregnancy when the mother's weight was measured, maternal history of high blood pressure, and the sex of the child. The data showed that 25% of the pregnant women were overweight and 10% were obese across all years studied. However, the proportion of obese mothers has increased 5-fold from the years 1950-1959 (3%) to the years 2000-2011 (16%).

Compared with normal weight mothers, being overweight or obese during pregnancy was associated with a significantly increased risk of any diabetes (type 1 or type 2) in the child, with an increased risk of 26% for [overweight mothers](#) and 83% for obese mothers. However, when looking only at type 2 diabetes, the increased risks were even higher. Being an obese mother was associated with a 3.5 times increased risk of T2D in the child, while for overweight mothers, the associated increased risk was 40%.

The underlying mechanism for the association between high maternal BMI and offspring type 2 diabetes is unknown. One theory is that obesity in the mother produces an adverse in-utero environment, with high levels of glucose, insulin and other metabolites leading to a 'programming' of adverse metabolic outcomes for the offspring (the fetal over nutrition hypothesis). In addition, there are complex neuroendocrine, metabolic and immune/ inflammatory changes associated with obesity in pregnancy that are likely to impact on hormonal exposure and nutrient supply to the fetus. Epigenetic changes (metabolic changes that switch genes on or off) in the intrauterine environment in

[obese mothers](#) may also cause stress on the insulin (2019). [DOI: 10.1007/s00125-019-4891-4](https://doi.org/10.1007/s00125-019-4891-4)
producing beta cells in the pancreas of the unborn child, which can then lead to earlier onset of type 2 diabetes and raised cardiometabolic risk. Further research is needed to definitively explain these relationships.

Provided by Diabetologia

The authors note several limitations to their study, including that it did not include data on the BMI of the offspring or of lifestyle factors such as diet and exercise, which in themselves are known to increase the risk of type 2 diabetes. It is plausible, the authors suggest, that the link between high maternal BMI and offspring diabetes may be caused by increased BMI in the child, either because of antenatal programming or because of a shared lifestyle between mother and child.

They say: "This large cohort study, using over 60 years of pregnancy data linked to the national diabetes dataset in Scotland, showed a significant association between maternal BMI and incidence of diabetes in the offspring. This association may partly explain the link between being overweight or obese during pregnancy and offspring cardiovascular disease and mortality rates—highlighting a potential target for intervention."

They add: "With the rising prevalence of being overweight/obese in women of childbearing age—for example, recent data indicated that over 60% of women in the USA were overweight or obese at the time of conception—our findings have profound public health implications. There is an urgent need to establish effective approaches to prevention of obesity and [diabetes](#) among [mothers](#) and their [offspring](#)...pregnancy represents a potential time to intervene with health advice for the family".

In the UK, data suggest around half of all women of childbearing age (covering age 16-44 years) are overweight or obese. Looking only at women aged 25-44 years, this proportion of overweight / obese women is almost 60%.

More information: Marius Lahti-Pulkkinen et al. Consequences of being overweight or obese during pregnancy on diabetes in the offspring: a record linkage study in Aberdeen, Scotland, *Diabetologia*

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