

## Women's Heart Health and Pregnancy Outcomes



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A study of more than 18 million pregnancies shows a strong and graded relationship between women's heart health and pregnancy outcomes. The research is published in the *European Journal of Preventive Cardiology*.

The researchers examined the presence of four risk factors for cardiovascular disease in women prior to pregnancy: unhealthy body weight, smoking, hypertension and diabetes. The likelihood of key pregnancy complications – maternal intensive care unit (ICU) admission, preterm birth, low birthweight and foetal death – rose incrementally with the number of pre-pregnancy cardiovascular risk factors.

“Individual cardiovascular risk factors, such as obesity and hypertension, present before pregnancy have been associated with poor outcomes for both mother and baby,” said study author Dr. Sadiya Khan, Northwestern University Feinberg School of Medicine, Chicago, US. “Our study now shows a dose-dependent relationship between the number of risk factors and several complications. These data underscore that improving overall heart health before pregnancy needs to be a priority.”

The study was a cross-sectional analysis of maternal and foetal data from the US National Center for Health Statistics (NCHS), which collects information on all live births and foetal deaths after 20 weeks' gestation. Individual-level data was pooled from births to women aged 15 to 44 years from 2014 to 2018.

Information was collected on the presence or absence of four cardiovascular risk factors before pregnancy: body mass index (BMI; under 18.5 kg/m<sup>2</sup> or over 24.9 kg/m<sup>2</sup>), smoking, hypertension and diabetes. Women were categorised as having 0, 1, 2, 3, or 4 risk factors. The researchers estimated the relative risks of maternal ICU admission, preterm birth (before 37 weeks), low birthweight (under 2500 g), and foetal death associated with risk factors (1, 2, 3, or 4) compared with no risk factors (0). All analyses were adjusted for maternal age at delivery, race/ethnicity, education, receipt of prenatal care, parity, and birth plurality.

A total of 18,646,512 pregnancies were included in the analysis. The average maternal age was 28.6 years. More than 60% of women had one or more pre-pregnancy cardiovascular risk factors, with 52.5%, 7.3%, 0.3%, and 0.02% having 1, 2, 3, and 4 risk factors, respectively.

Compared to women with no pre-pregnancy risk factors, those with all four risk factors (3,242 women) had an approximately 5.8-fold higher risk for ICU admission, 3.9-fold higher risk for preterm birth, 2.8-fold higher risk for low birthweight, and 8.7-fold higher risk for foetal death.

There were graded associations between increasing numbers of pre-pregnancy risk factors and a higher likelihood of adverse outcomes. For example, compared to women with no risk factors, the risk ratio for maternal ICU admission was 1.12 for one risk factor, 1.86 for two risk factors, 4.24 for three risk factors, and 5.79 for four risk factors.

The analysis was repeated in women having their first baby (women with previous pregnancies were excluded) – with consistent results. “We conducted this analysis since women with a complicated first pregnancy are more likely to have complications in subsequent pregnancies,” said Dr. Khan. “In addition, gestational weight gain can lead to a higher BMI going into the next pregnancy. We saw very similar results which strengthens the findings in the full cohort.”

She continued: “Levels of pre-pregnancy obesity and high blood pressure are rising and there are some indications that women are acquiring

cardiovascular risk factors at earlier ages than before. In addition, pregnancies are occurring later in life, giving risk factors more time to accumulate. Taken together, this has created a perfect storm of more risk factors, earlier onset, and later pregnancies.”

Dr. Khan concluded: “The findings argue for more comprehensive pre-pregnancy cardiovascular assessment rather than focussing on individual risk factors, such as BMI or blood pressure, in isolation. In reality not all pregnancies are planned, but ideally we would evaluate women well in advance of becoming pregnant so there is time to optimise their health. We also need to shift our focus towards prioritising and promoting women’s health as a society – so instead of just identifying hypertension, we prevent blood pressure from becoming elevated.”

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Published on : Tue, 27 Jul 2021