A baby's sex determines how they will respond to exposures during pregnancy.from shutterstock.com

Men and women respond differently to diseases and treatments for biological, social and psychological reasons. In this series on Gender Medicine , experts explore these differences and the importance of approaching treatment and diagnosis through a gender lens.

We all know girls and boys are different. These differences include behaviour, DNA, hormones and risk of disease, to name a few. Differences between boys and girls start very early in life, well before the sex-specific organs form.

Our DNA is responsible for a lot that happens in our bodies. A key difference between men and women are the sex chromosomes . Women have two X chromosomes and men have an X and a Y chromosome. Whether you're an XX or XY will determine how you grow and respond to different exposures during pregnancy.

In a minority of the population, people with either XX (girl) or XY (boy) chromosomes may develop in a way atypical for the sex these combinations usually determine. But, for the purposes of this article, we will talk about the typical traits found in XX and XY chromosome babies.

Read more: ***Boy, girl or …? Dilemmas when sex development goes awry***

The fetus is influenced by its environment and what it is exposed to. These exposures, such as what the mum eats and whether she smokes or drinks, alter the fetus’s immediate health , but also increase their risk of diabetes or heart disease in adulthood.

For example, babies that have a low birth weight and grow slowly are more likely to have heart disease or type 2 diabetes as adults. The impacts of what the baby experiences while in the womb on their health as adults is known as the Barker hypothesis .

A well-known example of this is the Dutch famine of 1944-45. This resulted in five to six months of calorie restriction for the affected population. Studies show mothers who faced calorie restriction early in pregnancy (the first 13 weeks) had a child who was more likely to suffer from heart disease as an adult. The children of those who were in the later stages of pregnancy during the famine (the last 13 weeks of pregnancy) were more likely to develop type 2 diabetes in adulthood.

A child is affected by what they are exposed to as a fetus.from shutterstock.com

Exposures during pregnancy

Smoking during pregnancy is more likely to result in the birth of a small baby. It is also associated with behavioural problems in infancy and adolescence, as well as adverse health outcomes such as birth defects, asthma and allergies. But the impacts of these exposures during pregnancy, as well as their severity, depend on the sex of the baby.

A recent Finnish study examined how maternal smoking affected children's mental health at ages 25 to 27. It found adult men whose mothers smoked during pregnancy had worse problem-solving skills and vocabulary than men not exposed to maternal smoking. But no

negative effects were seen in the female children of mothers who smoked.

Read more: ***Passing on taste: how your mum’s diet affects what you eat***

Too much exposure to heavy metals – such as cadmium – during pregnancy is associated with adverse health effects in children including cancer, diabetes and heart disease. Pregnant women can be exposed to heavy metals through work and manufacturing processes, as well as smoking and diet.

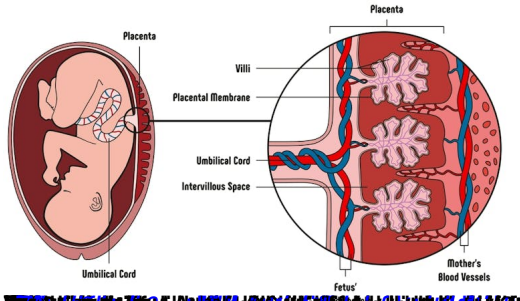
One study of more than 3,800 women and children showed higher levels of cadmium in the mum's blood at 9-13 weeks of pregnancy were associated with smaller female babies – but there was no impact on males.

Many other studies show how different sexes may respond differently to adverse exposures during pregnancy. These studies are difficult to explore in humans due to the number and range of adverse exposures one accumulates after birth. So they only offer associations between the two events, rather than evidence one caused the other.

For instance, studies of genetically identical twins show, as adults, one twin may develop type 2 diabetes or heart disease while the other twin remains healthy. Although the twins shared an identical environment in the womb, their different environments after birth meant they were exposed to different things as they aged.

The role of the placenta

Sex differences in response to adverse exposures during pregnancy may be mediated by the placenta. The placenta connects the developing fetus to the mother's uterus, ensuring the baby receives the nutrients it needs. It also takes care of waste, gases and hormone production. The placenta actually has the same DNA sequence as the baby, not the mother.


Placenta
Umbilical Cord
Placenta
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Umbilical Cord
Intervillous Space
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Mother's
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