

# Alcohol and pregnancy: an evidence summary

## Key points

- Alcohol consumption during pregnancy can increase the risk of miscarriage, premature birth, stillbirth, low birthweight, as well as being born small for gestational age.
- Prenatal alcohol exposure can also disrupt the development of all organs and systems in the developing body and can result in neurobehavioural and physical outcomes collectively known as Fetal Alcohol Spectrum Disorder (FASD).
- The risk of harm to the fetus from alcohol exposure increases proportionately with the amount of alcohol consumed and the frequency of alcohol consumption.
- Alcohol consumption has been shown to alter the placental vasculature, reduce placental weight and increase the risk of placental abruption.
- The placenta is not a barrier to alcohol entering the fetal circulation, where it reaches equilibrium with maternal blood alcohol concentration within an hour.
- Timing and dose of alcohol exposure both impacts the type of fetal organs and systems effected, as well as the extent to which they are affected.
- All types of alcohol have the potential to damage the developing baby, be it wine, beer or spirits, and no threshold level or amount of alcohol has been established as safe during pregnancy.

## Women who are pregnant or planning a pregnancy should not drink alcohol.

*National Health and Medical Research Council (NHMRC) Australian Guidelines to Reduce Health Risks from Drinking Alcohol, 2020<sup>1</sup>*

## Alcohol consumption during pregnancy

The National Health and Medical Research Council's Australian Guidelines to Reduce Health Risks from Drinking Alcohol (2020) recommend that women who are pregnant or planning a pregnancy should not drink alcohol.

Alcohol is a teratogenic substance that crosses the placenta to the embryo or fetus, potentially affecting the development of all organs and systems of the body. All types of alcohol, be it wine, beer, or spirits, can impact on the development of the baby, and no threshold level or amount of alcohol has been established as safe during pregnancy.<sup>2</sup>

Alcohol consumption during pregnancy can:

- increase the risk of miscarriage and stillbirth<sup>3</sup>
- increase the risk of premature birth, low birth weight, and being born small for gestational age<sup>4</sup>

- disrupt the development of all organs and systems of the body, resulting in an array of neurobehavioural and physical outcomes collectively known as Fetal Alcohol Spectrum Disorder (FASD).<sup>5,6</sup>

The risk of harm to the fetus from alcohol exposure increases proportionately, from zero, with the amount of alcohol consumed and the frequency of alcohol consumption.<sup>7</sup>

## Prevalence of prenatal alcohol use in Australia



Results from the National Drug and Alcohol Survey (2019) indicate that up to 35 per cent of women surveyed consumed alcohol while pregnant. Of this group, approximately one in two (55 per cent) consumed alcohol before they knew they were pregnant, and this declined to 14.5 per cent once they knew they were pregnant.<sup>8</sup> Overall, those who report alcohol exposure during pregnancy are more likely to be older, married, of higher education, and Caucasian.<sup>9,10</sup>

## The effects of alcohol exposure early in pregnancy

During the early weeks of pregnancy, the developing embryo is particularly vulnerable to the effects of alcohol. Alcohol exposure can alter the development of cells that go on to form the placenta as well as cells that will later give rise to the fetus. The developing fetus is most vulnerable to structural damage during the first three to six weeks of gestation.<sup>11</sup>

Alcohol can alter the placental vasculature, reduce placental weight, and increase the risk of placental abruption.<sup>12</sup> Optimal placental function is essential as it ensures adequate supply of oxygen and nutrients for the development of the embryo and later the fetus.

## The effects of alcohol exposure later in pregnancy

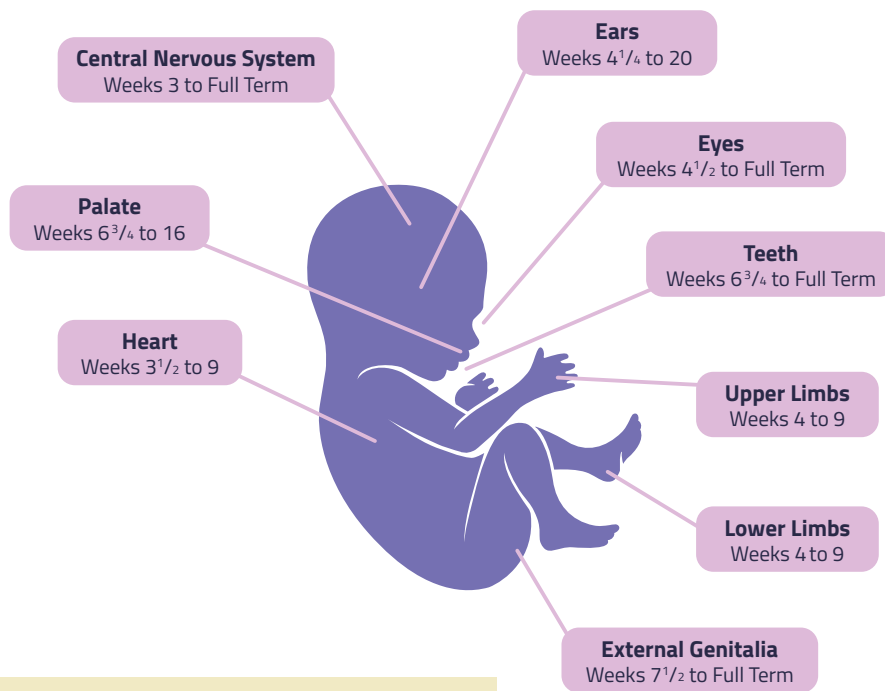
Alcohol can affect the fetus both directly, by causing abnormal growth and development of the brain and other fetal organs and systems of the body, as well as indirectly, through impacts on placental development.

The placenta is not a barrier to alcohol entering the fetal circulation, where it reaches equilibrium with maternal blood alcohol concentration within an hour.<sup>13</sup> The fetus has limited capacity for alcohol metabolism and therefore, alcohol is excreted unchanged into the amniotic fluid. Subsequent fetal swallowing of amniotic fluid containing alcohol prolongs the duration of the exposure.

Timing and dose of alcohol exposure both impacts the type of fetal organs and systems affected, as well as the extent to which they are affected.

For example, if alcohol exposure occurs while the heart or kidneys are developing, this may result in congenital defects of these organs. Brain development, which continues throughout pregnancy and into the early years of childhood, may be impacted by alcohol exposure at any time during pregnancy.





**Figure 1. Periods of Fetal Development<sup>14</sup>**

## Alcohol exposure and birth-related risks

Decades of research into the effects of prenatal alcohol exposure has provided strong evidence that alcohol, at any time during pregnancy can increase the risk of adverse birth outcomes. A systematic review of 36 studies of maternal alcohol consumption found a strong association between increasing amounts of alcohol consumption and the risk of babies being small for gestational age, a premature birth or low birthweight.<sup>4</sup>

A study examining data from over 650,000 pregnancies found a 40 per cent increase in likelihood of stillbirth for women who consumed any amount of alcohol compared with those who did not consume alcohol at all. The results demonstrated a dose-response relationship between alcohol and risk of stillbirth, with those who consumed five or more drinks per week during pregnancy experiencing a 70 per cent higher risk of stillbirth compared with those who did not consume any alcohol.

## Fetal Alcohol Spectrum Disorder (FASD)

Prenatal alcohol exposure can disrupt the development of all the organs and systems in the body and can result in an array of neurobehavioural and physical outcomes collectively known as Fetal Alcohol Spectrum Disorder (FASD).<sup>6</sup> FASD is a lifelong condition where individuals can experience challenges in a range of different domains including executive functioning, language development, learning and memory, adaptive functioning, and academic performance.

FASD presentations are diverse due to the wide range of paternal, maternal and child factors that influence prenatal development, coupled with differences in dose and timing of prenatal alcohol exposure.<sup>15</sup>

More recently, clinical FASD research has focused on the potential physical health impacts of prenatal alcohol exposure. A series of systematic reviews reported evidence for cardio-renal dysfunction, adverse reproductive outcomes, and impacts on metabolic health associated with prenatal alcohol exposure.<sup>16,17,18</sup> People living with FASD can experience increased rates of asthma, as well as eye, skin and heart conditions, compared with the general population.<sup>19</sup>

# The risks of low levels of alcohol exposure during pregnancy

While the risk of adverse pregnancy and birth outcomes increases with higher amounts and frequency of alcohol exposure, there is no established safe level of alcohol consumption during pregnancy and when planning a pregnancy.

There is some evidence to suggest that low levels of prenatal alcohol exposure can increase the risk of preterm birth.<sup>20,21</sup> Lower levels of prenatal alcohol exposure have also been associated with mild longer-term changes to neurodevelopment, including behaviour and cognition.<sup>22</sup> Studies using preclinical models have provided some evidence that prenatal alcohol exposure at low levels can predispose individuals to developing chronic health conditions in the future.<sup>23,24</sup>

A variety of maternal and fetal factors, including genetics, metabolic rates and maternal diet can influence the risks from drinking alcohol when pregnant, making it impossible to predict the exact level of risk in individual pregnancies.<sup>25,26</sup>

This is why the NHMRC Guidelines have recommended that women who are pregnant or planning a pregnancy should not drink alcohol.

## More information and support



### NHMRC Australian Guidelines to Reduce Health Risks from Drinking Alcohol (2020)

The National Health and Medical Research Council's guidelines provide health professionals, policy makers and the Australian community with evidence-based advice on the health effects of drinking alcohol:

[nhmrc.gov.au/health-advice/alcohol](https://www.nhmrc.gov.au/health-advice/alcohol)

### Alcohol and other drugs

The National Alcohol and Other Drug Hotline offers support, information, counselling and referral to services for individuals, family and friends, General Practitioners and other health professionals:

**1800 250 015** or [drughelp.gov.au](https://www.drughelp.gov.au)

### Talking to people who are pregnant about their alcohol consumption

The Women Want to Know resources can assist with having conversations with people about alcohol and pregnancy: [health.gov.au/resources/collections/women-want-to-know-resources](https://www.health.gov.au/resources/collections/women-want-to-know-resources)

### Fetal Alcohol Spectrum Disorder (FASD)

To learn more about FASD visit the FASD Hub: [fasdhub.org.au](https://www.fasdhub.org.au) and NOFASD's website: [nofasd.org.au](https://www.nofasd.org.au) or call the NOFASD helpline on **1800 860 613**

### Trauma-informed information and resources

To learn more about trauma-informed practice, you can visit the Blue Knot Foundation: [blueknot.org.au/resources/publications/practice-guidelines](https://www.blueknot.org.au/resources/publications/practice-guidelines). You can also visit New Terrain to find tools to integrate trauma and gender informed responses into substance use practice and policy: [bccewh.bc.ca/wp-content/uploads/2018/06/NewTerrain\\_FinalOnlinePDF.pdf](https://www.bccewh.bc.ca/wp-content/uploads/2018/06/NewTerrain_FinalOnlinePDF.pdf)



Learn more about alcohol, pregnancy, breastfeeding and Fetal Alcohol Spectrum Disorder at  
**everymomentmatters.org.au**

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Learn more about FARE at **fare.org.au**

## References

- <sup>1</sup>National Health and Medical Research Council, Australian Research Council and Universities Australia. (2020). Australian Guidelines to Reduce Health Risks from Drinking Alcohol. Canberra, ACT: Commonwealth of Australia, Canberra.
- <sup>2</sup>National Health and Medical Research Council, Australian Research Council and Universities Australia. (2020). Australian Guidelines to Reduce Health Risks from Drinking Alcohol. Canberra, ACT: Commonwealth of Australia, Canberra
- <sup>3</sup>Bailey, B. A., & Sokol, R. J. (2011). Prenatal alcohol exposure and miscarriage, stillbirth, preterm delivery, and sudden infant death syndrome. *Alcohol Research & Health*, 34(1), 86-91.
- <sup>4</sup>Patra, J., Bakker, R., Irving, H., Jaddoe, V. W., Malini, S., Rehm, J. (2011). Dose-response relationship between alcohol consumption before and during pregnancy and the risks of low birthweight, preterm birth and small for gestational age (SGA). A systematic review and meta-analyses. *BJOG*, 118, 1411-21.
- <sup>5</sup>Caputo, C., Wood, E., & Jabbour, L. (2016). Impact of fetal alcohol exposure on body systems: A systematic review. *Birth defects research Part C. Embryo Today*, 108(2), 174-80.
- <sup>6</sup>Mattson, S. N., Bernes, G.A., Doyle, L. R. (2019). Fetal alcohol spectrum disorders: A review of the neurobehavioral deficits associated with prenatal alcohol exposure. *Alcohol Clin Exp Res*, 43(6), 1046-1062.
- <sup>7</sup>O'Leary, C. M., Bower, C., Zubrick, S. R., et al (2010). A new method of prenatal alcohol classification accounting for dose, pattern and timing of exposure: improving our ability to examine fetal effects from low to moderate alcohol. *Journal of Epidemiology & Community Health*, 64, 956-962.
- <sup>8</sup>Australian Institute of Health and Welfare. (2020). National Drug Strategy Household Survey 2019: Drug Statistics series no. 32. PHE 270. Canberra, ACT: AIHW.
- <sup>9</sup>Cameron, C. M., Davey, T. M., Kendall, E., Wilson, A., & Mc Clure, R. J. (2013). Changes in alcohol consumption between 2007 and 2011. *The Medical Journal of Australia*, 199(5), 355-357.
- <sup>10</sup>Stanesby, O., Cook, M., & Callinan, S. (2018). Examining trends in alcohol consumption during pregnancy in Australia, 2001 to 2016. Canberra: Foundation for Alcohol Research and Education.
- <sup>11</sup>O'Leary, C.M. (2004) Fetal alcohol syndrome: diagnosis, epidemiology, and developmental outcomes. *J Paediatr Child Health*, 40, 2-7.
- <sup>12</sup>Steane, S. E., Young, S. L., Clifton, V. L., Gallo, L. A., Akison, L. K., Moritz, K. M. (2021). Prenatal alcohol consumption and placental outcomes: A systematic review and meta-analysis of clinical studies. *Am J Obstet Gynecol*.
- <sup>13</sup>Burd, L., Roberts, D., Olson, M., & Odendaal, H. (2007). Ethanol and the placenta: A review. *The Journal of Maternal Fetal & Neonatal Medicine*, 20(5), 361-75
- <sup>14</sup>Centres for Disease Control and Prevention. (n.d.) An Alcohol-free Pregnancy is the Best Choice for your Baby. [https://www.cdc.gov/ncbddd/fasd/documents/fasdbrochure\\_final.pdf](https://www.cdc.gov/ncbddd/fasd/documents/fasdbrochure_final.pdf)
- <sup>15</sup>Ehrhart, F., Roozen, S., Verbeek, J. et al. (2019). Review and gap analysis: Molecular pathways leading to fetal alcohol spectrum disorders. *Mol Psychiatry*, 24, 10-17.
- <sup>16</sup>Reid, N., Akison, L. K., Hoy, W. & Moritz, K. M. (2019). Adverse health outcomes associated with fetal alcohol exposure: a systematic review focused on cardio-renal outcomes. *J Stud Alcohol Drugs* 80(5) 515-523.
- <sup>17</sup>Akison, L., Moritz, K. & Reid, N. (2019). Adverse reproductive outcomes associated with fetal alcohol exposure: A systematic review. *Reproduction* 157(4) 329-343
- <sup>18</sup>Akison, L. K., Reid, N., Wyllie, M., Moritz, K. M. (2019). Adverse health outcomes in offspring associated with fetal alcohol exposure: A systematic review of clinical and preclinical studies with a focus on metabolic and body composition outcomes. *Alcohol Clin Exp Res*, 43, 1324-43.
- <sup>19</sup>Reid, N., Hayes, N., Young, S. B., Akison, L. K. & Moritz, K. M. (2020). Caregiver-reported physical health status of children and young people with fetal alcohol spectrum disorder. *J Dev Orig Health Dis*, 12(3) 1-8.
- <sup>20</sup>Miyake, Y., Tanaka K., Okubo, H., Sasaki, S., & Arakawa, M. (2014). Alcohol consumption during pregnancy and birth outcomes: the Kyushu Okinawa Maternal and Child Health Study. *BMC Pregnancy and Childbirth*, 14(1), 79.
- <sup>21</sup>Lundsberg, L. S., Bracken, M. B., & Saftlas, A. F. (1997). Low-to-moderate gestational alcohol use and intrauterine growth retardation, low birthweight, and preterm delivery. *Annals of Epidemiology*, 7(7), 498-508.
- <sup>22</sup>Lees, B., Mewton, L., Stapinski, L. A., Teesson, M., & Squeglia, L. M. (2020). Association of prenatal alcohol exposure with preadolescent alcohol sipping in the ABCD study®. *Drug Alcohol Dependence*, 214, 108187.
- <sup>23</sup>Nguyen, T. M. T., Steane, S. E., Moritz, K. M., & Akison, L. K. (2019). Prenatal alcohol exposure programmes offspring disease: Insulin resistance in adult males in a rat model of acute exposure. *The Journal of Physiology*, 597(23), 5619-37.
- <sup>24</sup>Walton, S. L., Tjongue, M., Tare, M., Kwok, E., Probyn, M., Parkington, H. C., et al. (2019). Chronic low alcohol intake during pregnancy programs sex-specific cardiovascular deficits in rats. *Biology of Sex Differences*, 10(1), 21.
- <sup>25</sup>Ehrhart, F., Roozen, S., Verbeek, J. et al. (2019). Review and gap analysis: Molecular pathways leading to fetal alcohol spectrum disorders. *Molecular Psychiatry*, 24, 10-17.
- <sup>26</sup>McQuire, C., Daniel, R., Hurt, L., Kemp, A., & Paranjothy, S. (2020). The causal web of foetal alcohol spectrum disorders: A review and causal diagram. *European Child & Adolescent Psychiatry*, 29, 575-594.