The determinants of health and individual human development during the prenatal stage

WHY IS THIS IMPORTANT?
The determinants of health and individual human development are important during the prenatal stage because they significantly influence the health and development of both the pregnant woman and her unborn baby. How effectively the body functions, the lifestyle choices made by parents, the physical environment in which parents live and social determinants such as the education of parents can have an effect on health and individual human development during the prenatal stage.

The determinants of health and development are vital in understanding the range of health issues that can impact on pregnant women and unborn babies, including spina bifida, low birth weight, foetal alcohol syndrome (or foetal alcohol spectrum disorder) and gestational diabetes. Understanding how the determinants act as risk and protective factors allows a range of government, community and personal strategies and programs to be implemented promoting health and development during the prenatal stage of the lifespan.

KEY KNOWLEDGE

1.4 determinants that have an impact on health and individual human development during the prenatal stage of the lifespan, including at least one from each of the following:
- biological, such as genetics (pages 214–18, 250)
- behavioural, such as maternal nutrition prior to and during pregnancy, parental smoking, alcohol and drug use during pregnancy, and vaccination (pages 219–26, 250)
- physical environment, such as tobacco smoke in the home and access to health care (pages 227–30, 250)
- social, such as parental education, parental income, parental health and disability and access to health care (pages 243–5)

1.5 determinants that act as risk and/or protective factors in relation to one health issue such as spina bifida, low birth weight, foetal alcohol syndrome or gestational diabetes (pages 231–3, 251)

1.6 government, community and personal strategies and programs designed to promote health and individual human development of pregnant women and unborn children (pages 242–6, 251).

FIGURE 7.1 The prenatal stage is the first stage of the lifespan and a range of determinants contribute to the health and individual human development of pregnant women and their unborn babies.
KEY SKILLS

- explain the determinants of health and individual human development and their impact during the prenatal stage of the lifespan using relevant examples (pages 218, 224, 226, 230, 233, 241, 246–7, 251)

- describe a specific health issue affecting the prenatal stage of the lifespan and draw informed conclusions about personal, community and government strategies and programs to optimise prenatal health and development (pages 241, 246, 248–9, 251).

KEY TERM DEFINITIONS

antenatal occurring before birth

carrier a person who has inherited a genetic trait or condition but does not display the trait or symptoms. They are able to pass the gene on to their children, who may or may not display the trait or symptoms.

chromosomes strands of DNA that contain genetic information

developmental milestones physical, social, emotional and intellectual developments that most children achieve by specific ages

endocrine system the system in the body that regulates the production and release of hormones (through the glands)

foetal alcohol spectrum disorder describes a range of features seen in babies who have been exposed to alcohol during the prenatal stage

genesis the blueprint of the body that controls growth, development and how the body functions

haemophilia an inherited condition characterised by an inability of the blood to clot. Both males and females can carry the gene for haemophilia, but the condition is usually present only in males.

hormone a chemical in the body that causes a change in the functioning of a specific tissue or organ

inherited condition a condition that is passed down from parents to children

Listeria monocytogenes bacteria that can increase the risk of stillbirth, miscarriage and premature labour in pregnant women

maternal nutrition the dietary intake of the mother during pregnancy

sex-linked chromosome genetic material that determines the sex of the developing baby

vaccination the administration of a micro-organism of a disease to bring about an immune response
KEY CONCEPT Understanding the biological determinants that have an impact on health and individual human development during the prenatal stage of the lifespan

The prenatal stage of the lifespan is when the foundations are laid for later life. Optimal health and development during this stage is important to help promote optimal health and development throughout the lifespan.

The health and individual human development of unborn babies are influenced by a range of factors including:

- biological influences such as genetics
- behavioural factors, such as maternal nutrition prior to and during pregnancy, parental smoking, alcohol and drug use during pregnancy, and vaccination behaviours
- physical environment, such as tobacco smoke in the home and access to health care
- social factors, such as parental education, parental income, parental health and disability, and access to health care.

Understanding the determinants that influence the health and development experienced during the prenatal stage allows personal, community and government strategies to be implemented to optimise the health and development of unborn babies in Australia.

**Biological determinants**

**Genetics**

An unborn baby begins life as a single cell containing the genetic information passed down from the mother and father. Fifty per cent of an individual’s genes are passed down from the biological father and 50 per cent from the biological mother. This information dictates much of the individual human development that occurs throughout the prenatal stage and throughout life.

In chapter 6, you learnt how, at fertilisation, the genetic make-up of the unborn child is determined. The genes that a child inherits from their biological parents have a significant impact on the child’s health and individual human development. Genes are the blueprint of the body because they control growth, development and how the body functions. An unborn baby’s genetic make-up determines:

- the rate and timing of development in the uterus as a result of the excretion of hormones from the glands of the endocrine system
- whether the unborn baby is male or female
- the development of genetic conditions such as haemophilia
- the development of chromosomal abnormalities including Down syndrome.

Genes are part of the chromosomes, which are long strands of deoxyribonucleic acid (DNA) that contain genetic information and are found in the nucleus of human cells. Each human cell — except blood cells, which have no nucleus — contains 46 chromosomes in 23 pairs. Of the 23 pairs, one pair is called the ‘sex-linked’ chromosome because it determines the sex of the individual (figure 7.2). The combination of genes contribute to the physical characteristics of the individual (e.g. facial features, sexual characteristics and eye colour), as well as genetic conditions and chromosomal abnormalities.
Genetic conditions

Sometimes the genes for certain genetic conditions are already present in the mother or father and can be passed on to the children. These conditions are called inherited conditions and examples include cystic fibrosis and haemophilia.

Cystic fibrosis is the most common life-threatening genetic disorder among light-skinned people. In Australia, 1 in 2500 babies are born with cystic fibrosis. Whether or not an unborn baby will have cystic fibrosis is determined at the time of fertilisation. An abnormality on the seventh chromosome causes cystic fibrosis but, in order to develop the condition, two defective chromosomes must be inherited, one from each parent. Individuals with one defective gene will not display the condition, but are considered to be ‘carriers’. If two carriers have a child, they have a 25 per cent chance of producing a baby with cystic fibrosis and a 50 per cent chance of producing a child that is a carrier (see figure 7.3).

**FIGURE 7.2** The 23rd pair of chromosomes determine whether the individual is male or female.

**FIGURE 7.3** How the inherited condition cystic fibrosis is passed on.

Although cystic fibrosis can be detected in the prenatal stage, it is often not diagnosed until the baby is born. This condition results in the secretion of a thick
mucus that affects the lungs, pancreas, liver and reproductive system. In the lungs, the mucus clogs small air passages and traps bacteria. This causes repeated bouts of infection, and the blockages can result in irreversible damage to the lungs. Lung failure is the major cause of death for people with cystic fibrosis. From birth, a person with cystic fibrosis undergoes constant medical treatments and physiotherapy. Currently there is no cure for cystic fibrosis.

**Sex-linked genetic conditions**

As explained earlier, each human egg and each human sperm contain one set of 23 chromosomes, with the 23rd chromosome being the one that determines the sex of the individual. Each cell in the female body contains two ‘X’ sex-linked chromosomes, but each cell in the male body contains one ‘X’ and one ‘Y’ sex-linked chromosome. Because every female egg contains one set of chromosomes, every egg will have only the ‘X’ sex-linked chromosome. In contrast, each male sperm can have either an ‘X’ sex-linked chromosome or a ‘Y’ sex-linked chromosome.

This explains why the gender of a developing baby is determined by the sperm. If an ‘X’ sperm fertilises an ‘X’ egg, then the result is a female baby. If a ‘Y’ sperm fertilises an ‘X’ egg, then the result is a male baby (figure 7.4).

![FIGURE 7.4 The sex of a child is genetically determined.](image)

Some genetic conditions are carried on the ‘X’ chromosome and a few genetic conditions are carried on the ‘Y’ chromosome. One normal copy of a gene on the ‘X’ chromosome is usually sufficient for normal function. Females (‘XX’ chromosomes) who may have a defective copy of a gene on one of the two ‘X’ chromosomes are protected by the normal gene on the second ‘X’ chromosome.

Conditions such as colour blindness are much more prevalent among males (‘XY’ chromosomes) as colour blindness is carried on the ‘X’ chromosome, of which males have only one copy. Therefore, males do not have the protective factor of a second chromosome carrying a normal gene.

Haemophilia is another example of a genetic condition where the gene is carried on the ‘X’ chromosome (figure 7.5). Haemophilia is a rare condition that affects approximately 2300 Australians, most of whom are males. It is passed on by females who carry the haemophilia gene and by males who have the condition. Individuals with haemophilia do not have one of the essential factors required to form a blood clot. This means they are prone to bleeding, particularly internally. Bleeding may occur as a result of injury or trauma or can occur spontaneously. Treatment involves the injection of the missing blood-clotting factor. If the bleeding is not stopped, it can result in pain and swelling. People with haemophilia may suffer from arthritis, chronic pain and joint damage as a result of bleeding into joints and muscles over a period of time.
When the father has haemophilia and the mother is unaffected

Father

XY

Mother

XX

XY

XY

XX

XX

None of the sons will have haemophilia. All of the daughters will carry the gene. Some might have symptoms.

When the mother carries the altered gene causing haemophilia and the father is unaffected

Father

XY

XY

XX

Mother

XX

XX

XY

There is a 50% chance at each birth that a son will have haemophilia. There is a 50% chance at each birth that a daughter will carry the gene. Some might have symptoms.

FIGURE 7.5 Haemophilia is a genetic condition that is carried on the 'X' chromosome.

Chromosomal abnormalities

Abnormalities during the creation of sperm and ova can cause a range of conditions in the unborn baby. Most often, these conditions arise as a result of too many or too few chromosomes.

A common chromosomal abnormality is trisomy, where there are three copies of a specific chromosome instead of the usual two. In most cases, an embryo with a trisomy will not survive. In these cases, the pregnant woman has a miscarriage. The miscarriage often occurs in the early stages of pregnancy, often before the woman realises she is pregnant.

The risk of trisomy abnormalities increase with the age of the mother. The approximate risks are:

- 1 in 1300 at age 25
- 1 in 1000 at age 30
- 1 in 400 at age 35
- 1 in 100 at age 40
- 1 in 35 at age 45

Other chromosomal abnormalities occur when part of a chromosome is missing, duplicated or attached to the wrong part of the chromosome.

Common chromosomal abnormalities include:

- **Down syndrome** — Down syndrome (also known as Trisomy 21) occurs when there are three copies of the 21st chromosome. One of the most common chromosomal conditions, individuals with Down syndrome generally have an intellectual disability and characteristic facial features.

- **Trisomies 13 and 18** — These trisomies usually are more severe than Down syndrome, but less common. Babies with either of these conditions often have severe intellectual disabilities and physical birth defects. Most babies born with these conditions die before their first birthday.
7.1 Determinants of health and individual development during the prenatal stage of the lifespan: biological

- **Turner syndrome** — Turner syndrome affects girls who are missing all or part of one of their X chromosomes. They are usually infertile and do not undergo the normal changes associated with puberty. Turner syndrome can result in short stature and cardiovascular and kidney problems.

- **Triple X syndrome** — Girls with this condition have an extra X chromosome. Affected girls generally have no physical birth defects, experience normal puberty and are fertile. Affected girls usually have normal intelligence, though many have learning problems. As the effects of this condition are subtle, many of those affected go undiagnosed.

- **Klinefelter syndrome** — This condition affects only boys and is characterised by having two, and sometimes more, X chromosomes in addition to their Y chromosome. Affected boys usually have normal intelligence, although may have learning difficulties. As adults, they produce lower-than-normal amounts of the male hormone testosterone and are infertile.

- **XYY syndrome** — This condition affects males, who have an extra Y chromosome. XYY syndrome results in fertile males who generally have normal intelligence although some experience learning, behavioural and/or speech problems. Some with this condition are taller than normal. Like triple X females, many affected males don’t know they have a chromosomal abnormality.

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**TEST your knowledge**

1. What determines the genetic make-up of an individual? Explain.
2. Outline three aspects of health and/or development during the prenatal stage that are influenced by genetics.
3. With reference to sex-linked chromosomes, explain how sex is determined.
4. What are the chances of a mother and father who are carriers of cystic fibrosis having a child with the condition? Explain why this is the case.
5. Explain why sex-linked conditions sometimes affect only either males or females.
6. Explain the term ‘trisomy’.

**APPLY your knowledge**

7. Using examples, explain what the difference is between a genetically inherited condition and a chromosomal abnormality.
8. ‘Genetics play the most significant role in the health and individual human development of unborn babies.’ Discuss.
9. Using the internet, research:
   (a) ways that inherited and chromosomal conditions can be tested for during the prenatal stage.
   (b) what genetic testing relates to. How could this information be used prior to pregnancy?
10. Use the [Genetics during the prenatal stage](eBookplus) links in the Resources section of your eBookPLUS to find the weblink and questions for this activity.
7.2 Determinants of health and individual development during the prenatal stage of the lifespan: behavioural

**KEY CONCEPT** Understanding the behavioural determinants that have an impact on health and individual human development during the prenatal stage of the lifespan

The behavioural determinants that impact on prenatal health and development are related to the behaviours and choices of the parents, both before and during pregnancy. Examples include maternal nutrition status, parental smoking, alcohol and drug use during pregnancy, and vaccination behaviours.

**Maternal nutrition**

![Maternal nutrition is important for the health and individual human development of the growing baby.](image)

For women of child-bearing age, ensuring a healthy balanced diet prior to becoming pregnant is important for preparing the body for the demands of carrying a baby. A woman’s nutritional status during pregnancy is influenced by the nutritional reserves that are built up in her body prior to conception. Women who have nutritional deficiencies prior to conceiving a child are likely to have these deficiencies during pregnancy, particularly as the body faces additional nutritional demands because of the growing baby. Although a balanced intake of all nutrients is required for optimal prenatal development, it is particularly important that women consume the required amount of folate, iron and calcium prior to and during pregnancy.

Ensuring good nutrition prior to conception is important because the ongoing development of the foetus is dependent on the health of the embryo. Upon implantation, the embryo divides into two types of cells — those that form the foetus and those that form the placenta. In undernourished women, a greater proportion of cells are likely to form the placenta rather than the foetus, which means the foetus will be relatively small when it begins its growth, and its development in the uterus will be restricted. There is an increased risk that the baby will be low birth weight when born.
Folate (folic acid)

Folate is a B-group vitamin that is required for the formation of red blood cells, which transport oxygen around the body. It also assists with DNA synthesis, cell growth and the development of the nervous system of the foetus. Adequate folate consumption before and during pregnancy reduces the risk of neural tube defects in the baby. Neural tube defects involve damage to the brain and spine, and to the nerve tissue of the spinal cord. The vertebrae or skull may not close properly during development, which results in the spinal cord or brain being exposed and placed at risk of further damage.

Spina bifida is the most common neural tube defect and occurs when the spinal nerves protrude through the gap in the unclosed vertebrae instead of growing down the middle of the spinal column. Spina bifida may result in one or more of the following symptoms:

- walking difficulties, which may result in the inability to walk
- reduced sensation in the legs and feet
- increased risk of burns and pressure sores due to limited feeling
- urinary and faecal incontinence
- sexual dysfunction
- deformities of the spine, commonly referred to as scoliosis (figure 7.7).

Good sources of folate include green leafy vegetables, poultry, eggs, cereals, citrus fruits and legumes. In Australia, many cereal products including bread are fortified with folate.

Iodine

Iodine is a mineral that is required in greater amounts during pregnancy to promote optimal brain and nervous system development. If iodine is deficient during pregnancy, the consequences can be serious and include stunted growth and intellectual disability.

Countries that have a sufficient iodine concentration in the soil generally get enough iodine from crops grown on the land. In countries that do not have enough iodine in the soil (such as Australia), iodine is added to other food items. In Australia, most iodine comes from iodised salt and bread fortified with iodised salt, but is also present in fish, seaweed, eggs, cow’s milk and strawberries.

Australians are reducing their intake of salt as a result of the increasing rates of cardiovascular disease, so people are now at an increased risk of iodine deficiency and need to ensure their requirements are being met by other dietary sources, especially during pregnancy. In Australia, recent studies conducted in Victoria and New South Wales indicate mild-to-moderate iodine deficiency in all groups.

Iron

Iron is a mineral that is required in greater amounts during pregnancy due to the increased demand for oxygen for the developing foetus as well as the increased energy needs of the mother. During pregnancy, there is an increase in blood volume to cater for the developing baby as well as the enlarging reproductive organs of the mother. Iron is needed for haemoglobin, a component of blood that carries oxygen around the body. Good sources of iron include red meat, fortified cereals, egg yolks, legumes, nuts and green leafy vegetables. Vitamin C assists with the uptake of iron from the small intestine. High-fibre diets, alcohol and tannic acid in tea can interfere with iron absorption.

Lack of iron can lead to iron-deficiency anaemia, resulting in the body not having enough iron to form haemoglobin. In pregnant women, iron-deficiency anaemia can increase the risk of a premature birth and a low birth weight baby.
Calcium

Calcium is required for the strengthening of bones and teeth. During pregnancy, calcium is required to meet the needs of the developing foetus as well as ensuring the maintenance of bone mass for the mother. Good food sources of calcium include dairy products such as milk, cheese and yogurt. If a pregnant woman does not consume the required amount of calcium-rich foods, the calcium that the developing baby needs will be leached (or taken) from the mother’s bones. This could lead to osteoporosis in later life.

Foods to avoid during pregnancy

Some foods contain the bacteria *Listeria monocytogenes*, which increase the risk of miscarriage, stillbirth or premature labour. For this reason, pregnant women should avoid the following foods:

- soft-serve ice-cream
- unpasteurised foods and soft cheeses such as camembert and ricotta
- pre-cooked or prepared cold foods such as quiches, delicatessen meats, salad from buffets
- raw seafood such as oysters and smoked seafood such as salmon.

Foods that contain high levels of mercury can put the baby at risk of delayed development in the early years. The effects may not be noticed until the child fails to reach *developmental milestones* at the expected age. It may also result in difficulties with memory, language and attention span. Women need to be selective about the type of fish they consume during pregnancy, as some fish have significantly higher levels of mercury than others. Shark, swordfish, barramundi, gemfish, orange roughy and southern bluefin tuna should all be avoided.

Parental smoking during pregnancy

Smoking during pregnancy is a significant risk factor for a number of conditions for both the mother and her unborn baby. Tobacco smoke contains thousands of chemicals, and acts to reduce oxygen flow to the placenta and exposes the developing foetus to numerous toxins. Maternal smoking increases the risk of a range of health and developmental conditions of the unborn baby including:

- spontaneous abortion
- ectopic pregnancy
- prematurity
- complications of the placenta
- birth defects
- lung function abnormalities
- respiratory conditions
- foetal mortality.

According to the Australian Institute of Health and Welfare (2012), there is evidence that the more cigarettes a mother smokes, the higher the risk of poor birth outcomes.

Maternal smoking rates are higher in some population groups including Indigenous women, teenagers, single mothers and mothers with lower socioeconomic status. According to a survey taken by the AIHW in 2012, almost half of Aboriginal and Torres Strait Islander mothers reported smoking during pregnancy (48.1 per cent), compared with 10.7 per cent of non-Indigenous women who gave birth. Of all teenage mothers, 34.9 per cent reported smoking.

Maternal smoking rates have declined significantly over time (figure 7.10), reflecting the decreasing rates of smoking in the community as a whole.
Alcohol use during pregnancy

Alcohol can cause problems for women even before pregnancy because it may interfere with fertility. Therefore women who are trying to fall pregnant should limit their consumption of alcohol or stop it altogether. The consumption of alcohol during pregnancy can cause significant harm to the unborn child. When alcohol is consumed by a pregnant woman, it crosses the placenta from the mother’s blood to the baby’s blood. This can result in foetal alcohol spectrum disorder (figure 7.11). A foetus that is severely affected by foetal alcohol spectrum disorder is at risk of dying before birth. The alcohol may harm the development of the nervous system of the foetus, including the brain. It may also narrow the blood vessels in the placenta and umbilical cord, thereby restricting blood supply to the foetus. The impact of foetal alcohol spectrum disorder on the health and individual human development of the unborn child is described in table 7.1.

TABLE 7.1 Impact of alcohol consumption on the health and individual human development of the unborn child

<table>
<thead>
<tr>
<th>Impact of alcohol consumption on health</th>
<th>Impact of alcohol consumption on physical development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased risk of premature birth</td>
<td>Low birth weight</td>
</tr>
<tr>
<td>Increased risk of stillbirth</td>
<td>Smaller head circumference (microcephaly)</td>
</tr>
<tr>
<td>Undernourishment of the growing baby due to alcohol blocking the absorption of nutrients</td>
<td>Small eyes and epicanthal folds</td>
</tr>
<tr>
<td>Reduction in the amount of oxygen available to the baby due to alcohol narrowing the blood vessels in the placenta and/or umbilical cord resulting in the restriction of blood supply</td>
<td>Flattened face, including the bridge of the nose due to earlier than normal cell changes in the baby’s face during development</td>
</tr>
<tr>
<td></td>
<td>Underdeveloped vertical ridges between the nose and upper lip</td>
</tr>
<tr>
<td></td>
<td>Smaller lower jaw</td>
</tr>
<tr>
<td></td>
<td>Heart defects</td>
</tr>
<tr>
<td></td>
<td>Restriction of movement of elbow and knees due to tightening of ligaments, muscles, tendons and skin around the joints</td>
</tr>
</tbody>
</table>


Heavy consumption of alcohol, particularly in the first trimester (first three months) of pregnancy, is considered to be particularly dangerous to the foetus. The World Health Organization recommends that pregnant women consider not consuming alcohol at all.
Pregnant pause on alcohol

By Fiona Baker

The advice from experts is clear: there’s no ‘safe’ level of alcohol consumption in pregnancy. But that message becomes impacted by a lot of human factors.

More and more is being understood about foetal alcohol spectrum disorder (FASD), an umbrella term for a range of physical, developmental and neurological disabilities resulting from alcohol consumption in pregnancy.

Health experts believe it’s far more widespread than previously believed. In the US, FASD is the most common cause of developmental delay and is estimated to affect between 2 and 7 per cent of all births.

This isn’t a condition that’s only found in disadvantaged pockets of the community, because drinking isn’t confined to socioeconomic groups, explains Elizabeth Elliott, a professor of paediatrics and child health at the University of Sydney.

‘What we do know is that women who don’t drink any alcohol during pregnancy face no risks of [this kind of] damage to their foetus,’ she says.

‘Frequent, high intakes of alcohol, and particularly binge drinking, increases the risk.

‘What we don’t know is the risk to an individual pregnancy. Each pregnancy is different and every woman’s body responds differently to alcohol consumption because of a range of factors such as age, body composition, genetics and prior disease.’

So, she strongly advises that expecting and trying-to-conceive women apply the precautionary principle as recommended in Australia’s national alcohol guidelines that ‘not drinking alcohol is the safest option’.

However, that’s where some of these human factors come in.

Despite living in an age of highly accessible contraception, almost 50 per cent of pregnancies in Australia are unplanned. Add to that another contemporary issue of the sharp increase in young women binge drinking, and the message of having an alcohol-free pregnancy becomes blurred.

A new study from Newcastle University has revealed that eight in 10 expectant mums drink alcohol in pregnancy — 64 per cent higher than found in other Australian studies.

This follows survey results released last year by the Foundation for Alcohol Research and Education which found that 47 per cent of Australian women interviewed consumed alcohol while pregnant before knowing they’d conceived — and almost 20 per cent drank alcohol after confirmation of their pregnancy.

The most comparable figures for how much mums are drinking come from the US, where almost 1.5 per cent of women reported binge drinking while pregnant.

Elliott understands the panic women can feel if they continued drinking at high levels while unknowingly pregnant: ‘We know birth defects can result from first trimester alcohol exposure although the foetus is vulnerable throughout the pregnancy.

‘The best advice we can provide is that the woman talks about her alcohol consumption with her health provider. In most cases we’ll be able to provide reassurance that everything should be fine but if there are concerns, at least we can be prepared for that.’

Meanwhile, Elliott’s advice for women who are planning to get pregnant is ‘stop drinking now’.

She describes prevention as the only option. This should involve public education strategies such as labelling of alcoholic drinks.

Currently, labelling of the harms of alcohol in pregnancy is voluntary, but Elliott would like to see it mandated and enforced.

‘The impact of FASD on a family is devastating and it’s more common than we think,’ she says. ‘Strategies which focus on prevention are vital.’

A foetus is exposed to similar amounts of alcohol as the mother because it crosses the placenta into the baby’s bloodstream.

The National Organisation for Fetal Alcohol Spectrum Disorders (NOFASD) says the physical, developmental and/or neuro-behavioural characteristics of the disorder may not be noticed until the child reaches school age. Foetal alcohol syndrome is at the most serious end of the spectrum, and is often accompanied by characteristic facial features, such as a smooth philtrum (indent between the lip and nose), thin upper lip, upturned nose, flat nasal bridge and midface and small head circumference.

Red flags of FASD include developmental delays, learning difficulties, major organ damage and problems with memory and social relationships.

Source: Sunday Herald Sun, 12 August 2013.
Case study review
1 Briefly explain foetal alcohol spectrum disorder (FASD).
2 Discuss the factors that influence whether a mother drinks alcohol during pregnancy.
3 Design a poster to educate females about foetal alcohol spectrum disorder.

Drug use during pregnancy

Drug use during pregnancy may have a significant effect on the health and individual human development of the foetus. Some medications or drugs will cross the placenta and potentially harm the unborn child. Side effects may include withdrawal symptoms, developmental delay, intellectual disability, birth defects, premature birth and stillbirth. The types of drugs that may be harmful include:

- medicines (e.g. some prescription drugs, over-the-counter medicines, herbal remedies or nutrition supplements)
- caffeine
- illegal drugs (e.g. cannabis, heroin, cocaine, amphetamines)
- other substances used as inhalants (e.g. glue or aerosols).

The potential for harm to the unborn child depends on a range of factors including:

- the type of drug being consumed
- how the drug is taken
- the amount taken
- how often it is taken
- whether the drug is used alone or in combination with other drugs
- the response of the baby to the drug
- the gestational age of the unborn baby
- the level of health of the mother.

Table 7.2 outlines the possible effects of drug use on the health and individual human development of the unborn baby.

**TABLE 7.2 Possible effects of drug use on the health and individual human development of the unborn child**

<table>
<thead>
<tr>
<th>Type of drug</th>
<th>Possible impact on health and/or individual human development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over-the-counter and prescription medications, nutritional supplements and herbal medicine</td>
<td>Birth defects may be caused by some antibiotics, anticonvulsant medication (e.g. for the treatment of epilepsy), drugs that treat some rheumatic conditions, some thyroid medications, some blood thinning medications, and high doses of vitamin A. Medicines are given a risk category by the Australian Drug Evaluation Committee according to their safety during pregnancy.</td>
</tr>
<tr>
<td>Caffeine</td>
<td>Increased risk of miscarriage, premature birth and stillbirth if consumed heavily</td>
</tr>
</tbody>
</table>
| Illegal drugs | Cannabis — increased risk of poor or delayed growth
Heroin — increased risk of low birth weight, premature birth, foetal distress, stillbirth, blood-borne viral diseases, infant drug withdrawal after birth
Cocaine — increased risk of miscarriage, poor or delayed growth, birth defects (e.g. brain, heart, genitals, urinary system), stillbirth
Amphetamines — increased risk of miscarriage, premature birth, birth defects (e.g. smaller head size, eye problems, cleft palate, limb and brain defects), increased heart rate, infant drug withdrawal after birth |
| Substances used as drugs, e.g. inhalants | Increased risk of miscarriage, low birth weight, birth defects, sudden infant death syndrome (SIDS) |

Case study

The thalidomide tragedy

In 1956 Melbourne hosted the Olympic Games, television arrived in Australia, and the first child with disability caused by the medicine thalidomide was born to an employee of the German pharmaceutical company, who had taken samples home to his wife.

Thalidomide was marketed as a wonder drug — an effective tranquilliser and pain killer useful for insomnia, coughs and headaches — and it helped pregnant women with morning sickness!

It was considered to be safe: in contrast to older tranquillisers, an overdose did not result in death, but simply an extra long sleep.

However, no studies had been conducted to investigate the safety of thalidomide for the unborn child.

In 1961 a German paediatrician, Dr HR Wiedemann, described an ‘epidemic’ of babies being born with limb malformations, but the cause of this epidemic was unknown.

Linking birth defects to thalidomide

At the end of 1961, the Australian Dr William McBride and the German Dr Widukind Lenz separately worked out the likely cause and effect relationship between thalidomide use in early pregnancy and birth defects.

In recent months I have observed that the incidence of multiple severe abnormalities in babies delivered of women who were given the drug thalidomide (‘Distival’) during pregnancy, as an anti-emetic (anti-vomiting) or as a sedative, to be almost 20 per cent.

WG McBride, The Lancet, December 1961

Thalidomide was withdrawn in Australia, Germany and the UK by the end of 1961. Eight months after the withdrawal of thalidomide, babies stopped being born with the characteristic limb defects.

About 40 per cent of babies damaged by the effects of thalidomide died in their first year. But there are adults alive today who are living with disabilities caused by thalidomide.

Australian response to thalidomide tragedy

The thalidomide experience brought home to Australians the message that medicines have risks as well as benefits.

‘Never again’ was the wish of the Australian community, but what was the appropriate response?

It was decided that an independent committee should be set up to monitor the safety of new medicines as well as medicines that were already available. To achieve this, the Australian Government established the Australian Drug Evaluation Committee (ADEC) in June 1963.

Government control does not absolve drug manufacturers from the responsibility of conducting adequate laboratory and clinical tests to ensure, as far as this is possible, the safety of drugs before they are offered to the public.


Case study review

1. What was the intended purpose of thalidomide?
2. What impact did thalidomide have on unborn babies?
Vaccination behaviours

Vaccination plays an important role in reducing the spread of many conditions in Australia. Even though over 90 per cent of the population are up to date with their vaccinations, most vaccine-preventable diseases still occur in Australia. The prenatal stage of development is particularly susceptible to many of the effects of vaccine-preventable diseases. The greatest impact of these conditions is often during the embryonic stage because major organs, including those of the nervous system, are formed at this time. Specific diseases and their possible impact on the unborn baby include:

- rubella — can cause defects in the brain, heart, eyes and ears of the baby. It also increases the risk of miscarriage and stillbirth.
- chickenpox — can cause defects in the brain, eyes, skin and limbs of the baby
- measles — increases the risk of miscarriage, premature birth or stillbirth
- mumps — increases the risk of miscarriage
- hepatitis B — can be passed on to the baby during birth. The mother and baby can also become carriers of hepatitis B (when they have been infected and the virus has not been cleared from their body).
- influenza — increases the risk of miscarriage, premature birth or stillbirth, and increases the risk of severe illness and death in the mother
- whooping cough — can cause pneumonitis, seizures, conditions affecting the brain and the death of a baby (Source: Better Health Channel, Department of Health, Victoria).

A possible side effect of some vaccines is mild fever which can increase the risk of developmental abnormalities in the developing baby. As a result, vaccinations will generally not be given during pregnancy. The exception to this is the influenza vaccine which is deemed safe for pregnant women and can decrease the risk of developing fever as a result of the disease itself.

To reduce the risk of contracting one of the vaccine-preventable diseases, women who are planning a pregnancy should ensure their vaccinations are up to date prior to fertilisation. Once pregnant, women can also reduce their risk of contracting disease by regular hand washing, avoiding international travel and avoiding close contact with sick people.

**TEST your knowledge**

1. Explain the importance of folate, iodine, calcium and iron to the developing baby and/or mother during pregnancy.
2. Explain why nutrition is an important consideration prior to pregnancy.
3. Outline three possible effects on the unborn baby of maternal smoking.
4. Discuss the changes in rates of maternal smoking over time illustrated in figure 7.10.
5. What is the recommended alcohol level for pregnant women?
6. Explain the possible impact of alcohol consumption on the developing baby during pregnancy.
7. Outline the effects of foetal alcohol spectrum disorder on the health and individual human development of unborn babies.
8. Why should pregnant women avoid foods such as soft cheeses, shellfish and soft-serve ice-cream?
9. Why should pregnant women avoid fish that contain high levels of mercury?
10. The use of drugs can have a significant impact on the health and individual human development of the unborn child. What factors determine the potential harm that can occur as a result of drug use during pregnancy?
11. Explain the possible impacts of three vaccine-preventable diseases on the health and/or development of the unborn baby.

**APPLY your knowledge**

12. You have been appointed as a maternal and child health nurse. What advice would you give a first-time mother about nutrition, tobacco, alcohol and drug use, and vaccination?
13. Use the Foetal alcohol spectrum disorder links in the Resources section of your eBookPLUS to find the weblink and questions for this activity.
Aspects of a pregnant woman's physical surroundings can impact on the health and development of her unborn baby. Factors within the physical environment that can impact on the unborn baby include tobacco smoke in the home and access to health care.

**Tobacco smoke in the home**

Tobacco smoke in the home increases the risk of passive smoking among pregnant women. Passive smoking means breathing in other people’s tobacco smoke. Exhaled smoke is called exhaled mainstream smoke. The smoke drifting from a lit cigarette is called sidestream smoke. The combination of mainstream and sidestream smoke is called second-hand smoke or environmental tobacco smoke.

Tobacco smoke cools quickly which prevents it from rising. As smoke is heavier than air, it tends to hang in mid-air rather than be dispersed into the atmosphere. This increases the amount of second-hand smoke people breathe as it is concentrated in the lower half of the room.

For pregnant women who live with one or more smokers, the home can be source of exposure to second-hand smoke. Rates of tobacco smoke in the home have declined in the last decade, reflecting the continuing decline in the prevalence of smoking as well as an increase in smokers confining their smoking to outside the home environment. In 2013, more than three-quarters (70 per cent) of Australians lived in homes where no-one regularly smoked, and 26.2 per cent lived with one or more people who smoked only outside the home. However, around 4 per cent of non-smokers were exposed to smoke from another resident at home at least once a day (AIHW, 2014). Data are not available regarding the rate of pregnant women who were exposed to tobacco smoke in the home, but given the exposure rates applying to all non-smokers, it is reasonable to assume that some pregnant women would be exposed.
Exposure to environmental tobacco smoke can contribute to the same health and development effects as maternal smoking including:
- spontaneous abortion
- ectopic pregnancy
- prematurity
- complications of the placenta
- birth defects
- lung function abnormalities
- respiratory conditions including asthma
- foetal mortality.

**Access to health care**

Prenatal health care (also called antenatal care) is an important part of pregnancy and there is a strong relationship between regular prenatal health care and positive health outcomes for both mother and baby. The purpose of prenatal health care is to monitor the health of the mother and baby, monitor growth of the baby, provide health education and advice to the mother, identify any risks to the mother and baby, and provide medical interventions if necessary.

![Ultrasounds help monitor foetal development by using soundwaves to create an image of the developing foetus.](image)

The World Health Organization recommends pregnant women access prenatal health care at least four times during their pregnancy to increase the likelihood of receiving effective maternal health interventions.

During prenatal health checks, a number of tests and measures are often taken, including body weight, an ultrasound, blood pressure, blood glucose and foetal heart rate. These allow the health and individual human development of the pregnant woman and unborn baby to be assessed. If issues are detected, interventions can be put in place.

The birthing process is a time when medical intervention is often required and, if adequate health care is not accessible, any complications arising can go untreated and impact the health and individual human development of both mother and baby.
Geographical factors such as the location of relevant services can impact on a woman’s ability to access prenatal health care. Many women in rural and remote areas struggle to access health services during pregnancy due to the time taken to reach them. As a result, the health of both mother and baby can be compromised.

In 2013, two-thirds (62 per cent) of women attended at least one antenatal visit before 14 weeks gestation, although 15 per cent of women did not receive antenatal care until after 20 weeks. In 2009, about 80 per cent of women in major cities and inner regional areas in New South Wales, South Australia and the Northern Territory received antenatal care in the first 14 weeks of pregnancy, compared with 73.7 per cent of women residing in remote and 53.1 per cent of women in very remote areas.

Stress in pregnancy can have a negative impact on both mother and baby. A 2011 study indicates that women who have to travel for more than one hour to access antenatal care are nearly eight times as likely to experience moderate or severe stress as mothers who have this care close to home (National Rural Health Alliance, 2012). A 2010 survey of rural families found only 12 per cent of the respondents felt they had good access to maternity services (National Rural Health Alliance, 2012).

### Case study

#### Spare a thought for rural mums on Mother’s Day

Every woman in Australia has the right to safe, affordable maternity services as close to home as possible. This is something most people would agree with — and something that is within the nation’s power to deliver.

But in recent years more than half of Australia’s small maternity units, many of them in rural areas, have been closed. This Sunday, Mother’s Day, is a timely reminder of the importance of maternal and child health. This is vital for mothers everywhere in Australia, for their babies and children, and ultimately for the health of the nation.

Over time, the number of procedural GPs in rural areas has been falling, while the number of rural women giving birth has been increasing. Also significant is the fact that the prevalence of midwives decreases with distance from capital cities, while the birth rate increases. Money can be saved in the short term by closing small rural maternity units, but this transfers cash costs to families and also imposes costs on mothers and babies through increased risk and family dislocation. Stress in pregnancy has a detrimental effect on mother and baby.

Mothers’ health is an important determinant of the health and wellbeing of children and communities. So this Sunday let’s remember the mothers who live in rural and remote areas of this country. They face the challenges of distance, isolation, poorer health and worse access to health services than women in the cities — and so often with their renowned fortitude and resilience.

Some of the steps towards improved maternal health in rural and remote Australia are spelled out in the National Maternity Services Plan, 2010–2015, endorsed by State, Territory and Commonwealth Governments. The Plan’s goal is to maintain Australia’s standard of safety and quality in maternity care and to improve access to services and choice of models of care.

Source: National Rural Health Alliance, media release, 11 May 2012.

### Case study review

1. Discuss how financial costs may increase for pregnant women who cannot access health care locally.
2. Brainstorm possible reasons for increased levels of stress among pregnant women who cannot access health care close to their homes.

Weblink:
Rural health
7.3 Determinants of health and individual development during the prenatal stage of the lifespan: physical environment

**TEST your knowledge**
1. What is the difference between mainstream and sidestream tobacco smoke?
2. Explain why second-hand smoke can be particularly damaging when indoors.
3. Discuss how tobacco smoke in the home can impact on the health and development of the unborn baby.
4. Outline the purpose of prenatal health care.

**APPLY your knowledge**
5. Design a poster that could be used to educate people of the dangers of tobacco smoke in the home during pregnancy.
6. Suggest two ways in which prenatal health care could promote the health and/or individual human development of an unborn baby.
7. Discuss two reasons why those who do not have health services near their homes may not access health care.
8. In groups of three, allocate one of the following tests to each student:
   - amniocentesis
   - ultrasound
   - chorionic villus sampling.
   After researching the test, each student should present a short explanation to the rest of the group. Make sure to include:
   (a) a description of the test
   (b) how it is performed
   (c) when it is performed
   (d) issues/conditions it can detect.
9. Use the Environmental tobacco smoke links in the Resources section of your eBookPLUS to find the weblink and questions for this activity.
Once fertilisation has occurred, unborn babies rely on their mother to achieve optimal health and individual human development during the prenatal stage. The society in which the mother lives and the social factors that impact on her life, will also contribute significantly to the health and development of her unborn baby. Social factors include parental education, parental income, parental health and disability, and access to health care.

**Parental education**

The parents' level of education can impact the developing baby in a number of ways. Knowledge of health behaviours (also known as 'health literacy') can increase the probability of parents caring for themselves in ways that promote the health and development of their unborn baby. Accessing health care, consuming nutritious food, being vaccinated, not smoking, avoiding teratogens such as alcohol and drugs, and preventing illness are more likely to occur in those who are educated about the benefits of maintaining optimal health during pregnancy. These behaviours promote optimal health and individual human development in the unborn baby and reduce the risk of conditions such as preterm birth, low birth weight and birth defects.

Parental education also increases employment opportunities and the ability to generate an adequate income which can be used for resources such as adequate nutrition and health care.

**Parental income**

Parental income is often related to the education of parents. Educated parents are more likely to have a higher paying job and are more able to access a range of health-promoting resources during the prenatal stage of the lifespan. Income can improve the ability of parents to provide resources such as prenatal health care and adequate nutrition which can enhance outcomes for the unborn baby by promoting optimal growth, health and development. Having an adequate income may also assist in decreasing stress levels as parents may be more comfortable knowing they can provide the necessary resources for their child.

Specific population groups are often more likely to experience the effects of low income during pregnancy, including teenage mothers, Indigenous Australians and those from low socioeconomic status groups.

Socioeconomic status is a measure that combines the levels of education and income, and occupation status. Those with higher socioeconomic status have higher paying jobs, higher levels of education and higher status occupations. These components are often, but not always, interrelated so a person with a higher level of education is more likely to get a higher paying job that has a high status within the community. Socioeconomic status has a relationship with the number and rate of low birth weight babies as shown in figure 7.14.
7.4 Determinants of health and individual development during the prenatal stage of the lifespan: social

Parental health and disability

The level of health experienced by parents influences the health and individual human development of developing babies in a number of ways. In some cases, conditions experienced by the mother can directly impact on the development of the baby. In other cases, parental illness or disability can impact on the unborn baby indirectly by influencing the ability of parents to provide the resources necessary for the optimal health and development of their unborn baby, such as earning an income.

Health concerns for pregnant women include:

- Gestational diabetes. This condition occurs in around 5 per cent of pregnant women and can impact the developing baby in a number of ways, including an increased risk of higher than normal birth weight, respiratory conditions and jaundice.
- Pre-eclampsia. High blood pressure during pregnancy causes the mother's blood vessels to constrict. This results in reduced blood flow to the uterus which can impact on the growth of the baby.
- Stress. Stress during pregnancy releases hormones that may impact on the unborn baby in a number of ways. Some research suggests that stress can contribute to premature birth and may also impact brain development.
- Infections. Most infections in pregnant women do not impact on the developing baby in the majority of cases but some infections can. If this occurs, the impacts can be significant. Vaccination prior to pregnancy can reduce the risk of many of these conditions, as was explored on page 226.

Parents experiencing optimal health may be more able to provide the resources required for optimal health and development of their unborn baby. Parental disability and health conditions, on the other hand, may limit the ability of parents to adequately care for themselves and their unborn baby. If a parent requires care as a result of their illness or disability, this can further decrease the ability to provide resources for the mother. Factors including employment, nutrition, health care, stress management and exercise may become difficult if the health of the parents is not optimal.

Access to health care

Although access to health care may be limited due to factors related to the physical environment such as geographical location of resources, many social factors also impact on access to health care. Education, cultural factors and income can all enhance or limit the ability of pregnant women to access health care.

If parents have a sound understanding of the benefits of health care during pregnancy, they may be more likely to access these resources. By accessing health care throughout the pregnancy, the mother's and baby's health and development can be monitored and interventions put in place if necessary. Education is often a key component of health care and the knowledge of parents with regards to promoting optimal health and development of their unborn baby can be enhanced.

Cultural factors can contribute to some pregnant women not accessing health care. Around 25 per cent of Australians were born overseas, reflecting the multicultural nature of Australian society. Language barriers and differences in beliefs about pregnancy and health care can contribute to some women not accessing health care.

Indigenous mothers are less likely to access health care during pregnancy than non-Indigenous Australians. In 2010, of Indigenous mothers who gave birth at 32 weeks or more, 77.7 per cent had five or more visits, compared with 92 per cent of non-Indigenous mothers. Indigenous Australians across the lifespan often record lower rates of health care usage than their non-Indigenous counterparts. According to the 2008 National Aboriginal and Torres Strait Islander Social Survey, almost 30 per cent of Indigenous people aged 15 and over experienced problems accessing services
and almost 10 per cent experienced problems accessing a doctor. Overall, 1.3 per cent reported barriers to accessing services due to discrimination, and 2.3 per cent reported barriers due to services not being culturally appropriate (AIHW, 2012).

Although many prenatal health services can be accessed free of charge for the user through Medicare, other services require a patient co-payment. Those with low incomes may not access health care during pregnancy as a result of the costs involved. This may increase the risk of complications going untreated throughout the prenatal stage.

**TEST your knowledge**

1. Explain two ways in which each of the following may impact on the health and/or individual human development of an unborn baby.
   - parental education
   - parental income
   - parental health and disability
   - access to health care

2. (a) Describe the trend relating to the rate of low birth weight babies according to socioeconomic status, as shown in figure 7.14.
   (b) Discuss possible reasons for this trend.

3. Besides geographical location of resources, discuss factors that may limit access to health care.

**APPLY your knowledge**

4. ‘Social factors often influence the behaviours of parents which, in turn, impact on the health and development of unborn babies’. Write a response to this statement.
7.5 Determinants that act as risk and/or protective factors in relation to one health issue

**KEY CONCEPT** Understanding the determinants that act as risk and/or protective factors in relation to one health issue such as spina bifida, low birth weight, foetal alcohol syndrome or gestational diabetes

As we have seen, there are a range of health issues that can affect the mother and unborn baby during the prenatal stage of the lifespan. Many determinants of health and development play a role in decreasing or increasing the risk of these issues occurring. An understanding of these issues and the determinants that play a role in their development is important in implementing personal, community and government strategies to reduce the risk of negative outcomes during pregnancy. Common issues include spina bifida, low birth weight, foetal alcohol syndrome (also referred to as foetal alcohol spectrum disorder) and gestational diabetes.

**Spina bifida**

Spina bifida is a condition that occurs when the neural tube (see figure 7.15) in the embryo fails to close properly (see figure 7.16).

The effects of spina bifida will vary from case to case, depending on the number of nerves exposed and damaged. In some cases, symptoms will be minor but in more severe cases, the individual may be paralysed and require assistance to carry out daily tasks such as feeding, washing and toileting.

![Figure 7.15](image1.png) **FIGURE 7.15** How the neural tube is formed

The neural tube is a cylindrical structure that will house the brain and spinal cord of the embryo. Before the tube is formed, the outer cells of the embryo lay flat to make a neural plate. From around day 16 to 24 after fertilisation, the neural plate folds in on itself and the sides fuse together to form the neural tube.

![Figure 7.16](image2.png) **FIGURE 7.16** Spina bifida occurs when the neural tube fails to close properly during the prenatal stage. As a result, the nerves of the spinal cord protrude out of the back instead of running down the middle of the spinal cord. The nerves become damaged, leading to moderate to severe disabilities.
Although the exact causes of spina bifida are not completely understood, there appear to be a number of factors or determinants that can either increase or decrease the risk of developing this condition. These factors will be explored in greater detail.

**Biological**

Certain genetic conditions can increase the risk of developing spina bifida, including trisomy 13 and trisomy 18. Trisomy 13 is a condition in which there are three copies of the 13th chromosome instead of the usual two. In Trisomy 18, there are three copies of the 18th chromosome. These conditions are rare and contribute to a range of development issues in addition to an increased risk of spina bifida.

There is a relationship between spina bifida and maternal age. The overall prevalence of spina bifida is higher at the extremes of reproductive age; that is, among women aged less than 20 years and women aged 35 years or more, than among women aged 20 to 35 (see table 7.3). The exact cause of this relationship is not known.

**Behavioural**

The use of saunas and spas exposes the pregnant woman to a hot environment and increases body temperature. Excess heat during early pregnancy has been shown to increase the risk of spina bifida (see figure 7.17).

Maternal nutrition can increase or decrease the risk of spina bifida. Folate is a nutrient (also known as Vitamin B<sub>9</sub>) that is essential for normal cell division and the production of new cells. Folate is particularly important during periods of rapid growth, as occurs during the prenatal stage. Folate has been shown to be a significant protective factor in the development of spina bifida.

The neural tube closes early in the pregnancy, often before the woman knows she is pregnant. As a result, all women of childbearing age where pregnancy is possible should ensure they consume adequate amounts of folate.

**Physical environment**

Exposure to excessive heat early in pregnancy may increase the risk of spina bifida. If the physical environment is excessively hot, the risk may be increased. Having access to saunas and spas may increase the chance of them being used, although choosing to use these resources is a behavioural determinant (see above).

Exposure to agents such as solvents, pesticides and x-ray radiation may increase the risk of spina bifida, although the exact link is unknown.

The prevalence of spina bifida increases with remoteness of residence (table 7.4). The exact reason for this trend is not known but it may be linked to reduced access to health care and differences in food availability in rural and remote areas.

**Social**

Maternal fever (parental health) raises body temperature and may increase the risk of spina bifida as a result. Women who experience illness that increases body temperature may be at an increased risk of having a baby with a neural tube defect.

In 2009, the Australian government introduced mandatory fortification of bread with folate. This aims to decrease the prevalence of neural tube defects as folate intake is increased.

Accessing health care prior to pregnancy can increase parental knowledge of folate intake and other precautionary measures such as avoiding hot environments. This may reduce the risk of spina bifida.

Those with adequate education surrounding maternal nutrition and pregnancy may ensure folate intake is adequate prior to conception. This can decrease the risk of spina bifida in the unborn baby.

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**TABLE 7.3 Prevalence of spina bifida in babies, by age of mother**

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Prevalence (per 10,000 births)</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 20</td>
<td>8.3</td>
</tr>
<tr>
<td>20–24</td>
<td>7.3</td>
</tr>
<tr>
<td>25–29</td>
<td>6.3</td>
</tr>
<tr>
<td>30–34</td>
<td>4.7</td>
</tr>
<tr>
<td>35 and over</td>
<td>7.5</td>
</tr>
</tbody>
</table>

Source: Adapted from Macaldowie A & Hilder L 2011. Neural tube defects in Australia: prevalence before mandatory folic acid fortification. Cat. no. PER 53. Canberra: AIHW.

**TABLE 7.4 Prevalence of spina bifida based on place of usual residence**

<table>
<thead>
<tr>
<th>Place of usual residence</th>
<th>Prevalence of spina bifida (per 10,000 births)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major cities</td>
<td>5.5</td>
</tr>
<tr>
<td>Rural</td>
<td>6.5</td>
</tr>
<tr>
<td>Remote</td>
<td>11.1</td>
</tr>
</tbody>
</table>

Source: Adapted from Macaldowie A & Hilder L 2011. Neural tube defects in Australia: prevalence before mandatory folic acid fortification. Cat. no. PER 53. Canberra: AIHW.
7.5 Determinants that act as risk and/or protective factors in relation to one health issue

**Low birth weight**

The birth weight of babies has a significant impact on health and individual human development in both the short and long term. Adequate birth weight often indicates that the body’s systems have developed optimally in the prenatal stage, therefore decreasing the risk of health issues after birth. Low birth weight, on the other hand, may indicate that the body’s systems are underdeveloped and the risk of a range of health and development problems increases, including:

- risk of infection as a result of an under-developed immune system
- respiratory conditions, such as bronchitis
- reduced lung function
- feeding difficulties, leading to lack of nutritional intake
- increased risk of bradycardia (a slowing of the heart rate)
- apnoea (a short-term suspension of breathing)
- jaundice — the yellowing of the skin due to the immature liver being unable to process the compound bilirubin, which is found in the blood (see figure 7.18)
- increased risk of asthma during childhood
- poor sucking and swallowing reflexes
- damage to the retina of the eye, resulting in sight difficulties including blindness
- increased risk of deafness
- greater likelihood of impaired learning capabilities
- greater likelihood of impaired growth and motor skill development.

![Jaundice](image1)

**FIGURE 7.18** Jaundice is characterised by yellowing of the skin.

In later life, low birth weight can contribute to high blood pressure, type 2 diabetes and cardiovascular disease.

Low birth weight can be classified according to three categories as shown in figure 7.20. As birth weight decreases, the risk of health and development problems increases. Those classified as having ‘extremely low birth weight’ have a higher risk of complications compared to those classified as having a ‘very low’ or ‘low’ birth weight.
There are many factors or determinants that can contribute to low birth weight. These can be biological, behavioural, physical environment and social determinants.

**Biological**

Babies born under 35 weeks gestation have an increased rate of low birth weight. Less time spent in the uterus means less time to grow and develop, especially in the foetal stage, when the rate of growth increases significantly.

Maternal age also has a relationship with birth weight. Young mothers (especially those under 15 years of age) and older mothers (those over 45 years of age) have higher rates of low birth weight babies (see figure 7.21).

Babies born to parents who are of small stature or were of low birth weight themselves may have an increased risk of being born with low weight. Genetics appear to play a part in this relationship.

**Behavioural**

Maternal nutrition is vital for supplying the unborn baby with the nutrients required for optimal development. An inadequate supply of nutrients can lead to underdevelopment of the foetus.

Smoking, excessive alcohol consumption and drug use during pregnancy contribute to higher rates of low birth weight.
Physical environment

Environmental tobacco smoke can have similar effects on the unborn baby as maternal smoking. Exposure to tobacco smoke increases the risk of a low birth weight baby.

Women in remote areas may have fewer health services in the areas in which they live. This can decrease access to health care which can mean that slowed growth is not detected and goes untreated, contributing to low birth weight.

Social

Parental health is a key factor contributing to birth weight. Illness of the mother during pregnancy can increase the risk of having a low birth weight baby. Infections in the uterus can lead to early labour, while other infections, such as chickenpox and rubella, can cause slowed growth.

Parental education and income influence the behaviours of the mother during pregnancy. Those with the knowledge and the means to access resources such as a nutritious food intake may reduce the risk of having a low birth weight baby.

Prenatal health care includes constant monitoring of the baby’s growth and development. If the foetus is experiencing slowed growth, interventions such as dietary change can be put in place to reduce the risk of low birth weight.

Foetal alcohol syndrome (foetal alcohol spectrum disorder)

The consumption of alcohol during pregnancy has been shown to impact the health and individual human development of the unborn baby in many ways. The severity of the impacts will depend on a range of factors including the amount of alcohol consumed and the susceptibility of the foetus. Common effects include:

- harm to the development of the nervous system, including the brain. Research shows that alcohol can damage developing brain cells. Impaired brain development in those experiencing foetal alcohol syndrome (also called foetal alcohol spectrum disorder) can impact on intellectual development and contribute to behavioural problems throughout life.
- under-nourishment of the growing baby. Alcohol can impact on the absorption of nutrients leading to low birth weight and under-developed organs.
- triggering of changes in the development of the baby’s face, resulting in the typical foetal alcohol syndrome facial features (see figure 7.22).

Behavioural

The biggest factor associated with an increased risk of foetal alcohol syndrome is the amount of alcohol consumed and how often it is consumed throughout the pregnancy. Frequent binge drinking is associated with especially high risks.

The 2009 Australian alcohol guidelines recommend that pregnant women abstain completely from alcohol during pregnancy. In 2010, the majority of pregnant women either reduced their alcohol consumption while pregnant (48.7 per cent) or abstained (48.9 per cent). The
The proportion of pregnant women abstaining during pregnancy increased between 2007 and 2010 (40.0 per cent in 2007 to 48.9 per cent in 2010).

**Physical environment**

Although alcohol consumption is the greatest risk factor for foetal alcohol syndrome, a range of factors can contribute to an increased risk. Those who live far away from health services may have difficulty accessing health care and may not receive the advice they need relating to the potential impacts of consuming alcohol while pregnant, and this may increase their risk of consuming alcohol at risky levels.

**Social**

Those with lower levels of education may not fully understand the risks associated with alcohol consumption during pregnancy. This may increase the likelihood of the mother drinking to risky levels.

Individuals who experience poor mental health during pregnancy may be more likely to consume alcohol in an attempt to numb feelings of sadness and despair. The health and development of the foetus may be affected as a result.

Women who face financial, cultural or other social barriers to accessing health care may not be able to discuss their alcohol consumption patterns with a health professional. As a result, strategies may not be put in place to reduce alcohol consumption if intake is considered to be at a risky level.

Women who access health care may discuss their alcohol consumption patterns with a health professional. Strategies may then be put in place to reduce alcohol consumption if intake is considered to be at a risky level.

**Gestational diabetes**

Gestational diabetes is characterised by high blood glucose levels. It occurs in around 5 per cent of all pregnancies and can impact on women in a number of ways, including:

- high blood pressure
- preterm labour
- longer hospital stay than mothers without gestational diabetes
- increased risk of developing type 2 diabetes
- increased risk of cardiovascular disease.

Gestational diabetes also increases the risk of many adverse outcomes for the developing baby including higher than normal birth weight, respiratory conditions and jaundice.

There are numerous factors that can either decrease or increase the risk of developing gestational diabetes.

**Biological**

Women who have a genetic predisposition to type 2 diabetes are at a higher risk of developing gestational diabetes during pregnancy.

Maternal age has been noted as a risk factor for gestational diabetes. The proportion increased with age from 4.1 per cent for women aged under 35 to 7.3 per cent for women aged 35–39 and 10.3 per cent for women aged 40 or over (AIHW, 2010).

Body weight is one of the major factors in determining the risk of gestational diabetes. Overweight and obesity at the time of fertilisation significantly increase
the risk factors for the development of gestational diabetes. Ensuring body weight is within the normal range before pregnancy occurs can reduce the risk of developing gestational diabetes.

**Behavioural**

Maternal nutrition can impact body weight. Although gaining weight is a normal and required aspect of pregnancy, those who consume an energy-dense diet and consume alcohol are at greater risk of becoming overweight or obese, which increases the risk of gestational diabetes.

Physical activity acts to burn off excess energy. Sedentary lifestyles, on the other hand, can contribute to weight gain and gestational diabetes.

**Physical environment**

Women who live in areas where health care is accessible may be able to receive health education prior to pregnancy occurring. They may be provided with strategies to assist them in losing excess body weight prior to becoming pregnant.

**Social**

Parental education is a key factor in preventing the onset of gestational diabetes. Those who are educated are more likely to understand the risk factors for gestational diabetes and act to reduce their risk of developing this condition.

Having adequate income can assist in affording resources such as health care and nutritious foods, which can, in turn, assist with weight management and decrease the risk of gestational diabetes.

Cultural factors can prevent some people from accessing health care. Indigenous Australians for example, are less likely to access health care during pregnancy, which can contribute to the higher rates of gestational diabetes experienced. Body weight also plays a role in this difference, but access to health care could provide knowledge about the risks associated with development of gestational diabetes.

Use the Gestational diabetes weblink in the Resources section of your eBookPLUS to watch a video about this condition.
**TEST your knowledge**

1. (a) Explain how the neural tube forms.  
   (b) Explain what is meant by a ‘neural tube defect’.  
   (c) Describe spina bifida.  
   (d) Explain why folate intake is important prior to fertilisation in reducing the risk of spina bifida.  
   (e) Besides nutrition, discuss the determinants of health and development that can increase the risk of spina bifida.

2. (a) Identify what constitute low, very low and extremely low birth weights.  
   (b) Outline the possible effects of low birth weight.  
   (c) Discuss the determinants of health and individual human development that can increase the risk of having a low birth weight baby.

3. (a) Describe foetal alcohol syndrome.  
   (b) Discuss the factors that may contribute to alcohol consumption during pregnancy.

4. (a) Explain gestational diabetes.  
   (b) Discuss the effects of gestational diabetes.  
   (c) Discuss the determinants of health and individual human development that can increase the risk of developing gestational diabetes.

**APPLY your knowledge**

5. Devise a poster, multimedia presentation or short video that educates parents about the risk and protective factors associated with a health issue of your choice.
7.6 Strategies and programs designed to promote prenatal health and individual development

**KEY CONCEPT** Understanding government, community and personal strategies and programs designed to promote health and individual human development of pregnant women and unborn children

As explored in the last section, there are a number of issues that can impact on the health and individual human development of pregnant women and their unborn babies. In response to these and other issues, a number of programs and strategies have been designed to reduce the risk of negative outcomes and promote the health and development of mothers and babies during the prenatal stage of the lifespan. These programs and strategies exist at a government, community and personal level.

**Government programs and strategies**

All levels of government, federal, state/territory and local, implement strategies and programs to promote the health and individual human development of pregnant women and their unborn babies.

**Federal government**

- Medicare is Australia's universal health insurance scheme that provides free or subsidised treatment for all Australians through the public health system. Pregnant women can access a range of Medicare-funded health services throughout their pregnancy, including free treatment in public hospitals. By making health care more affordable, Medicare increases accessibility to prenatal health care which can assist with early detection of issues during pregnancy and medical intervention when required. Medicare also assists in providing professional health workers such as nurses, midwives, doctors and obstetricians to assist with the birthing procedure at no charge to the patient.

*FIGURE 7.24* Medicare covers the costs of many prenatal health services.
• Food Standards Australia New Zealand is the federal government body responsible for making laws relating to the food industry. In Australia, numerous laws have been implemented in an attempt to increase the intake of nutrients required for the optimal health and development of unborn babies. Iodine and folate intake, specifically, have been shown to be deficient across the population and deficiency of these nutrients can contribute to a range of birth defects during pregnancy, including neural tube defects and impaired brain development. Mandatory fortification laws require food manufacturers to add iodine and folate to specific food products. Since 2009, all salt used in bread manufacturing (except organic bread) must be iodised salt. Similarly, all bread products (except organic bread) must contain added folate. Bread was selected as the subject of mandatory fortification laws as most people consume bread on a regular basis and regular consumption may decrease the risk of the defects associated with deficiency of iodine and folate.

• The federal government provides a **free** phone and online service for pregnant women and new parents who have a baby up to 12 months of age. The Pregnancy, Birth and Baby service provides information and advice on topics such as maternal nutrition, breastfeeding, a baby’s development and sleeping habits as well as direction to maternity-related services including specialist and support services (figure 7.26).

• Through the **Immunise Australia** program, the federal government provides free influenza vaccines for all pregnant women. Pregnant women are at high risk of severe consequences of influenza infection. The Australian government aims to provide greater protection against influenza for pregnant women, by making influenza vaccine available, free of charge.

• The **National Perinatal Depression Initiative** is a federal government strategy developed in conjunction with all state and territory governments. It aims to promote the mental health of pregnant women, providing:
  – routine and universal screening for perinatal depression
  – follow up support and care for women assessed as being at risk of or experiencing perinatal depression
  – workforce training and development for health professionals
  – research and data collection
  – national guidelines for screening for perinatal depression
  – community awareness.

![FIGURE 7.25](image_url) Most bread in Australia is fortified with folate and iodine.

![FIGURE 7.26](image_url) The Pregnancy, Birth and Baby service logo
**Victorian Government**

- The Victorian Government provides a range of maternity services for Victorian women. As well as running public hospitals (where many antenatal health care encounters and births occur), the government has also established three tertiary hospitals that provide state-wide maternity services for the most complex pregnancies. Tertiary hospitals employ specialists with experience in dealing with high-risk pregnancies.
- The Maternal and Child Health Line is a Victorian Government service that is staffed by qualified maternal and child health nurses who provide callers with information, support and advice regarding child health, maternal and family health, and parenting issues. This is a free service for all Victorians.
- Established by the Victorian Government, the Better Health Channel provides online health and medical information for the Victorian community. It contains information to educate parents about issues relating to pregnancy and childbirth. Fact sheets are available on topics such as:
  - folate during pregnancy
  - foetal alcohol syndrome
  - pregnancy and exercise
  - pre-eclampsia
  - gestational diabetes
  - ectopic pregnancy.
- The Healthy Mothers, Healthy Babies program aims to promote prenatal health of pregnant women and their unborn babies by addressing risk behaviours and providing support during pregnancy.
  The Healthy Mothers, Healthy Babies program targets pregnant women who are unable to access prenatal care services or require additional support because of their socioeconomic status, culturally and linguistically diverse background, Aboriginal and Torres Strait Islander descent, age or residential distance to services.
  The program operates in the outer growth suburbs of Melbourne that have high numbers of births, higher rates of relative socioeconomic disadvantage and lower service accessibility.
  The aim of the Healthy Mothers, Healthy Babies program is to improve the health and wellbeing of mothers and babies by:
  - facilitating access to prenatal, postnatal and other health and human services
  - supporting women throughout their pregnancy
  - delivering key health promotion messages that enable healthy behaviours in pregnancy and beyond.
  The Healthy Mothers, Healthy Babies program is not a clinical antenatal care service but acts to complement existing services by linking women into services early, providing additional support that is not available in current services, and promoting a continuum of care for the woman by working with maternity and maternal and child health services.

**Local government**

Maternal and child health centres are located in every local government area in Victoria, which are jointly funded by state and local governments and usually managed by local government. The centres are staffed by highly qualified maternal and child health nurses, with support from a range of other health professionals. Pregnant women can seek advice relating to their pregnancy and receive prenatal health care at these centres.
Community programs and strategies

Community programs and strategies are often developed by non-government organisations and have a specific focus with regards to prenatal health and development. *beyondblue’s* perinatal program, You2 Program and Australian Action on Pre-eclampsia are examples of community programs and strategies.

*beyondblue’s* perinatal program

*beyondblue* is an independent, not-for-profit organisation working to increase awareness and understanding of depression and anxiety in Australia, and to reduce the associated stigma. Part of *beyondblue’s* work relates to maintaining positive mental health during pregnancy and early parenthood. Through *beyondblue’s* perinatal program, a range of resources are provided for health professionals, women and their families including:

- online training for health professionals
- printed resources for health professionals
- resources for expectant and new parents
- the ‘Just Speak Up’ website, which provides a forum for people to share their experiences with antenatal and postnatal depression and anxiety
- the ‘Mind the Bump’ app, developed with Smiling Mind, a free mindfulness meditation tool for new and expecting parents.

**FIGURE 7.28** The *beyondblue* logo

You2

The You2 initiative was developed by Diabetes Australia with the aim of preventing gestational diabetes and supporting those with the condition. The You2 website provides practical advice relating to healthy eating, exercise and prenatal health care. The online blog allows women with gestational diabetes to share their stories and provide support to others with the condition.

**Australian Action on Pre-eclampsia (AAPEC)**

Australian Action on Pre-eclampsia Inc. (AAPEC) is a Victorian association set up to provide support and information to families who are experiencing or have experienced pre-eclampsia. The organisation aims to educate the public and health professionals about the prevalence and risks of pre-eclampsia, and campaigns for greater awareness of this condition. AAPEC publishes regular newsletters, provides brochures, organises educational seminars and workshops, and raises funds to promote research into the prevention and early detection of pre-eclampsia.

**FIGURE 7.29** The AAPEC logo
Personal programs and strategies

Many of the personal strategies that individuals can employ during pregnancy relate to addressing the factors that can be modified to optimise the health and individual human development of themselves and their unborn babies. Examples include:

- Maintaining healthy body weight can reduce the risk of gestational diabetes.
- Ensuring nutrient intake is adequate leading up to pregnancy and taking supplements if required, specifically folic acid and iodine supplements, can reduce the risk of neural tube defects.
- Having regular prenatal health checks assists in monitoring health and implementing changes required to promote health and individual human development.
- Increasing education levels relating to pregnancy, including attending antenatal classes, provides information and strategies relating to the birthing procedure.
- Avoiding teratogens such as raw fish, soft cheeses, alcohol, drugs, x-rays and tobacco can reduce the risk of conditions such as low birth weight.
- Ensuring vaccinations are up to date prior to pregnancy reduces the risk of infection and disease during pregnancy.
- Reducing the risk of infection by avoiding contact with those who are ill and maintaining adequate levels of hygiene.
- Reducing stress levels can assist in maintaining optimal mental health.

TEST your knowledge

1. Identify three government strategies and/or programs and explain how each can promote the health and individual human development of pregnant women and/or their unborn babies.

2. (a) Briefly explain mandatory fortification.
    (b) i. Which nutrients are the subject of mandatory fortification laws?
    ii. Discuss why these nutrients are a focus of mandatory fortification laws.

3. (a) Identify the federal government’s phone and online help service.
    (b) Discuss two ways in which this service may promote health and development of pregnant women and/or unborn babies.

4. (a) Explain the Healthy Mothers, Healthy Babies program.
    (b) Explain how the program works to promote health and development of mothers and babies.

5. Discuss how local governments contribute to improved health and individual human development for pregnant women and unborn babies.

APPLY your knowledge

6. Use the Better Health Channel links in the Resources section of your eBookPLUS to find the weblink and questions for this activity.

7. Use the beyondblue, You2 or the Australian Action on Pre-eclampsia links in the Resources section of your eBookPLUS to find the weblink and questions for this activity.

8. Use the Just Speak Up links in the Resources section of your eBookPLUS to find the weblink and questions for this activity.

9. Create a pamphlet that could be given out at maternal health centres to assist in educating pregnant women about personal strategies that may promote their and their unborn baby’s health and development.
KEY SKILLS The determinants of health and individual human development during the prenatal stage

KEY SKILL Explain the determinants of health and individual human development and their impact during the prenatal stage of the lifespan using relevant examples

In order to demonstrate this skill, a thorough understanding of the determinants of health and individual human development and how they relate to the prenatal stage of the lifespan is essential. The ability to use relevant examples to demonstrate this understanding is expected. When outlining the determinants of health and individual human development, it is important to remember the following:

- Understand at least one factor or example relating to each determinant, i.e. one biological, behavioural, physical environment and social environment example.
- Focus on factors that are relevant to the prenatal stage of the lifespan and ensure that the discussion makes reference to how the selected factor impacts on health and human development during this stage.
- To clearly demonstrate an understanding of the impact of a selected determinant of health on health and individual human development during the prenatal stage, it is important to be able to outline what the factor is.
- The determinants of health and individual human development help explain or predict trends in health. When outlining the impact of a selected determinant, explain the way in which it impacts on the health and individual human development during the prenatal stage.

Consider the following example where the biological determinant of health and individual human development is explained and one example is discussed with regards to the possible impacts on health and human development during the prenatal stage of the lifespan.

Biological determinants are factors relating to the body that impact on health and human development. Genetics are an example of a biological determinant that is particularly relevant during the prenatal stage of the lifespan.

Genetics relate to the genetic information passed from parents to the unborn baby at fertilisation. During the prenatal stage, genetics can impact on health in a number of ways. Genetic conditions such as haemophilia can be passed down from the unborn baby's parents. Haemophilia is a sex-linked condition that is generally carried by females and occurs in males. It is characterised by an inability of blood to clot. Chromosomal abnormalities such as Down syndrome are also related to genetics. Three copies of the 21st chromosome are present instead of two. Down syndrome is characterised by intellectual disability.

Genetics also contribute to individual human development during the prenatal stage. The sex of the unborn baby is determined by the 23rd pair of chromosomes. An unborn baby with an ‘XY’ pairing will be male and an unborn baby with ‘XX’ will be female. Sex determines the sex organs that will develop during the prenatal stage.
PRACTISE the key skills

1. (a) Explain the physical environment as a determinant of health and individual human development.
(b) Identify one example of a physical environment determinant and explain how it can impact on health and individual human development during the prenatal stage of the lifespan.

2. Behavioural determinants relevant to the prenatal stage of the lifespan include maternal nutrition prior to and during pregnancy, parental smoking, alcohol and drug use during pregnancy, and vaccination behaviours. Select one of these examples, and explain how it can impact on health and individual human development during the prenatal stage of the lifespan.

KEY SKILL Describe a specific health issue affecting the prenatal stage of the lifespan and draw informed conclusions about personal, community and government strategies and programs to optimise prenatal health and development.

For this key skill, knowledge of one health issue relevant to the prenatal stage is essential. Issues include spina bifida, low birth weight, foetal alcohol syndrome (foetal alcohol spectrum disorder) and gestational diabetes. The first step of this skill is to be able to describe the issue. The determinants of health and development that increase or decrease the risk of the issue are an important aspect of the description.

The second part of this skill relates to the personal, community and government strategies and programs that aim to optimise health and development during the prenatal stage. Knowledge of these strategies and programs is required and the ability to draw informed conclusions relating to how they can optimise health and development is necessary.

In the following example, gestational diabetes is described.

Gestational diabetes is characterised by an inability of the body to utilise glucose effectively. Instead of being transported into the cells, glucose remains in the bloodstream and is filtered out through the kidneys and eventually passed in the urine. As a result of the excess blood glucose present, extra energy is provided to the foetus, which can result in high birth weight. Mothers who are overweight or obese (biological) have an increased risk of gestational diabetes. Food intake and exercise prior to pregnancy (behavioural) impact body weight and also play a role in the onset of this condition. Advancing age and a genetic predisposition (biological) also increase the risk of gestational diabetes.

In the next example, strategies that can assist with optimising health and development during the prenatal stage are discussed. In this instance, reducing the risk and impacts of gestational diabetes are the focus.

Personal strategies, including maintaining healthy body weight before and during pregnancy, can reduce the risk of gestational diabetes. Accessing expert advice on behaviours such as food intake and exercise to assist in maintaining healthy body weight is also beneficial in reducing the risk of gestational diabetes.

Community strategies such as the You2 program provide support for those with gestational diabetes. The online blog allows sufferers to share their experiences of gestational diabetes. Individuals can provide advice and support to each other to assist with dealing with the impacts of this condition.
The Victorian Government’s Healthy Mothers, Healthy Babies program provides support to population groups at increased risk of health concerns during pregnancy, including gestational diabetes. Vulnerable individuals are linked to health services to ensure that education and health care are provided throughout the pregnancy to reduce the risk of developing the condition. For those diagnosed with gestational diabetes, blood glucose levels can be monitored and relevant interventions put in place to reduce the impact of the condition.

**PRACTISE the key skills**

3 Issues affecting the prenatal stage of the lifespan include spina bifida, low birth weight, foetal alcohol syndrome (foetal alcohol spectrum disorder) and gestational diabetes.
   (a) Select one of these issues and explain it briefly.
   (b) Discuss the determinants of health and individual human development that can decrease or increase the risk of this health issue.

4 A range of personal, community and government strategies exist to promote health and individual human development during the prenatal stage of the lifespan.
   (a) Identify two personal strategies and explain how each can promote health and individual human development during the prenatal stage of the lifespan.
   (b) Discuss one community strategy that is designed to promote prenatal health and individual human development.
   (c) Discuss a range of government programs and/or strategies that aim to promote health and individual human development during the prenatal stage of the lifespan.
Chapter summary

- A range of determinants of health and individual human development impact on both pregnant women and their unborn babies during the prenatal stage of the lifespan.
- Biological determinants are factors affecting the body that impact health and individual human development and include genetics.
- Genetics determine numerous aspects of health and development during the prenatal stage including the sex of the baby, genetic conditions and chromosomal abnormalities.
- The behavioural determinants that impact on prenatal health and development are related to the behaviours and choices of the parents both before and during pregnancy. Examples include maternal nutrition prior to and during pregnancy, parental smoking, alcohol and drug use during pregnancy, and vaccination behaviours.
- Adequate nutrition is important in ensuring that the nutrients required for optimal health and individual human development of the unborn baby are present. Deficiency of specific nutrients such as folate and iodine can contribute to health concerns such as spina bifida and intellectual disability.
- Parental smoking causes toxic substances to cross the placenta. This increases the risk of birth defects and foetal mortality.
- Alcohol use during pregnancy can lead to foetal alcohol syndrome. Foetal alcohol syndrome, also known as foetal alcohol spectrum disorder, increases the risk of premature birth, heart defects, behavioural problems and a range of physical characteristics.
- A range of drugs can impact on the unborn baby including prescription and illegal drugs, and caffeine. Side effects include low birth weight, increased risk of miscarriage and delayed growth.
- Vaccination is important prior to pregnancy to reduce the risk of infection and disease in the mother. The unborn baby is particularly susceptible to the impacts of diseases such as influenza that can result in birth defects and miscarriage.
- The physical environment relates to the physical surroundings in which people live, work and play. Examples include tobacco smoke in the home and access to health care.
- Tobacco smoke in the home can cause chemicals in tobacco smoke to cross the placenta and impact the unborn baby in numerous ways, including spontaneous abortion, prematurity and birth defects.
- Where people live impacts on their ability to access health care. Those in rural and remote areas, in particular, may not be able to access local health services. Lack of access to health care can contribute to adverse health and development outcomes as conditions may not be diagnosed and treated.
- Social determinants relate to aspects of society and the social environment that impact on health and development. Examples relevant to the prenatal stage of the lifespan include parental education, parental income, parental health and disability, and access to health care.
- Parental education influences the behaviours of parents during the prenatal stage of development including accessing health care, nutrition, tobacco use and alcohol consumption. It also impacts on the income of the parents.
- Parental income influences the ability of parents to access health-promoting goods and services during the prenatal stage, such as nutritious food and health care.
- Optimal parental health during pregnancy assists in promoting the health and development of the unborn baby. Ill health and disability, on the other hand, can limit the ability of the parents to provide all the necessary resources for their unborn baby. Infectious diseases can interfere with normal development if they cross the placenta and infect the baby.
- Social factors such as income, education and culture can limit the ability of individuals to access health care during the prenatal stage of the lifespan.
A range of health issues are a concern during the prenatal stage of the lifespan, including spina bifida, low birth weight, foetal alcohol syndrome and gestational diabetes.

Spina bifida occurs when the neural tube fails to close properly. Genetic conditions, maternal age, folate deficiency, exposure to excessive heat, parental illness and education all play a role in the development of spina bifida.

Low birth weight is classified as a baby under 2500 grams at birth. Premature birth, maternal age, genetics, maternal nutrition, tobacco and alcohol use, tobacco in the home, access to health care, parental health and parental education and income all play a role in low birth weight.

Foetal alcohol syndrome is characterised by developmental issues such as intellectual disability, low birth weight and changes in the facial features of the baby. Alcohol use, parental education, maternal health and access to health care play a role in foetal alcohol syndrome.

Gestational diabetes is characterised by an inability to transport glucose from the bloodstream into the cells. It can contribute to high birth weight in the baby and increased risk of type 2 diabetes in the mother. Risk factors include overweight and obesity, advancing age, genetic predisposition, food intake, alcohol consumption, physical inactivity, lack of access to health care, and low levels of parental education and income.

A range of government, community and personal strategies and programs have been implemented to promote prenatal health and development.

Government initiatives include Medicare, mandatory fortification laws, the Pregnancy, Birth and Baby Service, Immunise Australia, the National Perinatal Depression Initiative, the Maternal and Child Health Line, Better Health Channel, the Healthy Mothers, Health Babies program, and Maternal and Child Health Services.

Community initiatives include beyondblue, the You2 program and Australian Action on Pre-eclampsia.

Personal strategies include accessing health care, maintaining adequate nutrition, not smoking or consuming alcohol, increasing education, avoiding teratogens and being vaccinated.

TEST your knowledge

1. Discuss the possible impacts on health and individual human development during the prenatal stage of the lifespan in relation to one:
   (a) biological determinant
   (b) behavioural determinant
   (c) physical environment determinant
   (d) social determinant.

2. Select one health issue and complete the following table:

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description</th>
<th>Determinants that act as risk or protective factors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Biological</td>
</tr>
</tbody>
</table>

3. Select one government, community and personal strategy and/or program and explain how it can optimise health and individual development during the prenatal stage of the lifespan.