INQUIRY QUESTION
What factors might influence the cardiovascular and respiratory health of these individuals?
Good cardiorespiratory health is important for the efficient functioning of the cardiovascular and respiratory systems. Maintaining a healthy lifestyle and participating in regular physical activity has an important role in reducing the risk factors that may lead to chronic illnesses associated with these body systems.

**KEY KNOWLEDGE**
- Physiological, social, cultural and environmental enablers and barriers of cardiovascular health (such as atherosclerosis, coronary heart disease, high cholesterol levels, hypertension and stroke) and respiratory health (such as chronic obstructive pulmonary disease)
- The role of physical activity, sport and exercise to enhance the capacity and functioning of the cardiovascular and respiratory systems

**KEY SKILLS**
- Assess enablers and barriers to cardiorespiratory health and investigate strategies to enhance the capacity and functioning of the cardiorespiratory system

**CHAPTER PREVIEW**

Cardiovascular disease
- Atherosclerosis
- Coronary heart disease
- High cholesterol
- Hypertension
- Stroke

Enablers and barriers
- Physiological
- Social
- Cultural
- Environmental

Respiratory disease
- Chronic obstructive pulmonary disease

Strategies to enhance the capacity and functioning of the cardiorespiratory system
- Physical activity, sport, exercise
8.1 Cardiorespiratory health

**KEY CONCEPT** The health of the cardiovascular and respiratory systems is important for the efficient functioning of the body. When the functioning of these systems is compromised, it is much more difficult for the individual to deliver oxygen required for daily activities to cells.

**Cardiovascular health**

Cardiovascular health refers to the efficient functioning of the heart and blood vessels to transport oxygen, nutrients and waste products around the body. A number of factors can influence the health of the cardiovascular system, either positively or negatively. The maintenance of a healthy lifestyle is well known to be important for maintaining good cardiovascular health and preventing and managing cardiovascular disease.

**Cardiovascular disease** describes a number of conditions that affect the heart and blood vessels, including atherosclerosis, coronary heart disease, high cholesterol levels, hypertension, stroke and heart attacks.

Cardiovascular disease is the leading cause of death worldwide and is one of the biggest killers in Australia. In 2012 approximately 30 per cent of deaths recorded in Australia attributed cardiovascular disease as the underlying cause. Furthermore, an estimated 3.7 million Australians, or 1 in 5 adults, are living with a cardiovascular disease (AIHW, 2011–12).

**TABLE 8.1 How cardiovascular disease affects Australian adults**

<table>
<thead>
<tr>
<th>Cardiovascular disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 in 5 Australian adults (22%) — approximately 3.7 million people in 2011–12 — had</td>
</tr>
<tr>
<td>cardiovascular disease, based on self-reported data.</td>
</tr>
<tr>
<td>1.1 million</td>
</tr>
<tr>
<td>Hospitalisations — 11% of all hospitalisations in 2013–14 — where cardiovascular</td>
</tr>
<tr>
<td>disease was the principal and/or additional diagnosis.</td>
</tr>
<tr>
<td>30%</td>
</tr>
<tr>
<td>or 43,946 Australian deaths in 2012, recorded cardiovascular disease as the underlying</td>
</tr>
<tr>
<td>cause.</td>
</tr>
<tr>
<td>2 times as high</td>
</tr>
<tr>
<td>Cardiovascular disease hospitalisation rates for Aboriginal and Torres Strait Islander</td>
</tr>
<tr>
<td>Australians compared to other Australians.</td>
</tr>
<tr>
<td>Cardiovascular disease death rates were 30% higher than for non-Indigenous Australians.</td>
</tr>
<tr>
<td>50% higher</td>
</tr>
<tr>
<td>Cardiovascular disease death rates in the lowest socioeconomic group compared with the</td>
</tr>
<tr>
<td>highest group.</td>
</tr>
<tr>
<td>Similarly, 20% higher for CVD hospitalisation rates.</td>
</tr>
</tbody>
</table>

This information was last updated in August 2015.

**Cardiovascular diseases**

**Atherosclerosis**

*Atherosclerosis* is a condition where the arterial walls become clogged up with fatty deposits known as plaque or atheroma (see figure 8.1). This build-up of deposits narrows the vessels and restricts blood flow in the arteries, meaning the heart has to work harder to pump blood around the body. This build-up can occur in any artery in the body.

Atherosclerosis is the underlying cause of many cardiovascular diseases and can lead to heart attack or stroke due to the blockage created by the deposits in the arteries. Atherosclerosis can be caused by lifestyle habits such as smoking, poor nutrition and physical inactivity, as well as other factors such as high cholesterol, high blood pressure, diabetes and family history.

![Atherosclerosis diagram](image)

**FIGURE 8.1** Atherosclerosis is the underlying cause of many other cardiovascular diseases.

**Coronary heart disease.**

**Coronary heart disease (CHD)** is also called ischaemic heart disease. It occurs when plaque builds up in the coronary arteries causing them to narrow and thus reducing blood flow to the heart (atherosclerosis). It can lead to heart attack (blood supply to the heart blocked) and angina (chest pain or discomfort due to reduced blood flow to the heart).

CHD is the most common form of heart disease, affecting 1.2 million Australians (5.2 per cent). It is also the leading cause of death in Australia, accounting for 13.4 per cent of all deaths registered in 2013 (ABS).

The major risk factors for CHD are the same as those for atherosclerosis.

**High cholesterol levels**

Cholesterol is a waxy, fat-like substance found in body cells. There are three forms of cholesterol in the body:

- **High density lipoproteins (HDL).** These carry cholesterol in the blood to the liver for removal from the body. HDL helps protect against coronary heart disease by removing the cholesterol.

- **Low density lipoproteins (LDL).** These carry most of the cholesterol in the blood and can cause fatty deposits to build up in the artery walls. High levels of LDL lead to increased risk of coronary heart disease.
8.1 Cardiorespiratory health

**High cholesterol** is when a person has greater amounts of cholesterol in the blood than required, which can increase the risk of cardiovascular disease.

**Figure 8.2** Foods high in saturated and trans fats contribute to the development of high cholesterol levels.

- **Triglycerides.** These are found in the blood and stored in fat cells, and they can increase the risk of coronary heart disease. A high level of triglycerides in the bloodstream can be caused by eating too much food high in animal fat.

In 2014–15, 1.6 million Australians (7.1 per cent) reported having high cholesterol levels (ABS).

High cholesterol is caused by eating foods high in saturated and trans fats. It is one of the major causes of heart disease as it deposits on and narrows arteries, making the heart work harder to pump blood around the body. Individuals should aim to raise their HDL levels and lower their LDL levels for good health. This can be achieved through adopting a healthy lifestyle such as making healthy eating choices, incorporating regular physical activity and not smoking.

**Hypertension**

As outlined in chapter 6, blood pressure indicates how hard the body has to work to push blood out of the heart and through the arteries. A typical blood pressure reading is 120/80 mm Hg, where 120 is the systolic pressure (contractile phase of the heart cycle) and 80 is the diastolic pressure (relaxing phase of the heart cycle).

**Hypertension** (high blood pressure) is when the systolic and/or diastolic pressure is elevated above normal levels. Hypertension is classed as having a reading higher than 140/90 mm Hg (individually or together). A high blood pressure reading means that the heart has to work harder to pump blood through the arteries and blood flow may be restricted due to the pressure applied. This places an individual at increased risk of coronary heart disease, stroke, heart attack and renal disease.

In 2014–15, 1 in 3 adults (32 per cent) over 25 years of age reported or were measured as having hypertension. Men are more likely to have high blood pressure than women and it generally increases with age (see figure 8.3).

**Figure 8.3** Percentage of people with hypertension, by age and gender


Individuals with a family history of hypertension are at increased risk of developing it, along people who are overweight or obese, physically inactive, smoke tobacco, drink excessive alcohol or have a poor diet, particularly one that is high in salt. Hypertension requires life-long treatment that may include medication as well as adopting a healthy lifestyle.
Stroke

A stroke occurs when blood supply to the brain is disrupted. When blood flow doesn’t get to the brain, there is lack of oxygen and cells may die, causing permanent damage. The two main types of stroke are:

- Ischaemic stroke, where a blood clot blocks a vessel
- Haemorrhagic stroke, or rupture and bleeding of a blood vessel.

Ischaemic stroke is the most common, accounting for 80 per cent of all strokes, and the remaining 20 per cent are caused by haemorrhagic stroke. One in six Australians will have a stroke and it is one of the leading causes of disability (AIHW, 2013).

Strokes can be fatal and are the third most common cause of death, accounting for 7 per cent of all deaths in Australia. Strokes are more likely to occur with increasing age, especially over 65 years.

Hypertension (high blood pressure) is the most important risk factor for having a stroke. Other risk factors include age, gender and family history, as well as high cholesterol, overweight and obesity, physical inactivity, poor diet, smoking and excessive alcohol consumption.

Like all other diseases affecting the cardiovascular system, strokes can be prevented through a healthy lifestyle.

Risk factors for cardiovascular disease

Cardiovascular disease can largely be prevented. There are many factors that can contribute to the development of these diseases, some within our control and others that aren’t. Factors that are not modifiable and can’t be controlled include:

- Age — older age increases risk
- Gender — males are more likely to have a cardiovascular disease
- Genetic influence — family history has a strong link to the development of cardiovascular disease
8.1 Cardiorespiratory health

- ethnicity
- other medical conditions — high blood pressure, high cholesterol and diabetes increase risk.

Factors that are modifiable and can be controlled by the individual include health behaviours such as:
- tobacco use
- poor nutrition
- physical inactivity
- harmful use of alcohol.

These influences will be explored further in section 8.2.

### TABLE 8.2 Cardiovascular disease risk factors

<table>
<thead>
<tr>
<th>Behavioural risk factors</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tobacco smoking</strong></td>
<td></td>
</tr>
<tr>
<td>Rates of daily smoking have continued to drop, to 14.5% of adults (2.6 million) smoking in 2014–15, compared with 16.1% in 2011–12 and 22.4% in 2001.</td>
<td></td>
</tr>
<tr>
<td><strong>Excessive alcohol consumption</strong></td>
<td></td>
</tr>
<tr>
<td>In 2014–15, 17.4% of adults consumed more than the recommended two standard drinks per day on average (exceeding the National Health and Medical Research Council lifetime risk guidelines).</td>
<td></td>
</tr>
<tr>
<td><strong>Inadequate fruit and vegetable consumption</strong></td>
<td></td>
</tr>
<tr>
<td>Over 1 in 2 Australian adults (52%) do not eat enough fruit.</td>
<td></td>
</tr>
<tr>
<td>Over 9 in 10 Australian adults (92%) do not eat enough vegetables.</td>
<td></td>
</tr>
<tr>
<td><strong>Insufficient physical activity</strong></td>
<td></td>
</tr>
<tr>
<td>In 2014–15, 55.5% of 18–64 year olds participated in sufficient physical activity in the last week (more than 150 minutes of moderate physical activity or more than 75 minutes of vigorous physical activity, or an equivalent combination of both, including walking). Nearly one in three (29.7%) were insufficiently active (less than 150 minutes in the last week) while 14.8% were inactive (no exercise in the last week).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Biomedical risk factors</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overweight and obesity</strong></td>
<td></td>
</tr>
<tr>
<td>In 2014–15, 63.4% of Australian adults were overweight or obese (11.2 million people).</td>
<td></td>
</tr>
<tr>
<td><strong>High blood pressure</strong></td>
<td></td>
</tr>
<tr>
<td>In 2014–15, 23% of adults (4.1 million people) had measured high blood pressure.</td>
<td></td>
</tr>
</tbody>
</table>


### Respiratory health

Respiratory health relates to the efficient functioning of the lungs. On average, we breathe 23 000 times a day and as this is an involuntary process we tend not to notice it. It is only when our breathing may be compromised, such as during a cold or when exercising, that we do notice it. Many factors can influence the health of our lungs and it is important that we take steps to make sure that they remain healthy and are not at risk of disease.

**Chronic obstructive pulmonary disease (COPD)**

Chronic obstructive pulmonary disease (COPD) is a chronic respiratory condition that limits airflow in the lungs. It is caused by damaged air passages in the lungs. Symptoms can include shortness of breath, coughing, excessive phlegm production, chest tightness and wheezing. COPD is a broad term that also includes the conditions of emphysema (damaged lung tissue) and chronic bronchitis (frequent cough caused by excessive phlegm production).

According to AIHW, in 2011–12 530 000 Australians had COPD. It mainly affects older adults and an estimated 5.7 per cent of Australians 55 and over reported having...
the condition. COPD was the fifth leading cause of death, accounting for 4 per cent of all deaths in Australia. Mortality rates are higher for those living in more remote areas and in areas of low socioeconomic status (SES).

People who have COPD continue to lose lung function over their lifetime. There is no cure for COPD, however steps can be taken to manage the condition. Maintaining lung function and quality of life for people who have COPD is important as it can affect daily activity, sleep patterns and the ability to exercise. Interventions such as quitting smoking, use of specific medication, oxygen therapy and participating in pulmonary rehabilitation programs where education on the benefits of exercise and healthy nutrition are the focus, all help people with COPD manage their respiratory health.

COPD has shared risk factors with cardiovascular conditions such as advancing age and tobacco use but also has specific risk factors relevant to the functioning of the respiratory system such as long-term exposure to lung irritants including fumes, dust and smoke.

**FIGURE 8.6 COPD limits the amount of airflow into the lungs.**

**TEST your understanding**

1. Define cardiovascular and respiratory health.
2. List the common risk factors that can contribute to both cardiovascular and respiratory disease.
3. Name and describe the cardiovascular disease that is the underlying cause of many other cardiovascular diseases.
4. Describe chronic obstructive pulmonary disease and identify a risk factor specific to the respiratory system.

**APPLY your understanding**

5. Cardiovascular and respiratory diseases can largely be prevented. Explain this statement using examples to support your explanation.
6. Using figure 8.3, answer the following questions:
   (a) Outline one trend evident on the graph.
   (b) Compare the difference in hypertension rates between males and females.
   (c) Explain why hypertension is a risk factor for developing other cardiovascular diseases.
7. Access the ABS National Health Survey 2014–15 First Results using the ABS Health Survey weblink in your eBookPLUS.
   Choose one of the following sections related to cardiovascular health and outline how the statistics for people affected by these diseases has changed over time.
   - High cholesterol
   - Heart, stroke and vascular disease
   - Hypertension and blood pressure
8.2 Enablers and barriers to cardiovascular and respiratory health

**KEY CONCEPT** There are many influences on an individual's ability to maintain good cardiovascular and respiratory health. Some of these influences can be positive (enablers) whereas others can be negative (barriers), leading to poor health outcomes.

A number of common risk factors have been identified that can compromise cardiovascular and respiratory health. Some of these factors cannot be modified, such as age, however others are modifiable, such as engaging in physical activity.

The ability to address these risk factors can be influenced by individual physiology, and the social, cultural and physical environments surrounding the individual. Each area has the potential to be an enabler or a barrier to maintaining good cardiovascular and respiratory health. These areas of influence have been outlined below, including their role as an enabler and/or barrier to health.

**Physiological enablers and barriers**

**Age**

Advancing age can act as a barrier to cardiovascular and respiratory health as the body gradually loses efficiency in its functions over time. The heart and lungs become less efficient and this can contribute to the development of cardiorespiratory diseases. Basal metabolic rate also slows with advancing age, making it more difficult to manage weight and therefore increasing the chance of weight gain.

**FIGURE 8.8** Advancing age is a non-modifiable risk factor for cardiorespiratory diseases.
Gender
Being male can act as a barrier to cardiorespiratory health. Males tend to be more prone to cardiorespiratory diseases and are less likely than females to seek regular medical checkups to monitor their health. Physiologically, males have a higher propensity to store fat around the abdomen, as well as being more likely to be overweight (70.8 per cent compared to 56.3 per cent) and have hypertension (24.4 per cent compared to 21.7 per cent) than females.

Family history
Family history can act as an enabler to good cardiorespiratory health. Although family history is not modifiable, if an individual is aware of the increased risk of developing cardiorespiratory disease due to family history, they may choose to lead a healthy lifestyle and seek regular medical assistance to monitor their blood pressure and cholesterol levels.

Body weight
Maintaining a healthy body weight can act as an enabler to good cardiorespiratory health. Engaging in physical activity and eating a well-balanced diet low in saturated fats contribute to energy balance and reduce the chance of developing cardiorespiratory diseases.

Beings overweight or obese can act as a barrier to cardiorespiratory health, as having excess body weight makes it harder for the heart and the lungs to effectively deliver oxygen into and around the body. This increases the risk of hypertension and high cholesterol levels in the blood.

Other cardiovascular diseases
Atherosclerosis, high blood pressure and high cholesterol all act as barriers to good cardiovascular health. The build-up of plaque in the blood vessels makes the heart work harder and can lead to the development of coronary heart disease, heart attack or stroke. Reducing salt and saturated and trans fat intake through a healthy diet can help an individual reduce the risk of cardiovascular disease.

Social enablers and barriers
Socioeconomic status
Socioeconomic status refers to an individual’s position in society in comparison to others, based on their income, education and occupation.
High socioeconomic status can act as an enabler for cardiorespiratory health as people with a higher income and level of education are more likely to have greater knowledge, choices and resources available to them to engage in a healthy lifestyle. This can include being able to purchase healthier food, such as fresh fruit and vegetables, as well as having gym memberships to be physically active.
Conversely, low socioeconomic status can be seen as a barrier as it is often associated with increased risk factors, leading to poor cardiorespiratory health. People in low socioeconomic groups are more likely to be obese, and have higher rates of smoking and lower levels of physical activity, which are all significant risk factors for developing cardiovascular and respiratory disease (see figure 8.9).
8.2 Enablers and barriers to cardiovascular and respiratory health

People who are unemployed or in low-paid jobs have less money to purchase healthy food, participate in physical activity and pay for medical visits to reduce the effect of the common risk factors for developing cardiorespiratory diseases.

According to AIHW, cardiovascular disease death rates are 50 per cent higher in the lowest socioeconomic group compared with the highest socioeconomic group (Table 8.1).

**Education**

Knowledge about the health benefits of engaging in physical activity, eating a nutritious diet, limiting salt, saturated and trans fat and alcohol intake, and not smoking, acts as an enabler to cardiovascular and respiratory health. Health literacy, or the understanding of health information, is an important part of knowing how to lead a healthy life and where to access healthcare.

**Social support**

Social support of family, friends and health professionals can act as an enabler to cardiorespiratory health. The support of others can assist an individual through encouragement to engage in healthy behaviours, such as participating in physical activity together or sharing healthy meals. Social support can also assist with reducing risky behaviours that may lead to cardiorespiratory diseases, such as encouragement to quit smoking.

**Cultural enablers and barriers**

**Ethnicity**

Ethnicity is a non-modifiable risk factor for development of cardiorespiratory disease. Australia is a multicultural country and many cultures have different knowledge, beliefs and attitudes to health and the behaviours that can promote good cardiorespiratory health.

Culturally and linguistically diverse communities are at greater risk of developing cardiorespiratory disease. Barriers such as language, access to healthcare providers, and the absence of culturally appropriate programs and services may all contribute to poor cardiorespiratory health. For example, Muslim women who may not be able to access female healthcare professionals may go undiagnosed with cardiovascular and respiratory health.

Indigenous Australians have higher rates of many of the risk factors for cardiorespiratory disease compared to non-Indigenous Australians. This includes obesity, hypertension, tobacco and alcohol use, lower levels of physical activity and poor diet. Cardiovascular disease death rates are 30 per cent higher than for non-Indigenous Australians (AIHW) (table 8.1).

Both these community groups often have lower socioeconomic status (less education, income, employment) and often reside in rural and remote areas. These multiple barriers to health can predispose them to cardiovascular and respiratory diseases.

**FIGURE 8.10** Exercising with others is a strong motivator for participating in physical activity.

**FIGURE 8.11** Indigenous Australians are at greater risk of suffering from a cardiovascular disease than non-Indigenous Australians.
Environmental enablers and barriers

Geographic location
Living in remote and rural areas can act as a barrier to health, due to lack of access to services that are more readily available in major towns and cities. This can include access to fresh fruit and vegetables. If there is not a regular delivery, people may eat processed foods that are high in salt and saturated fat, placing them at increased risk of atherosclerosis and weight gain.

Healthcare facilities may be limited and the inability to access a variety of healthcare specialists may limit the opportunities those in rural and remote communities have to seek medical advice. Long waiting times and lack of prescreening, such as regular blood pressure and cholesterol checks, can be barriers to cardiorespiratory health.

Access to transport can also be a barrier as individuals may have greater distances to travel for services such as purchasing of food, participation in physical activity and seeking medical assistance. Travel can be expensive and this is a significant issue as in some communities there is higher than average unemployment and lower levels of income.

Access to recreation facilities
Areas such as parks, ovals, cycling and walking paths, as well as indoor sports and recreation facilities can act as enablers to good cardiorespiratory health. They provide an opportunity for people to be active and engage in physical activity which can assist in the maintenance of a healthy body weight and efficient functioning of the cardiovascular and respiratory systems. Urban environments are more likely to have such infrastructure than rural and remote environments.

Air quality
Good indoor and outdoor air quality is particularly important for the health of the respiratory system. Working in an environment where the individual may be exposed to irritants and fumes, such as being a painter, can act as a barrier to good health. Likewise, exposure to tobacco smoke, whether actively or passively inhaled, is a serious risk to both systems, contributing to chronic obstructive pulmonary disease.

TEST your understanding
1 Discuss the difference between enablers and barriers to cardiovascular and respiratory health.
2 Explain how socioeconomic status can be both an enabler and barrier to good health.
3 People who live in rural and remote areas are more likely to have a cardiorespiratory disease. Discuss why this is the case.

APPLY your understanding
4 Choose one of the barriers to cardiovascular health and provide suggestions of how this could be overcome to become an enabler of good cardiovascular health.
5 Indigenous communities, low socioeconomic groups, and those in rural and remote areas all have higher incidences of cardiovascular and respiratory conditions. Choose one of these groups and create a fact sheet about the importance of cardiorespiratory health. Include the enablers and barriers that may impact on an individual maintaining good health.
6 Access the Heart Foundation ‘Heart Map of Victoria’ using the Heart Foundation ‘Map of Victoria’ weblink in your eBookPLUS.
Choose five different Victorian shires and compare their incidence of the following risk factors:
- current smoking
- overweight or obese
- insufficient fruit and vegetable consumption
- insufficient exercise.
Suggest reasons why there may be different percentages of people in different shires exhibiting these risk factors for cardiovascular health.
Role of physical activity, sport and exercise to enhance the capacity and functioning of the cardiovascular and respiratory system

**KEY CONCEPT** There are clear links between being physically active and the prevention of cardiovascular and respiratory conditions.

Regular physical activity can improve health and wellbeing, and reduce the risk of premature death, illness and disability. Studies have shown that participation in regular physical activity can decrease cardiovascular-related deaths by up to 35 per cent. The physical benefits of regular activity specific to the cardiorespiratory system include reducing the risk of developing:

- cardiovascular disease
- high blood pressure
- type 2 diabetes
- chronic obstructive pulmonary disease (COPD).

Regular physical activity has the capacity to reduce risk factors, as well as assist the functioning of these systems through:

- maintenance of a healthy body weight
- lowering total blood cholesterol and triglycerides, and increasing HDL (good cholesterol) to transport fat to the liver for processing, reducing the risk of plaque depositing in arteries
- reducing blood pressure, placing less strain on the heart and blood vessels.

**Physiological adaptations to exercise**

Participation in physical activity, sport and exercise contributes to the efficient functioning of the body. This is particularly important for the heart and lungs. Moderate to vigorous activity improves the ability of the cardiovascular and respiratory systems to deliver oxygen around the body for energy production. The most common method to enhance the efficiency of these systems is engaging in aerobic-type activities such as walking, running, swimming, fitness classes and team sports.

![A variety of aerobic-type activities are recommended for cardiovascular and respiratory health.](image)
Physiological adaptations that occur through regular participation in physical activity, sport and exercise include:

- **Cardiac hypertrophy** — an increase in the size and strength of the left ventricle of the heart, which leads to improved contractility of the heart allowing more blood to be pumped around the body.
- **Increased capacity for blood flow** — blood vessels increase in diameter and have greater elasticity, allowing for smoother flow of blood through the arteries to deliver oxygen to the body.
- **Increased diffusion of oxygen at the lungs** — greater capacity for oxygen and carbon dioxide to diffuse between the alveoli and capillaries.

These and other adaptations are explored further in chapter 9, ‘Performance enhancement of the cardiorespiratory system’.

**Strategies to enhance the capacity and functioning of the cardiorespiratory systems**

Several studies have found that engaging in low levels of physical activity provides considerable improvement in the functioning of the cardiovascular and respiratory systems. Furthermore, increases in exercise intensity are associated with a greater benefit and reduction of the risk of developing cardiorespiratory diseases.

With this in mind, many government and non-government organisations provide a variety of guidelines, strategies and interventions to motivate and assist individuals to engage in physical activity, sport and exercise.

**Australia’s Physical Activity and Sedentary Behaviour guidelines**

The current Australian Physical Activity and Sedentary Behaviour guidelines have been designed to provide individuals with information regarding the optimal intensity, frequency, duration and type of physical activity required to improve health.

For youth aged 13–17, the guidelines state that for health benefits they should accumulate at least 60 minutes of moderate to vigorous intensity physical activity every day. For additional health benefits, young people should engage in even more activity.

For adults aged 18–64 the guidelines suggest that doing any physical activity is better than doing none. Individuals are encouraged to be active on most, preferably all, days every week. Participation in 150 to 300 minutes (2½ to 5 hours) of moderate intensity physical activity or 75 to 150 minutes (1½ to 2½ hours) of vigorous intensity physical activity (or an equivalent combination of both moderate and vigorous activities) each week is associated with better health outcomes.

These and other guidelines are discussed further in chapter 11, ‘Physical activity and sedentary behaviour’.
Role of physical activity, sport and exercise to enhance the capacity and functioning of the cardiovascular and respiratory system

National Heart Foundation: in focus
The National Heart Foundation provides a range of programs targeting involvement in physical activity across a variety of age groups. Each program revolves around participation in aerobic exercise of varying intensities to improve cardiorespiratory health. Some of these programs are briefly outlined below.

**Jump Rope for Heart**
Program aimed at school-aged children to increase physical fitness and heart health. The program provides skills and resources to learn to skip in a supportive environment.

**Heart Foundation Walking**
This program is a free, community-based program targeted at people of all ages and fitness levels. Walking is an accessible activity that can be done almost anywhere.

**Heart moves**
This program is a low to moderate physical activity program incorporating aerobic, weight-bearing and stretching exercises. It is targeted at adults who have risk factors or medical conditions that may limit their capacity to engage in physical activity.

In Unit 2 we will further investigate strategies and interventions to assist individuals to engage in physical activity for overall health.

FIGURE 8.15 Programs such as Jump Rope for Heart allow people of all ages to have fun engaging in physical activity.

FIGURE 8.16 Low impact physical activity can be beneficial for the elderly if their ability to exercise is limited.
TEST your understanding

1 Outline the physical benefits of participation in regular exercise, in relation to cardiorespiratory health.
2 Explain why physical activity is prescribed for people with cardiovascular disease.
3 List the physiological adaptations of the cardiovascular and respiratory systems that occur through participation in regular exercise.

APPLY your understanding

4 Use the Better Health weblink in your eBookPLUS to watch the video clip produced by the Better Health Channel, ‘Exercise in your local surroundings’. Create a list of all the places in your local community that people could use to engage in physical activity. Explain the types of activities people could do in these spaces to improve their cardiorespiratory health.

5 Practical activity
The National Heart Foundation’s ‘Heart Moves’ program is designed to assist people who may have difficulty participating in physical activity to make a start.

Use the Heart Moves weblink in your eBookPLUS to participate in the Heart Moves video session.
(a) Discuss how the exercises completed during this session can help someone who has not participated in physical activity recently begin to increase their activity levels.
(b) Outline other activities that could be incorporated into this session to increase cardiovascular and respiratory health.
(c) Choose one of the other programs offered by the National Heart Foundation and create an information sheet outlining the program, its target audience and how it can contribute to improving cardiorespiratory health.
CHAPTER 8 REVISION

KEY SKILLS
- Assess enablers and barriers to cardiorespiratory health and investigate strategies to enhance the capacity and functioning of the cardiorespiratory system.

UNDERSTANDING THE KEY SKILLS
To address this key skill, it is important to remember the following:
- Cardiorespiratory health is affected by a number of modifiable and non-modifiable risk factors.
- There are a number of physiological, social, cultural and environmental influences on an individual’s cardiorespiratory health and each of these has the potential to be an enabler or barrier to good health.
- Physical activity, sport and exercise all play an important role in the efficient functioning of the cardiovascular and respiratory systems, as well as the reduction of risk factors associated with diseases of these systems.

PRACTICE QUESTION
There are a variety of influences on an individual to maintain good cardiovascular and respiratory health. These influences can be physiological, social, cultural and environmental. For each of these influences, choose one factor relevant to it and outline how this factor can be an enabler or a barrier to cardiorespiratory health. 2 + 2 + 2 = 8 marks

Sample response
Physiological: Age — advancing age is a barrier to cardiorespiratory health as the body systems no longer function as efficiently as in younger years.
Social: Socioeconomic status — High socioeconomic status can act as an enabler, as people with a higher income and level of education are more likely to have greater knowledge, choices and resources available to them to engage in a healthy lifestyle, reducing the risk of cardiorespiratory diseases.
Cultural: Ethnicity — Language can act as a barrier for culturally and linguistically diverse communities as people may not be able to understand the recommendations for cardiorespiratory health, such as living a healthy lifestyle and accessing healthcare providers to monitor health.
Environmental: Geographic location — Living in urban areas can act as an enabler due to increased range of and access to services, such as health professionals, to monitor cardiorespiratory health. These are not as readily available in rural and remote areas.

PRACTISE THE KEY SKILLS
1. Explain how the capacity and functioning of the cardiovascular and respiratory system can be reduced when an individual suffers from a chronic disease such as coronary heart disease.
2. Discuss how the geographic location in which you live can be both an enabler and a barrier to cardiorespiratory health.
3. Outline a physical activity strategy that targets cardiorespiratory health.

KEY SKILLS EXAM PRACTICE
1. Socioeconomic status can influence an individual’s ability to maintain good cardiovascular and respiratory health. Outline how socioeconomic status can be a barrier and provide a strategy that may assist an individual to overcome this barrier. 2 marks

CHAPTER REVIEW

CHAPTER SUMMARY
- Cardiovascular disease is the leading cause of death in Australia and 1 in 5 adults live with some form of cardiovascular disease.
- Risk factors for poor cardiovascular and respiratory health include non-modifiable factors such as age, gender, ethnicity and family history, as well as modifiable factors such as physical inactivity, poor nutrition, tobacco use and excessive alcohol use.
- Cardiovascular diseases include atherosclerosis, coronary heart disease, high cholesterol, hypertension and stroke. Respiratory diseases include chronic obstructive pulmonary disease, which also includes the conditions of emphysema and chronic bronchitis.
There are a number of factors that can influence cardiorespiratory health including individual physiology, and social, cultural and physical environment factors. These factors can act as enablers or barriers to achieving good cardiorespiratory health. Regular physical activity can reduce the risk of premature death, illness and disability in relation to the development of cardiorespiratory disease.

**MULTIPLE CHOICE QUESTIONS**

1. One of the leading causes of death in Australia is
   (A) brain injury.    (B) cardiovascular disease.    (C) obesity.    (D) cancer.

2. Risk factors within an individual’s control to reduce the incidence of cardiorespiratory disease include
   (A) tobacco use, age, physical inactivity, high blood pressure.    (B) age, gender, family history, ethnicity.    (C) high cholesterol levels, poor nutrition, physical inactivity, age.    (D) tobacco use, poor nutrition, physical inactivity, harmful use of alcohol.

3. The underlying cause of many cardiovascular diseases is
   (A) atherosclerosis.    (B) obesity.    (C) high blood pressure.    (D) blood clots.

4. Chronic obstructive pulmonary disease (COPD) is caused by
   (A) reduced air flow to the heart.    (B) hardening and narrowing of the arteries.    (C) damaged air passages in the lungs.    (D) coughing and wheezing.

5. Hypertension is
   (A) low blood pressure.    (B) high blood pressure.    (C) high cholesterol.    (D) atherosclerosis.

6. Social enablers of good cardiorespiratory health include
   (A) high socioeconomic status and social support.    (B) high socioeconomic status and ethnicity.    (C) low socioeconomic status and education.    (D) low socioeconomic status and family history.

7. The environment in which an individual lives can have a significant impact on maintaining cardiorespiratory health. Which of the following is not a factor related to environment?
   (A) Geographic location    (B) Access to health care    (C) Air quality    (D) Income

8. A barrier to good cardiorespiratory health is
   (A) participating in regular physical activity.    (B) being overweight or obese.    (C) eating a diet low in salt.    (D) being female.

9. Regular physical activity has been shown to assist the functioning of the cardiovascular and respiratory systems. Which of the following is not a benefit of physical activity related to the cardiorespiratory systems?
   (A) increased capacity for blood flow    (B) increased lung diffusion    (C) increased muscle mass and bone density    (D) increased contractility of the heart

10. Physical activity can reduce risk factors associated with coronary heart disease such as
     (A) blood cholesterol levels.    (B) body weight.    (C) hypertension.    (D) All of the above.

**EXAM QUESTIONS**

Question 1 (adapted from ACHPER Trial Exam 2013, section b, question 1c)
‘Inactivity is one of four leading risk factors for cardiovascular disease’.
Explain the link between physical inactivity and cardiovascular disease.  2 marks