

Non-communicable diseases

Revision notes · Multiple causes of non-communicable disease, lifestyle effects at local, national and global level, BMI, and treating cardiovascular disease.

For Edexcel GCSE Biology 1BI0 and Combined Science 1SC0. **Triple only** is not in Combined Science. **Higher tier** is only on the Higher paper.

Non-communicable diseases **Spec 5.23–5.25**

Causes of non-communicable diseases **Spec 5.23**

Many non-communicable diseases are caused by the **interaction of a number of factors**. No single factor usually explains why one person gets the disease and another does not.

Non-communicable diseases and some linked factors	
Type of disease	Examples of factors involved
Cardiovascular disease	Diet, lack of exercise, smoking, alcohol, inherited factors
Many forms of cancer	Smoking, harmful radiation, certain chemicals, inherited factors
Some lung diseases	Smoking, air pollution
Some liver diseases	Drinking too much alcohol
Diseases influenced by nutrition	Too much or too little of certain foods; obesity and malnutrition

Factors can be **lifestyle** (what a person chooses to do), **environmental** (what a person is exposed to) or **inherited** (passed on in genes). Having several of these together increases the chance of disease more than having one alone.

Lifestyle factors and non-communicable diseases **Spec 5.24**

Lifestyle choices affect the risk of non-communicable diseases. Their effects are seen at three levels.

Effects at different levels		
Level	What it means	Example
Local	A community, town or region	Local access to affordable healthy food and sports facilities affects obesity rates
National	A whole country	The cost to a country's health service of treating cardiovascular disease; government campaigns
Global	Around the world	Obesity and malnutrition are both found around the world; the WHO monitors and responds to them

Exercise and diet: obesity and malnutrition

Malnutrition is a diet that does not contain the right balance of nutrients. It can mean too little food or too much. **Obesity** is having too much body fat, often because energy taken in from food is greater than energy used in exercise. Obesity increases the risk of cardiovascular disease and other diseases influenced by nutrition. Regular exercise and a balanced diet reduce the risk.

Two measurements are used to assess body size:

$$\text{BMI} = \text{mass (kg)} \div \text{height (m)}^2$$

$$\text{waist : hip ratio} = \text{waist circumference} \div \text{hip circumference}$$

A high BMI suggests a person is overweight or obese. A high waist : hip ratio means more fat is stored around the waist, which is linked to a higher risk of cardiovascular disease. You will be given the values to compare with.

Calculating BMI

A person has a mass of 72 kg and a height of 1.80 m. Calculate their BMI.

1. $\text{height}^2 = 1.80 \times 1.80 = 3.24 \text{ m}^2$
2. $\text{BMI} = \text{mass} \div \text{height}^2 = 72 \div 3.24$
3. $\text{BMI} = 22.2$

Answer: BMI = 22.2 (to 1 decimal place)

Calculating waist : hip ratio

A woman has a waist circumference of 81 cm and a hip circumference of 90 cm. Calculate her waist : hip ratio.

1. $\text{waist : hip ratio} = \text{waist circumference} \div \text{hip circumference}$
2. $= 81 \div 90$
3. $= 0.90$

Answer: 0.90 (a ratio has no units, as long as both measurements are in the same unit)

Maths skill: Square the height before dividing. Dividing by the height without squaring gives a much larger answer than the real BMI.

Alcohol and liver disease

The liver breaks down alcohol. Drinking too much over a long time damages liver cells and can cause liver diseases such as a fatty liver, inflammation and scarring (cirrhosis), which can lead to liver failure.

Smoking and cardiovascular disease

Chemicals in tobacco smoke damage the lining of arteries, which increases the build-up of fatty deposits and narrows the arteries. Nicotine also increases heart rate and blood pressure. Together this increases the risk of cardiovascular disease. Smoking is also a risk factor for lung diseases and lung cancer.

Exam tip: A correlation between a lifestyle factor and a disease does not prove that one causes the other. A large sample and a mechanism that explains the link make a causal link more likely.

Treating cardiovascular disease Spec 5.25

Cardiovascular disease is disease of the heart or blood vessels. In an evaluate question you must give advantages and disadvantages of each treatment, then reach a conclusion.

Evaluating treatments

Treatment	Advantages	Disadvantages
Life-long medication , for example statins to lower cholesterol, or drugs that lower blood pressure or stop blood clotting	Reduces risk; no operation needed; can be effective for many years	Must be taken every day for life; possible side effects; ongoing cost; may be forgotten
Surgical procedures , for example stents, bypass surgery, valve replacement or a heart transplant	Can quickly restore blood flow or heart function; effective for serious cases	Risks of surgery such as infection and bleeding; recovery time; cost; a transplant needs a donor and may be rejected
Lifestyle changes , such as stopping smoking, eating a balanced diet and exercising	Cheap; no side effects; also reduces the risk of other diseases	Needs long-term effort; results take time; not enough alone for severe disease

The best choice depends on the patient. Lifestyle changes are suitable for most people to reduce risk. Medication is used to manage existing disease. Surgery is usually used when disease is severe or has caused a blockage.

Exam tip: To get full marks on an evaluate question, finish with a justified conclusion, such as which treatment you would recommend for a particular patient and why.

Quick check

1. What does it mean that many non-communicable diseases are caused by an interaction of factors?
2. Write the BMI equation.
3. How does smoking increase the risk of cardiovascular disease?
4. Which disease is linked to drinking too much alcohol?
5. Give one advantage and one disadvantage of life-long medication.

Quick check answers

Non-communicable diseases

- 1 . Several factors, such as lifestyle, environmental and inherited factors, act together to cause the disease, rather than one factor alone.
- 2 . $\text{BMI} = \text{mass (kg)} \div \text{height (m)}^2$
- 3 . It damages artery linings, so fatty deposits build up and arteries narrow; nicotine raises heart rate and blood pressure.
- 4 . Liver disease, for example cirrhosis.
- 5 . It reduces risk without surgery; it must be taken for life and may have side effects.