CHAPTER 7: HEALTHY LIVING
WHAT DOES OUR FOOD CONTAIN?

• In science, the word diet means ‘what you eat’.

• Your food provides the raw materials for your body, which are needed for:
  • Energy
  • Growth and repair
  • Health

• Packaged food have nutrition labels, which allow you to see the names of the things in the food.
What are the main food substances shown on a nutrition label?

1) Protein
2) Carbohydrates
3) Fat
4) Fibre
5) Salt
• If you had to add up all the amounts found on a nutrition label, you would realise that they do not add up to 100g.

• The rest of the mass will be water.
NUTRIENTS

• Carbohydrates, fats, proteins, minerals and vitamins are all nutrients.

• Nutrients are food substances that provide raw materials for our body.

• We also need water and fibre in our diet.

• Fibre is made out of plant cell walls. Our bodies cannot use it, but eating it helps to keep our intestines clean and healthy.
  • It also stops our intestines getting blocked up (constipation).
  • A good source of fibre is wholemeal bread.
WATER

• About 65% of a person is water!
• Water dissolves things so that they can be carried around the body.
• It also fills up cells so that they hold their shapes and cools you down when you sweat.
• You must drink lots of water every day in order to stay healthy.
WATER

COMPOSES 75% OF YOUR BRAIN

REGULATES YOUR BODY TEMPERATURE

HELPS CARRY NUTRIENTS AND OXYGEN TO YOUR CELLS

MOISTENS OXYGEN FOR BREATHING

MAKES UP 83% OF YOUR BLOOD

HELPS CONVERT FOOD TO ENERGY

REMOVES WASTE

PROTECTS AND CUSHIONS YOUR VITAL ORGANS

COMPOSES 22% OF YOUR BONES

HELPS YOUR BODY ABSORB NUTRIENTS

CUSHIONS YOUR JOINTS

MAKES UP 75% OF YOUR MUSCLES
a) Which food substances are nutrients?

a) What other substances do you need in your diet?

a) What are these other substances needed for?
FOOD TESTS
TEST FOR CARBOHYDRATES (1)

Benedicts Test:

- Add a small amount of Benedicts solution to the food sample.
- Heat in a water bath for a few minutes.
- If sugars are present, the solution changes from blue to bright red/orange.
TEST FOR CARBOHYDRATES (2)

Test for Starch

• Add 2 drops of iodine solution to a food sample.
• If starch is present, solution turns from brownish yellow to blue / black.
TEST FOR PROTEINS

Biuret Test

• Add about 5 drops of Biuret solution to a food sample.

• If protein is present, solution will turn from blue to purple.
TEST FOR FATS

• Rub a small dry food sample on some white paper.

• Hold the paper up to the light.

• If fat is present, the food sample leaves a greasy mark.
5) Gita tested her bread and butter with iodine solution. What nutrients was she testing for?

6) Sugars are a typical type of carbohydrate. You can also do food tests for sugars.
   a) Which of these foods do you think will have a lot of sugar in them?
      Fish, fizzy drink, potato, chocolate, sausages
   a) Name one other type of carbohydrate.
BALANCED DIET

- Different food contain different food substances.
- No one food contains all the food substances that you need, and as a result you need to eat many different foods.
- If you eat the right amounts of a wide variety of foods, you have a balanced diet.
- A food pyramid can help you plan a balanced diet.
FOOD FOR ENERGY

- Carbohydrates are good sources of energy.
- Starch and sugar are two kinds of carbohydrates.
- Starch is found in foods like bread, rice, pasta and potatoes.
- Sugars are found in many foods, including sweets, cakes and fruit.
- When carbohydrates are not used up, they can be turned into fat in your body.
FOOD FOR ENERGY

• Fats are also found in foods like milk, cheese, butter and eggs.
• Fat is stored to be used for energy in the future.
• Some fat is stored under the skin to stop heat from escaping from your body.
• Different people need different amounts of food.
• You need more food if you are very active or are a boy.
• The amount of chemical energy that food contains is measured in kilojoules (KJ).
2) Starch and sugar are examples of what food substance?
   a) Name two sources of starch.
   b) Name two sources of sugar.

3) How are fats used in your body?
FOOD FOR GROWTH AND REPAIR

- Proteins are needed to make new cells to help us to grow and repair our bodies.

- Proteins are found in foods like meat, fish, eggs, cheese, beans and milk.
FOOD FOR GROWTH AND REPAIR

• When a woman is breast feeding, the baby will be getting most of the proteins from the milk.

• This is why a pregnant or breast feeding woman will require more proteins. If a woman keeps eating the same amount of food after she stops breast feeding, then she will likely gain weight as she is consuming an excess of nutrients.
FOOD SUBSTANCES FOR HEALTH

- Vitamins and mineral salts (often called minerals) are needed in small quantities.
- They are often found in fruits and vegetables.
- They help to keep our bodies healthy.
- For example, iron is needed to make red blood cells and vitamin C helps cells in tissues to stick together properly.
VITAMINS AND MINERALS

• Vitamin C helps wounds to heal. A lack of vitamin C results in Scurvy.

• Calcium is needed for strong teeth and bones. A lack of calcium results in weakened teeth and bones.

• Iron, when combined with haemoglobin is needed to transport oxygen around the body. A lack of iron results in anaemia.

Why do women need more iron than men?

• Iodide is needed to form thyroid hormone. A lack of iodine results in decreased levels of thyroid hormone.
POOR DIETS

- In some parts of the world, people cannot get enough to eat and they starve.
- In other areas, people get diseases caused by a lack of a particular nutrient.
- Eating too much fat can lead to certain cancers and heart disease.
- In heart disease, fat blocks the supply of blood to the heart muscle. The muscle starts to die and can cause a painful squeezing feeling in the chest.
POOR DIETS

• If you eat food containing more energy than you use up, you may get fat.
• Overweight people have more health problems, including heart disease.
• People who are very fat are said to be obese.
• Some people become ill by going on diets that are not balanced or contain too little food.
• People who do not eat often enough feel weak and tired.
• In some cases, this can lead to a disease called anorexia.
KWASHIORKOR

- Results from a diet that is low in protein.

- It is characterised by a swelling of the tummy.
ANOREXIA

• Individuals suffering from this condition refuse to eat, and if they do, they eat very little.

• It is characterized by a general wasting of the body.
HEART DISEASE
DIABETES

• Diabetes causes high levels of glucose to build up in the blood, which can damage the brain, eyes and kidneys.

• Insulin is a chemical that is made in the pancreas, that causes cells to take glucose out of the blood.

• It is released into the blood when the glucose level goes above a certain point.
DIABETES

• People with type I diabetes, cannot make insulin.
• People with type II diabetes, do not produce enough insulin.
• Obese people are at risk of developing type II diabetes.
• Some people with diabetes have to inject themselves with insulin to make sure that their blood glucose does not get too high.
• Others control their diabetes by cutting down on the amount of sugary foods that they eat.
YOU’VE GOT GUTS

- CARBOHYDRATES
- FATS
- PROTEINS
THE DIGESTIVE SYSTEM
WHAT DO PARTS OF THE DIGESTIVE SYSTEM DO?

• A process called digestion turns food into a form that your body can use.

• It happens as food passes down a tube made up of different organs, called the gut.

• Other organs, like the liver, also help with digestion.

• The gut and these other organs make up the digestive system.
THE DIGESTIVE SYSTEM

• The gut is about 8m long. The intestines are coiled up so that they can fit inside the body.

• It normally takes between 24 and 48 hours for food to go through the gut.

• Fibre in your diet helps this to happen.

• Most of the food we eat is insoluble (it won’t dissolve). To make the most of our food, most of it needs to be broken down into smaller, soluble substances.

• This is what happens in digestion.
THE DIGESTIVE SYSTEM

• Special chemicals called enzymes do this.
• Sugars (ex: glucose), vitamins and minerals are small and soluble in water and as a result can pass through the wall of the small intestine.
• Larger insoluble molecules, like starch, fats and proteins, need to be broken up into small, soluble molecules, by enzymes.
INGESTION

• Putting food in your mouth is called ingestion.
• Your teeth grind your food into smaller pieces.
• The salivary glands produce a liquid called saliva.
• Salvia makes the food moist so that it’s easy to swallow.
• Carbohydrate digestion starts in the mouth.
THE GULLET

• When you swallow, the windpipe is shut off and food goes into the gullet.

• Muscles in the wall of the gullet contract (get smaller) to narrow the tube above the food. This is called peristalsis.

• This pushes food down to the stomach.
THE STOMACH

• Protein digestion starts in the stomach, by the enzyme pepsin.

• In the stomach, food is churned up with a strong acid (hydrochloric acid, pH 1-2). The acid is needed to activate the enzymes and to kill any bacteria.
THE SMALL INTESTINE

- The particles that make up food are called molecules.
- Small molecules are absorbed (taken into the body) through the wall of the small intestine.
- Starch, proteins and fats are broken down in the small intestine.
- The small intestine is highly folded to increase the surface area for absorption.
THE SMALL INTESTINE – VILLI

• The small intestine is completely lined with villi.
• These are needed to increase the surface area for absorption of nutrients.
• The larger the surface area, the more nutrients can be absorbed.
THE LARGE INTESTINE

- Food that we cannot digest, (ex: fibre) goes into the large intestine, where water is removed.
- This forms a more solid material called faeces.
RECTUM AND ANUS

- Faeces are stored in the rectum.
- They are eventually pushed out of the anus in a process called egestion.
SUMMARY

Food is chewed to make digestion easier.
The stomach starts to digest the food and makes it into a liquid.
The small intestine finishes digesting the food and the tiny dissolved food particles move into the blood.
Undigested food passes out through the large intestine.
CIRCULATION
There are 3 types of blood vessels in humans:

1) Arteries (carry blood away from the heart)
   - Carry oxygenated blood.

2) Veins (carry blood towards the heart)
   - Carry deoxygenated blood.

3) Capillaries (connect an artery to a vein)
THE HEART

- Left Atrium
- Left Ventricle
- Right Atrium
- Right Ventricle
The heart (diagrammatic).

- Vena Cava
- Pulmonary Veins
- Right Atrium
- Left Atrium
- Pulmonary Artery
- Right Ventricle
- Left Ventricle

Direction of blood flow:
- Venous blood returned to heart
- Oxygenated blood from lungs
Microorganisms are Very Small

When millions of them grow in one place then you can see them

Colonies of Bacteria and Fungi growing in an agar plate.

Agar jelly is their food.
SOME MICROORGANISMS ARE PATHOGENIC
PATHOGENIC MEANS THEY CAUSE DISEASES

- Athletes foot
- Flu, HIV
- Tuberculosis, Cholera

Fungal
Viral
Bacterial

If you are infected with one of these you will show symptoms:
E.g. runny nose, high temp,

Some diseases are caused by the things we do:
Over eating, cigarettes, alcohol, drugs
These are called LIFESTYLE diseases:
Obesity, Heart disease, lung cancer.
Remember: YOU can change your lifestyle
HOW DO MICROBES SPREAD?
HOW DO MICROBES SPREAD?

Starter:
Match the disease to the microbe which causes it:

<table>
<thead>
<tr>
<th>Disease</th>
<th>Microbe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Athlete’s foot</td>
<td>HIV virus</td>
</tr>
<tr>
<td>Flu</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Common cold</td>
<td>Fungus</td>
</tr>
<tr>
<td>Aids</td>
<td>Not caused by a microbe</td>
</tr>
<tr>
<td>Food poisoning</td>
<td>Virus</td>
</tr>
<tr>
<td>Cancer</td>
<td>Virus</td>
</tr>
</tbody>
</table>
DISEASES CAN SPREAD BY...

Coughs/Sneezing (Air)

Water

Food

Touch

Animals

Sexual contact
DISEASES

Some harmful microbes cause diseases. Bacteria and viruses are the most common causes of diseases.

The spread of diseases is known as transmission.
Droplets containing microbes fly into the air when people sneeze or cough. The microbes they contain get into other people if breathed in.

Eg. Chicken pox, colds, measles
Animals may carry harmful microbes. The microbes can get into a person who is scratched or bitten by such an animal.

Eg. Malaria spread by mosquitoes
Food can have harmful microbes in and on it. The microbes get into the body when the food is eaten, causing food poisoning.
Microbes can be passed from one person to another when people touch each other, or when they touch something an infected person has handled.

Ex: Athletes foot
Water can have harmful microbes in it. The microbes get into the body when the water is swallowed.

Eg. Cholera
Disinfectants are substances that are applied to non-living objects to destroy microorganisms.
ANTISEPTICS

Antimicrobial substances that are applied to living tissue/skin to reduce the possibility of infection.
How do microbes make us ill?

Microbes are microorganisms that are too small to be seen. A pathogen is a microbe that can cause diseases if it enters the body:

- They can be breathed in through the mouth or nose
- They can be ingested (eaten) through the mouth
- They can enter through cuts or bites in the skin or just by touching something

...or other natural openings...
CHICKEN POX

Spread by:

Direct contact – eg touching or hugging someone with it

In the air – you can breathe in the microbes

Symptoms:

- Rash
- Coughing
- Sneezing
MALARIA

Spread by: mosquitoes.
-A mosquito bites an infected person and drinks their blood
-If the mosquito bites someone else – they pass the microbes on in the blood

Symptoms
-Headache
-Vomiting
-Diarrhoea
COMMON COLD

Spread by:

Direct contact – ex: touching or hugging someone with it

Sneezing – you release viruses into the air

Symptoms:
- Coughing
- Sneezing
- Sore throat
- Headache/tummy ache
CHOLERA

Spread by:

Water

If an infected person goes to the toilet, the bacteria enters the water.

If someone else drinks the water they will become infected

Symptoms:
- Vomiting
- Diarrhoea
- Muscle cramps
How is it spread?

• Food poisoning is caused by bacteria in food.

• Certain foods like meat contain bacteria that could make you ill.

• When you cook food it kills the bacteria.

• If your food is not cooked all the way through the bacteria are not killed. If the food is eaten the bacteria are able enter your body.

Symptoms:

• Vomiting
• Diarrhoea
• Muscle cramps
ATHLETES FOOT

Spread by:
- Athletes foot is caused by a specific type of fungus.
- It is mainly transmitted through public showers.

Symptoms:
- Peeling, cracking, and scaling of the feet.
- Redness, blisters, or softening and breaking down of the skin.
- Itching, burning, or both
HIV & AIDS

**HIV**: Human Immunodeficiency Virus

HIV is a virus which attacks immune system in humans.

**AIDS**: Acquired Immune Deficiency Syndrome

AIDS is a medical condition (immune system is too weak to fight infections).

Virus by ChtiTux (CC-by-SA 1.0) & Red ribbon by Gary van der Merwe (CC-by-SA 3.0).
Example: **Tetanus**

**How is it spread?**

- Tetanus is caused by a bacteria
- The bacteria lives on dirty objects such as rusty nails
- If you have an open cut that touches something with the bacteria on it the bacteria will pass through the cut into your body.
- If something with the tetanus bacteria on it pierces your skin the bacteria will also be able to pass into your blood.

**Symptoms:**

- Lockjaw
- Spasms
Mode of transmission: **Bitten by an infected animal**

Example: **Rabies**

**How is it spread?**

If an animal infected with the rabies virus bites you the virus enters your body through the cut when you are bitten.

**Symptoms:**

- Flu like symptoms
- Hallucinations
- Brain damage / death
THE IMMUNE SYSTEM

• The purpose of the immune system is to keep pathogens, such as certain bacteria, viruses, and fungi, out of the body, and to destroy any infectious microorganisms that do invade the body.

• The immune system is made up of a complex and vital network of cells and organs that protect the body from infection.

• The following are some of the organs that make up the immune system: appendix, tonsils, and spleen. Thus these organs help to fight off infections.
The immune system, which is made up of special cells, proteins, tissues, and organs, defends people against microorganisms every day.

In most cases, the immune system does a great job of keeping people healthy and preventing infections. But sometimes problems with the immune system can lead to illness and infection.

White blood cells are the blood cells that are involved in protecting the body from invading pathogens (microorganisms that cause disease).
WHITE BLOOD CELLS

There are two types of white blood cells:

1) Lymphocytes: These can kill bacteria and viruses directly. They are able to produce antibodies, which are molecules that group together bacteria and viruses and kill them.

2) Phagocytes can either:
   - Ingest and absorb the pathogens or toxins
   - Release an enzyme to destroy them

Having absorbed a pathogen, the phagocytes may also send out chemical messages that help nearby lymphocytes to identify the type of antibody needed to neutralise them.
Yeast is a unicellular fungus that is added to bread to allow it to rise.

When the yeast is added to the bread, it respires:
Glucose + oxygen $\rightarrow$ Carbon dioxide + Water + Energy

The carbon dioxide that is produced is what allows the dough to rise by forming air pockets in the dough.
When specific types of bacteria are added to milk, they cause it to coagulate. This forms yogurt.

The lactose in the milk is converted into lactic acid, giving yogurt its particular sour taste.
Yeast can also be used to produce wine and beer. A special type of reaction takes place which results in the production of alcohol.