



# UNIT 10

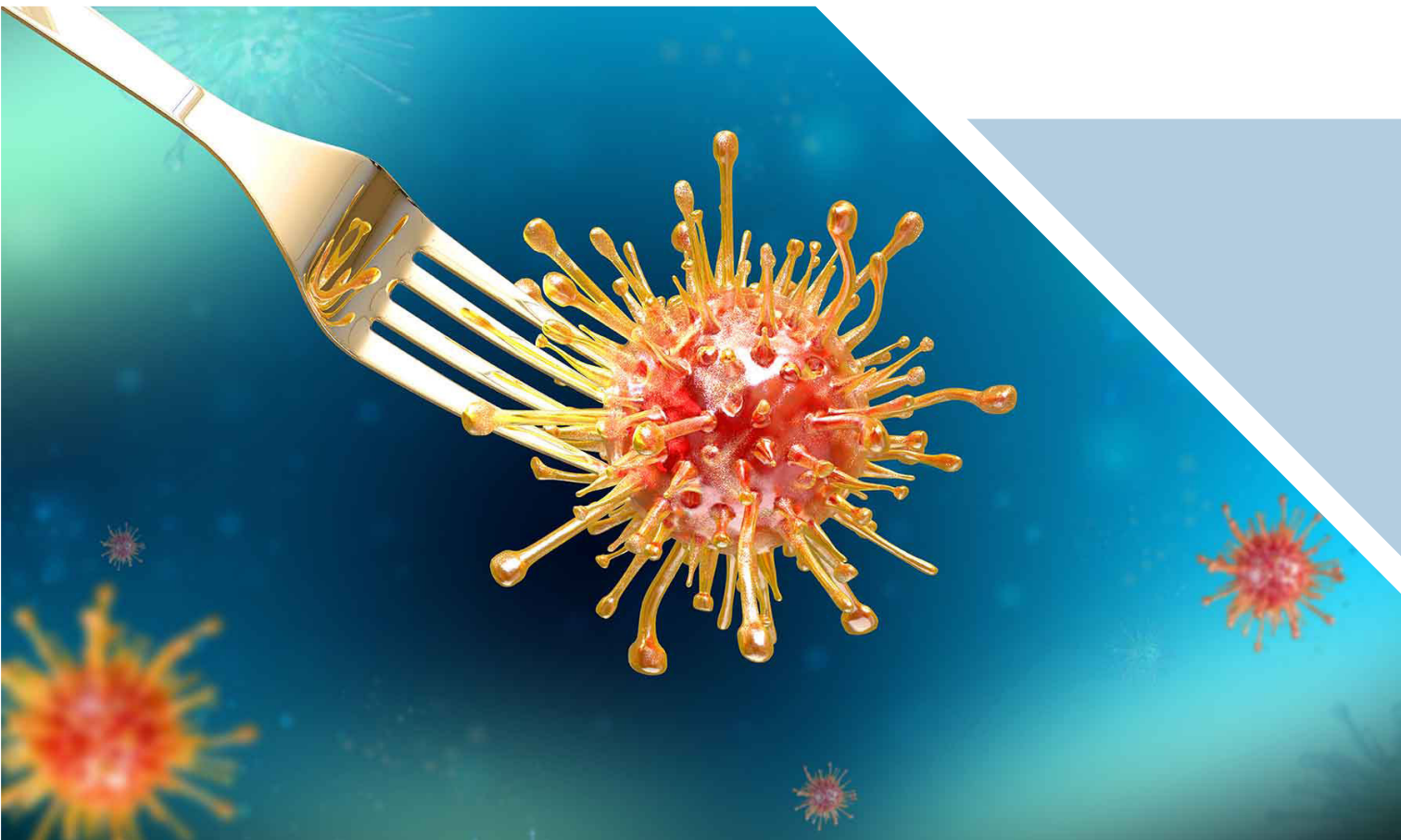
## Food safety and hygiene

- 10.1** Foodborne illness
- 10.2** Prevention of foodborne illness
- 10.3** Food allergies and cross-contamination

## Introduction

Foodborne illnesses, also known as food poisoning, are caused by eating food that are contaminated with bacteria, viruses or other harmful substances. Food can become contaminated at any point during slaughter, processing, transport, storage, or preparation. There are many different bacteria that cause more than 200 foodborne illnesses. For every ten people who eat contaminated food, one person will become ill. Foodborne illness can cause death, particularly in young children and older adults.

In this unit, you will look at four common types of bacteria that lead to foodborne illness. You will understand how to prevent causing foodborne illnesses, and five key steps which should be taken in order to prevent the spread of dangerous bacteria to humans ranging from hand washing to food storage. You will explore the many causes of allergies, how they are treated, and how to avoid cross-contamination.



## Learning outcomes

Learning outcome 10: Explore the importance of food safety and hygiene in avoiding foodborne illness and cross-contamination.

### **Performance indicators:**

- 11.10.1 Explore the concept of foodborne illness.
- 11.10.2 Identify the importance of proper hygiene practices when handling food.
- 11.10.3 Explain how to avoid foodborne illness through proper food storage practices.
- 11.10.4 Understand safe food handling procedures when preparing meals.
- 11.10.5 Describe the causes of food related allergy and the strategies to avoid cross contamination.

## Keywords

Word	Form	Definition
allergy	noun	a medical condition that causes someone to become sick after eating or touching something that is harmless to most people
anaphylaxis	noun	a serious allergic reaction that can cause death
bacteria	noun	a group of very small living things that cause disease
contaminated	verb	when something becomes dangerous, for example food, when a harmful or undesirable substance is added, like bacteria
diarrhoea	noun	An illness that causes waste to be passed from the body frequently in liquid rather than solid form
disease	noun	a condition that prevents the body or mind from working normally
faeces	noun	solid waste that is released from the body
foodborne	noun	when something is carried through food, such as a disease
symptom	noun	a change in the body or mind that suggests a disease is present
transmission	noun	the process by which something is spread or passed from one person or thing, to another



## 10.1 Foodborne illness

### What are foodborne illnesses?

A foodborne illness is an infection or irritation of the gastrointestinal (GI) tract. It is caused by food or drinks that contain harmful bacteria, parasites, viruses or chemicals.



#### Keyword

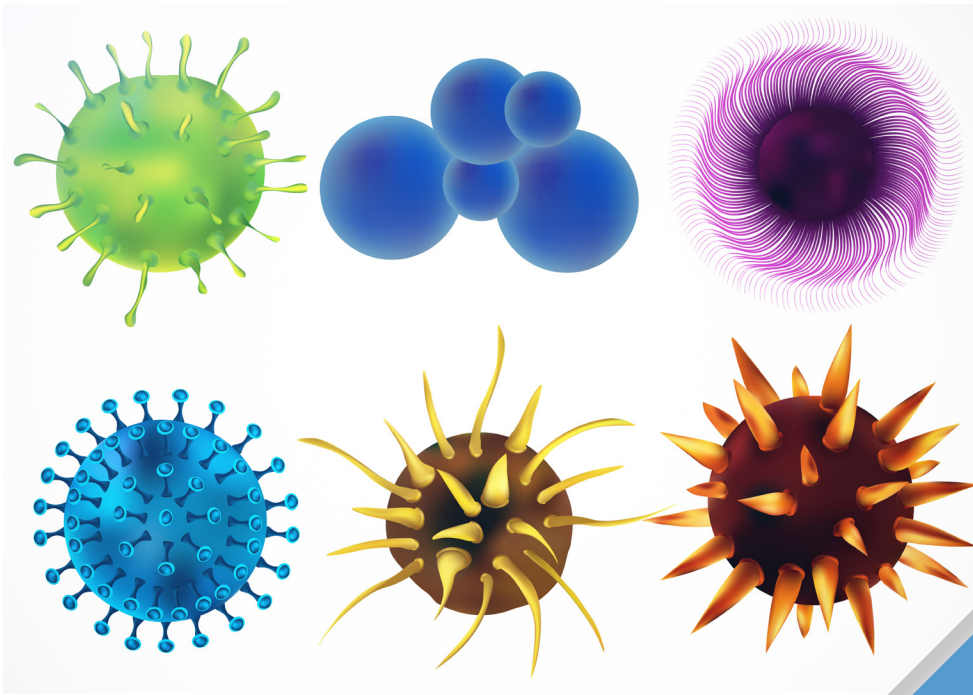
**foodborne**

when something is carried through food; usually a disease



#### Did you know?

Foodborne illness is also known as food poisoning.



Most foodborne illnesses happen suddenly and last a short time. They can occur from 6 – 72 hours after eating contaminated food. Most people recover on their own without treatment. Occasionally, foodborne illnesses may lead to more serious complications.



## Keyword

### contaminated

when something becomes dangerous, for example, food; when a harmful or undesirable substance is added like bacteria



## Discussion: Foodborne illnesses

Have you ever had a foodborne illness? What signs and symptom did you have? Do you know anything about the different kinds of foodborne illnesses? Discuss with your class.

## Causes of foodborne illnesses

Most foodborne illnesses are caused by certain bacteria and viruses. Parasites, chemicals and mould may also cause foodborne illnesses. Food that was once safe to eat can easily become contaminated by these things. This can make it harmful to eat.



## Did you know?

One in ten people fall ill after eating contaminated food. Each year 420,000 people in the world die. From this number 125,000 are children younger than five years of age.

## 10.1 Foodborne illness

### Bacteria

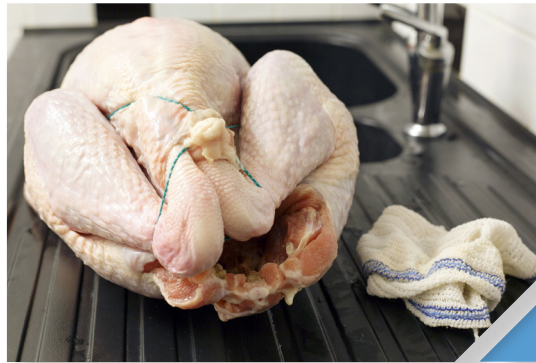
Harmful bacteria may already be in foods when you buy them. Raw foods often contain bacteria that cause foodborne illness. Contamination can occur at any time during growth or harvesting. It can also occur during slaughter, processing, storage and shipping of food. Foods may be contaminated with bacteria when they are prepared in a restaurant or in a home kitchen.



#### Discussion: Contamination

Discuss with your class why you think bacteria can grow and spread during the processing and storage of food.

If hands, kitchen utensils, chopping boards and other surfaces come into contact with raw food, contamination may occur.



When food is not stored properly, it gives bacteria the chance to grow. Keeping food in the fridge can reduce the growth of bacteria. Freezing food can further slow, or even stop this growth.

However, bacteria in refrigerated or frozen foods will become active again when brought to room temperature. These foods should be properly cooked to kill any harmful bacteria.



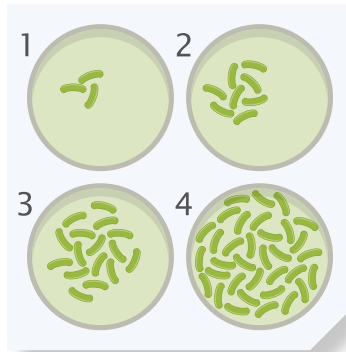
#### Did you know?

Food containing harmful bacteria and other harmful substances such as viruses, parasites or chemicals can cause more than 200 diseases ranging from diarrhoea to cancer.

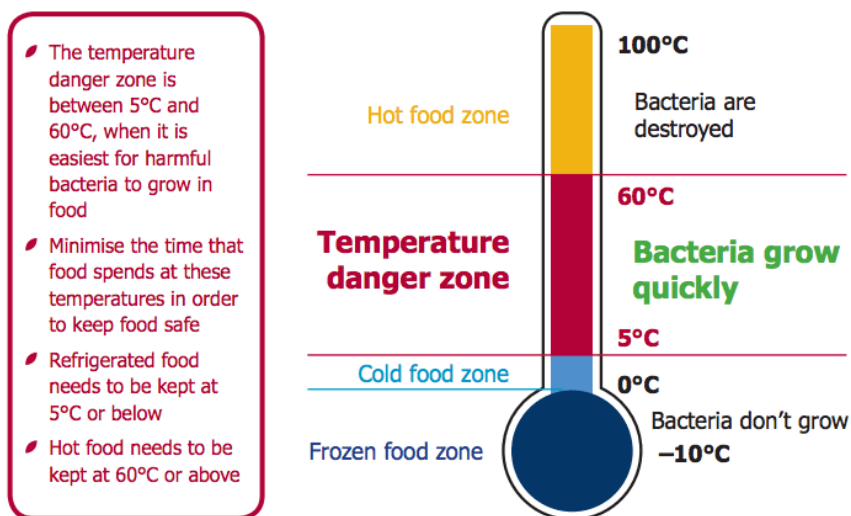
## Bacterial growth

Bacteria grow by multiplying and they can do this very quickly. They need certain conditions to grow. These include:

- ⦿ **Time:** Bacteria double every 15 minutes. This means that within six hours, one bacterium can multiply to over 16 million.



- ⦿ **Warmth:** Bacteria need warmth to multiply. The ideal temperature is 37°C. They can multiply in temperatures between 5°C and 60°C.



- ⦿ **Food:** Just like people, bacteria need nutrients to grow. Meat, seafood, cooked rice, cooked pasta, milk, cheese and eggs are all foods that provide ideal growing conditions for bacteria.
- ⦿ **Water:** Bacteria need moisture to grow.

# 10.1 Foodborne illness

## Types of bacteria that lead to foodborne illness

### *Campylobacter*



#### Break it down

Cam-py-lo-bac-ter

*Campylobacter* is found in animals we eat such as cattle, sheep, goats and chickens. It can also be found in contaminated water. *Campylobacter* is passed to humans generally in undercooked meat and meat products. It can also be passed through contaminated milk or milk that has not been put through a heat treatment called pasteurisation. Often, meat is contaminated by *Campylobacter* that comes from faeces during slaughtering. Undercooked poultry is one of the main transporters of *Campylobacter* to humans.



#### Further information

The disease caused by *Campylobacter* is called *Campylobacteriosis*.

Symptoms of infection caused by *Campylobacter* normally are felt between two and five days after the bacteria enters the body. The most common symptoms of *Campylobacter* infections include diarrhoea, abdominal pain, fever, headache, nausea/vomiting. Symptoms normally last from three to six days. Death by this bacteria is rare but it can happen to young children, elderly people, and people who are suffering from other serious diseases.



In general, medical treatment is not required. People may require water and electrolyte replacement for rehydration.

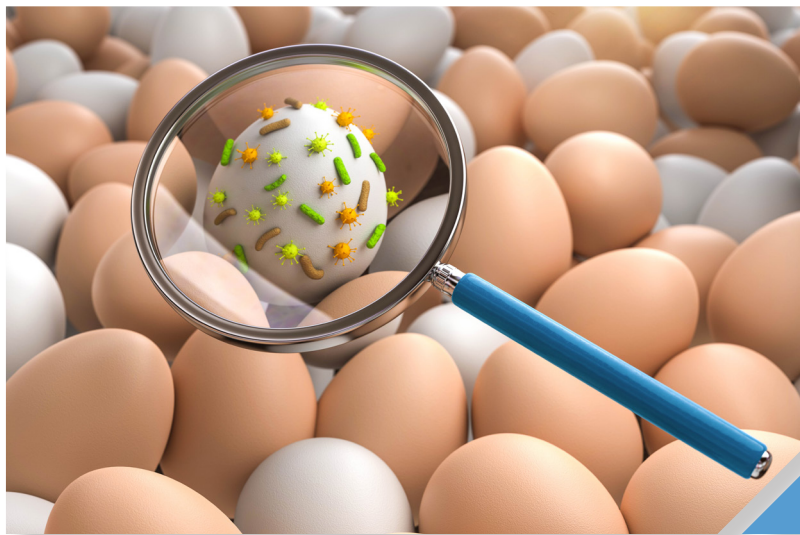
## Salmonella



### Break it down

Sal-mon-ella

*Salmonella* bacteria are found in animals. They can pass through the food chain from food eaten by animals. They can even pass through processing to food products in homes and restaurants. They are found in animals we eat such as poultry and cattle. *Salmonella* is passed to humans by eating contaminated food, mainly eggs, meat, poultry and milk.



*Salmonella* is one of four key causes of diarrhoeal disease in the world. Diarrhoeal diseases are the most common illnesses that happen from eating unsafe food.



### Further information

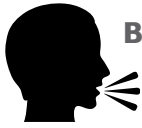
*Salmonella* bacteria cause a disease called salmonellosis.

Symptoms of illness caused by *Salmonella* are quite mild. They include fever, abdominal pain, diarrhoea and nausea. They occur between 12-36 hours after eating contaminated foods. The illness lasts between two and seven days. Patients will recover without treatment in most cases. But the effects of dehydration can be life-threatening in cases of young children and older people.



# 10.1 Foodborne illness

## *Listeria monocytogenes*



### Break it down

Lis-ter-ia mono-cyto-genes

*Listeria monocytogenes* are one of the most serious and severe bacteria that cause foodborne diseases.



*L. monocytogenes* is unlike other common foodborne disease-causing bacteria because they can survive at low temperatures and are usually found in refrigerators. *L. monocytogenes* come from the soil. Ready-to-eat foods can become contaminated during processing. High-risk foods include vegetables, ready-to-eat meat products (cooked or cured meats), soft cheeses and cold fish products. The bacteria are passed to humans through eating these contaminated foods. High levels

of *L. monocytogenes* commonly enter the body by eating refrigerated foods that have a long shelf-life. This can also happen by eating foods that have not had any treatment (e.g. cooking that would kill bacteria).



### Further information

The disease caused by *L. monocytogenes* is called listeriosis. There are two types of listeriosis; invasive (more severe) and non-invasive (less severe). Pregnant women are twenty times more likely to contract listeriosis than other healthy adults.

Symptoms of infection caused by *L. monocytogenes* vary depending on the infection. Some of the symptoms include diarrhoea, fever, headache, muscle pain and in some rare cases, meningitis. The less-severe infections last for a few days while infections which are more severe can last for around two weeks.

The number of cases of people with *L. monocytogenes* related diseases is small. However, the death rate of infected people is high and therefore it is a major health concern. If it is diagnosed early, it can be treated. In cases of meningitis, antibiotics can be used to treat cases.



## *E. coli*

*Escherichia coli* – commonly known as *E. coli* is a bacterium found in the gut of animals, mainly cattle. It is passed to humans by eating raw or undercooked ground meat products, milk that has not been pasteurised, and faecal contamination of vegetables. Cross-contamination during food preparation can also cause *E. coli* to spread to humans.



### Did you know?

*E. coli* grows fastest at a temperature of 37°C which makes it extremely harmful to humans.

Symptoms of diseases caused by *E. coli* include abdominal cramps, diarrhoea, fever and vomiting. They take from two to five days to develop. Most people recover within ten days of becoming infected. A small number of people (normally young children and older people) may find that their infection could lead to other life-threatening diseases. The treatment of disease caused by *E. coli* includes drinking fluids and electrolytes to help prevent dehydration and fatigue.



## 10.2 Prevention of foodborne illness

### Prevention or cure?

Foodborne illness is a problem in countries all over the world. Every day, thousands of people die from cases of foodborne diseases that could have been prevented. They strain healthcare systems, and they can cause problems to the economy.

You may have noticed from the previous lesson that there are not a lot of treatment options for people who have foodborne illnesses. The people who are most seriously affected are young children and the elderly. There are measures in place that can help to prevent most foodborne diseases.



### Five keys to safer food



#### Video: Five keys to safer food

Watch the video that has been created by the World Health Organization showing five steps to safer food handling and storage.

## 1. Keep clean



Just because something looks clean it doesn't mean that it is. It takes over 2.5 billion bacteria to make 250ml of water look cloudy but, in some cases, it only takes twenty harmful bacteria to make a person sick.

### Why is it important?

Dangerous germs are widely found in soil, water, animals and people. These germs are carried by hands, clothes and kitchen equipment. The slightest contact can transfer germs to food and cause foodborne diseases.

### How to keep clean: Handwashing

Hands transfer germs from one place to another, so handwashing is very important. You should wash your hands:

- ⦿ before handling food.
- ⦿ before eating.
- ⦿ after going to the toilet.
- ⦿ after handling raw meat or poultry.
- ⦿ after blowing your nose.
- ⦿ after handling rubbish.
- ⦿ after handling cleaning products.
- ⦿ after touching animals or playing with pets.

In term one, you learned about safe handwashing. As a reminder here are brief steps for washing your hands:

1. Wet hands under running water.
2. Rub hands together for at least forty seconds with soap.
3. Rinse hands under running water.
4. Dry hands with a clean dry towel.



## 10.2 Prevention of foodborne illness



### Further information

Many people do not wash their hands properly. They do not use soap, or they only wash part of their hands. When washing hands, pay attention to fingertips, fingernails, thumbs and in between fingers.

Using hot water and soap will help to remove bacteria, grease and dirt.



If gloves are being used to handle food, they should be changed often. Clothes should be clean as well as fingernails. Long fingernails can harbour bacteria, so it is important to keep them trimmed and cleaned.

### Cleaning plates and kitchen equipment

Some general advice from the WHO includes the following:

- ⦿ Clean while preparing food so bacteria do not have a chance to grow.
- ⦿ Pay special attention to eating, drinking and cooking equipment that may touch both raw food and the mouth.
- ⦿ Sanitise cutting boards and equipment after they have been in contact with raw meat or seafood.
- ⦿ Don't forget to clean and dry the cleaning equipment as bacteria grows fast in damp places.



### Think

Know the difference between cleaning and sanitising. Cleaning is the process of physically removing dirt and crumbs of food. Sanitising is the process of killing germs or disinfecting.

## Protect food from pests

Pests include cockroaches, mice, rats, flies, and insects. They can pass harmful germs onto food and kitchen surfaces. Pets carry pests in their fur or their feet. Do the following things to keep food safe from pests:



- ⦿ Food should be covered or in closed containers.
- ⦿ Rubbish bins should be covered and rubbish should be removed regularly.
- ⦿ Food preparation areas should be in good condition (repair cracks or holes).
- ⦿ Keep house pets away from food preparation areas.

## 2. Separate raw and cooked food

Separating raw and prepared foods will stop the transfer of bacteria between foods. This process can make people very ill.

### Why is it important?

Raw food, especially meat, poultry and seafood (and their juices) contain dangerous bacteria which can move onto other foods during food preparation and storage.



## 10.2 Prevention of foodborne illness

### How to keep raw food and prepared foods separate

- ⦿ While shopping, keep raw meat, poultry and seafood separate from other foods.
- ⦿ In the fridge, store raw meat, seafood and poultry on shelves or sections below cooked foods.
- ⦿ Store food in containers with lids to stop raw and cooked foods from touching.
- ⦿ Wash plates that have been in contact with raw foods, and always use a clean plate for cooked foods.



Foods should be kept separate at all times, from slaughtering, to storage and during preparation.



### 3. Keep food at safe temperatures

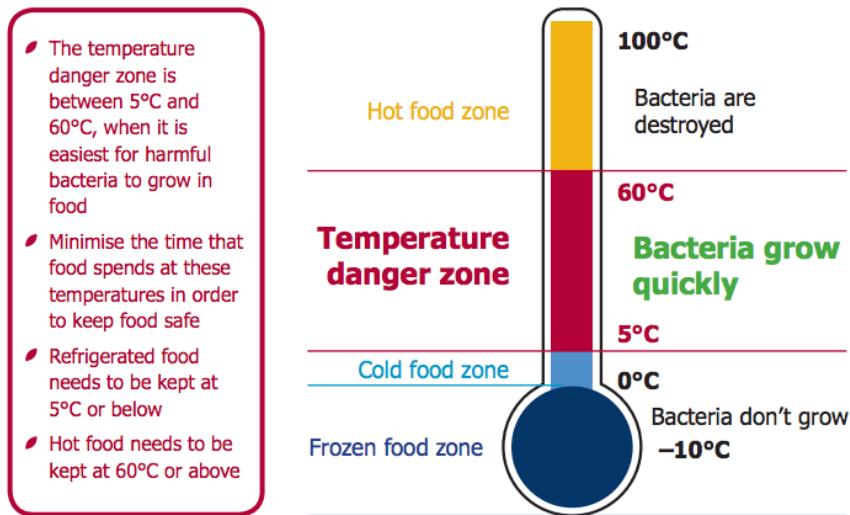


#### Discussion: Remember

Can you remember the name of the bacteria you have learned about that can grow in cold temperatures?

#### What are the safe temperatures for food?

The danger zone is the temperature range between 5°C to 60°C. This is where bacteria multiply very quickly. Bacteria cannot grow if it is too hot or too cold. Therefore, storing food at a temperature below five degrees is ideal. It will slow down bacterial growth and it does not burn the food or cause permanent damage to the structure or taste. But remember, some bacteria can grow even in cold conditions.



#### How to keep food at safe temperatures

- Cool and store all leftover food quickly. This can be done by putting the food on open trays, slicing large pieces of meat into smaller pieces, or placing food in a clean, cool container.
- Leftover food should not be stored in the fridge for more than three days and should not be reheated more than once. This is because food enters the danger zone once it is reheated and bacteria can grow quickly.
- Label leftovers to show how long they have been stored for.
- Thaw frozen food in the fridge.

## 10.2 Prevention of foodborne illness

### 4. Cook thoroughly



#### Keyword

**thoroughly**

being careful about doing something in the correct way

#### Why is it important?

Proper cooking can kill almost all dangerous bacteria. Cooking food to 70°C can help ensure it is safe to eat. A temperature of 70°C can even kill large groups of bacteria within thirty seconds.



#### Did you know?

Foods that require more attention include minced meats, whole poultry, and large joints of meat.

#### How to cook food thoroughly

Use a thermometer to check that foods reach 70°C.



Instructions for using a thermometer to check the temperature of foods are as follows:

- ⦿ Place the thermometer in the centre of the thickest part of meat.
- ⦿ Make sure the thermometer isn't touching the bone, the cooking surface, or the side of the container.
- ⦿ Make sure the thermometer is cleaned and sanitized between each use to avoid cross-contamination between raw and cooked foods.

Sometimes a thermometer will not be available. There are other ways to check that food is properly cooked without using a thermometer to check the temperature. This includes:

- ⦿ Cook meat and poultry until the juices are clear and the inside is not pink.
- ⦿ Cook eggs and seafood until piping hot the whole way through.
- ⦿ Boil liquid-based foods like soups and stews. Allow them to remain in a boiling state for at least one minute.

### Using a microwave oven



Microwave ovens can cook unevenly. They sometimes can leave cold spots where dangerous bacteria can survive. It is very important to check that food cooked in a microwave is a safe temperature the whole way through to the centre.

Microwave ovens can be used to reheat many different foods. Similar to cooking, reheating can also result in cold spots forming in foods. It is important to reheat cooked food thoroughly, to a temperature of 70°C

Some plastic containers release toxic chemicals when they are heated, these should not be used in a microwave to reheat food. Always check that the equipment you are using is microwave safe.

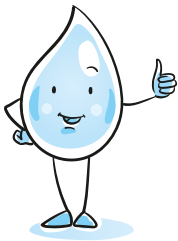


## 10.2 Prevention of foodborne illness

### 5. Use safe water and raw materials

'Safe' means that water and food are free from dangerous bacteria and chemicals that could cause illness.

#### Why is it important?



Raw materials, including water and ice, may be contaminated with dangerous bacteria and chemicals. Dangerous chemicals can be formed in mouldy foods. You should be careful when buying raw materials and carry out simple measures like washing and peeling fruits and vegetables to reduce the risk of eating dangerous bacteria.

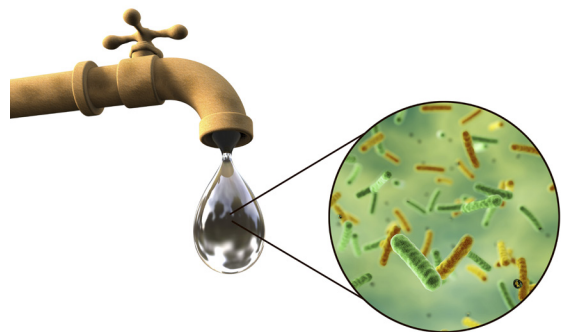
#### What is safe water?

Water from lakes, rivers and canals is not safe. It contains bacteria that can cause diarrhoea and other diseases.

#### Is tap water safe in the UAE?

In the UAE, seawater is treated in a process that removes dirt and germs before it flows through the taps. The water is completely safe to drink when it leaves the water treatment plant, but it must pass through tanks from the treatment plant to the homes of residents. In this journey, there may be contamination by bacteria and chemicals, or chlorine may be added which can give it an unpleasant taste.

Therefore, a lot of UAE residents choose not to drink tap water unless it has been filtered at home.



Safe water is needed to:



- ⦿ wash fruits and vegetables.
- ⦿ add to food and drinks.
- ⦿ make ice.
- ⦿ clean cooking equipment.
- ⦿ wash hands.



## 10.3 Food allergies and cross-contamination

### Food allergies



#### Discussion:

Have you, or does anybody you know, have a food allergy? If so, what is the allergy? What would happen if you (or the person you know) ate the food they are allergic to?

A food allergy is when the body's immune system responds unusually to certain foods. When you have a food allergy, your body reacts to the food and tries to fight against it.



### Who is at risk?

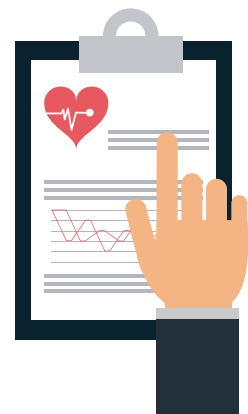
Exactly what causes the immune system to cause a reaction is unknown. However, some things are thought to increase the risk of developing a food allergy.

#### Family history

If you have a parent or sibling that has an allergy, you could be at a higher risk of having or developing an allergy. But it may not be the same as your family member's.

#### Other allergic conditions

Children who have eczema in early life are more likely to develop a food allergy.



## Common causes of allergy

A food allergy is caused by the immune system. The immune system will handle harmless substances in the food you eat and see them as a threat. This tells the body to release chemicals which cause an allergic reaction.

Foods that commonly cause allergies include:

Peanuts (and other nuts)	Shellfish
Eggs	Fish
Gluten	Milk and dairy foods
Mustard	Sesame seeds



### Did you know?

More than 170 foods have been reported to cause allergic reactions.

## 10.3 Food allergies and cross-contamination



### Further information

#### The rise in food allergy cases

The number of people with food allergies has risen a lot over the past few decades. The reason for this is unclear but there are a couple of theories that suggest why. One theory is that the typical child's diet has changed a lot over the last thirty to forty years. Another theory is that children are growing up in "germ-free" environments. Their immune systems might not develop properly because they are not exposed to germs. When they eat certain foods, their bodies mistake harmless substances for bacteria, and they think they are being attacked, causing an allergic reaction.



### Did you know?

Allergies can develop at any stage in life. For example, shellfish allergies are more likely to develop in adulthood.

## Signs and symptoms of food allergies

Signs and symptoms of food allergies can range from person to person depending on how mild or severe their allergy is. If a person suffers a mild reaction on one occasion, it doesn't mean that their reaction will be mild the next time.

Some common signs and symptoms include:

- ⊙ a raised, itchy/tight red rash (hives).
- ⊙ an itchy sensation inside the mouth, throat or ears.
- ⊙ swelling of the face, around the eyes, lips, tongue and roof of the mouth.
- ⊙ vomiting.
- ⊙ abdominal pain or bloating.
- ⊙ breathing problems.
- ⊙ dizziness.
- ⊙ diarrhoea.



HIVES



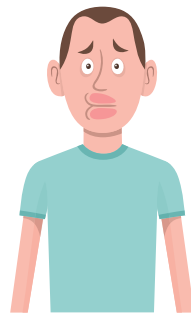
ITCHY MOUTH



SWOLLEN FACE



SWOLLEN TONGUE



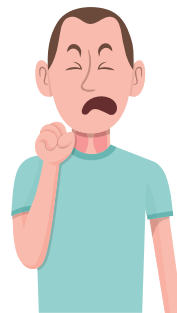
SWOLLEN LIPS



NAUSEA OR VOMITING



ABDOMINAL PAIN



TROUBLE BREATHING



DIZZINESS



DIARRHOEA



## Further information

### Anaphylaxis

Anaphylaxis is a severe reaction to certain foods and it can lead to death. A person who has an anaphylaxis reaction needs immediate emergency medical care.

Symptoms of anaphylaxis include:

- ⦿ Difficulty breathing
- ⦿ Rash on the skin
- ⦿ Rapid heart rate
- ⦿ Nausea

If someone has a severe reaction, they may go into a state known as anaphylactic shock. The sufferer should be treated with an injection of adrenaline that comes in the form of an auto-injector and an ambulance should be called immediately. Most people with severe allergies carry an adrenaline auto-injector with them, commonly known as an epinephrine pen.





## 10.3 Food allergies and cross-contamination

### Administering an adrenaline auto-injector

- ⦿ Ask the person if they are having an allergic reaction. People generally know if they have an allergy. If they respond yes, then ask them if they have an adrenaline auto-injector.
- ⦿ You might need to help them to locate their adrenaline auto-injector.
- ⦿ You should always read the instructions on the injector. Do not put your hand over either end of the injector, the injection is released from one of the ends.
- ⦿ Remove the safety cap.
- ⦿ Hold the person's leg firmly in place. The injection should be given halfway between the hipbone and the knee.
- ⦿ Place the tip of the auto-injector (where the injection is released) hard against the person's thigh.



- ⦿ Hold the pen in place for the time given on the instructions. This is generally between three and ten seconds.
- ⦿ Pull out the auto-injector. Do not touch the needle.
- ⦿ Rub the thigh where the injection was placed for about ten seconds.
- ⦿ Make a note of all details, including the time the injection was given.
- ⦿ Pass all details to emergency services when they arrive. Give the adrenaline auto-injector to medical staff to dispose of properly.

## Cross-contamination

Cross-contamination can occur when particles of an allergy-containing food accidentally land on another food that is normally safe to eat. This can happen quite easily, especially if the people preparing food are not careful.



### Example

Somebody who has a nut allergy uses a knife that was not cleaned properly. The knife was last used to spread peanut butter on toast. Some nut particles will end up on the food that the allergic person is going to eat causing a severe allergic reaction.

Cross-contamination can lead to an allergic reaction. If a person has an allergy to certain foods, they must not eat the food. Even a trace of the allergen food can cause a reaction.





## 10.3 Food allergies and cross-contamination

The following tips are useful for a person with a food allergy to avoid cross-contamination:

- ⦿ Use different cooking utensils for ingredients when preparing meals.
- ⦿ Don't store the allergy-containing foods with other foods. Try to use a different shelf in the fridge or store the food in sealed containers.
- ⦿ Label everything properly.
- ⦿ Check all food labels for the allergen.
- ⦿ Watch out for statements like “may contain traces of...” or “processed in a factory that also manufactures...” on food packaging.



- ⦿ Avoid cooking the food on the same tray or dish as the allergen-containing foods.
- ⦿ Use a separate preparation area. Dust particles and traces of the food can still be present.
- ⦿ Clean the area carefully before and after using the allergen ingredient. Some of the most dangerous foods can be difficult to clean or may leave crumbs or other traces.
- ⦿ In restaurants, ask members of staff for foods that do not contain the allergen. If they are not sure, choose something different.

## **Prevent cross contamination**

**Use the correct colour coded chopping boards and knives**

**Raw meats and poultry only**

**Raw fish and shellfish only**

**Raw unwashed vegetables, salads and fruits only**

**Ready to eat and cooked foods only**

**Washed vegetables, salads and fruits only**

**Bakery and dairy products only**

**Food Hygiene Act 1995**