Food spoilage and contamination.

Key Words

Micro-organisms—tiny microscopic forms of life both plant and animal

Food Spoilage—Making food unfit and unsafe to eat

Contaminate—making a food unsafe to eat by allowing it to come into contact with micro-organisms that will grow and multiply.

Pathogenic—capable of causing illness

High-risk food—foods containing a lot of moisture and nutrients (especially protein) e.g. meat + fish) that easily support the growth of pathogenic micro-organisms, particularly bacteria. Also called **perishable foods**

Catalyst—a substance that speeds up the rate of a chemical reaction

Types of microorganism that can spoil foods: **Bacteria, moulds, yeasts.**

Micro-organisms make food unfit and unsafe to eat: Because they contaminate it with their waste products, their physical presence (being in the food) and the toxins (poisons) that they produce.

Conditions needed for micro-organisms to grow and multiply: The right temperature, food, moisture, time, the right amount of acidity/alkalinity (pH).

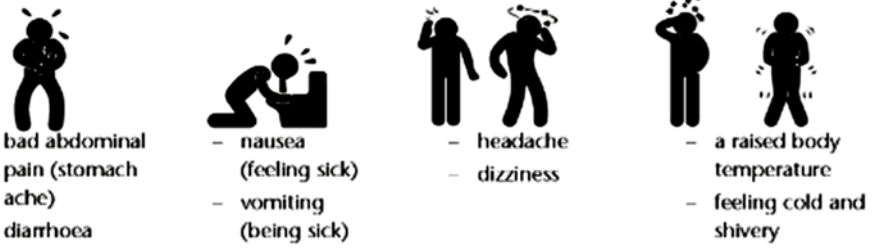
Pathogenic micro-organisms, e.g. bacteria/moulds cause food poisoning. • Non-pathogenic micro-organisms do not cause food poisoning.

Yeasts are tiny plants in the air which settle on food.

High risk foods are foods that will spoil quickly and are most likely to cause food poisoning because bacteria and other micro-organisms can grow and multiply very easily and quickly in it. • They have the right conditions for growth: nutrients (especially protein) and water/ moisture. • These types of foods spoil very quickly and must be refrigerated, cooked thoroughly and eaten within a few days. • Examples: meat, poultry, fish, shellfish, cream, milk, cheese, eggs, yogurt.

Pathogenic bacteria examples are: Campylobacter, E. coli, Salmonella, Listeria.

- **The symptoms of food poisoning** can include:



Enzymes are • Natural substances (mostly proteins) found in foods and all living things. • Called biological catalysts, which means they have the ability to speed up chemical reactions.

Enzymes affect fruits and vegetables when they have been harvested they ripen and eventually break down the cells and tissues in them. They change colour and any starch they contain is broken down and converted to sugar so they soften and sweeten.

Some fruits, such as apples + bananas, go brown when exposed to air because enzymes and natural substances in them react with oxygen when they are cut or peeled. Enzymes are proteins. Proteins are denatured by acids. Lemon juice contains citric and other acids, which stop the enzymic browning process from happening because it denatures the protein. Salt, submerging in water or vinegar also delay enzymic browning

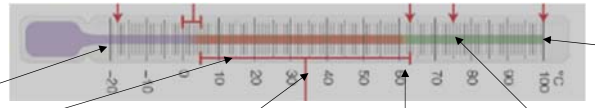
Moulds are air bourne spores. Lots of types exist. In right conditions when mould spores land on food they germinate and send down a root system (mycelium) into food. Invisible waste products from the mould come out through the mycelium and into the food. They may be harmful (toxic), so even if the visible mould is scraped off, there may still be waste products present

Some micro-organisms do not cause food poisoning but are used in food production

Blue-veined cheese: A special culture containing non-pathogenic bacteria and the spores of a non-pathogenic mould is added to the milk.• The bacteria set the milk into a semi-solid by turning the lactose sugar (in the milk) into lactic acid, which coagulates the protein, adds flavour and texture and helps to preserve the cheese. • The moulds germinate as the cheese ripens which adds blue veins and a particular flavour.

Bread: A special baker's yeast is used. If given the right conditions of warmth, moisture, food (sugar or starch) and time, it breaks down the starch in the flour and produces CO2 gas bubbles, which make the dough rise. It also produces alcohol, which adds flavour, but evaporates in the oven. The yeast adds flavour to the baked bread.

Yogurt: made from milk fermented by two types of non-pathogenic bacteria. • The bacteria ferment the lactose sugar in the milk producing lactic acid. The lactic acid denatures and coagulates the milk proteins, which makes the milk become semi-solid. • The lactic acid and other natural substances that are produced give the yogurt its distinct, traditional flavour.



-18°C to –24°C Freezer. Bacteria dormant

Chilled food 0°C to 5°C. Bacteria multiply slowly

5°C to 63°C **Danger zone.** Bacteria multiply rapidly = ideal conditions for growth

63+°C keep cooked food hot

100°C. water boils. Bacteria cells are dead. Bacteria spores can survive

75°C. Cooked from raw food Reheat cooked food once

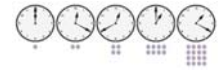
Steps to prevent food poisoning when buying, storing and cooking food:

Buying foods: •Food should be bought from a reputable supplier and the shop should be clean. •The foods should be stored correctly in the shop, e.g., perishable foods at the correct temperature in fridges or freezers • The food should be in good condition, e.g. there should be no bruising on fruit or veg •The foods should be within the use-by date for high-risk foods (such as chicken, dips, burgers and cream) and best-before date for ambient foods, such as breads. The packaging needs to be checked to ensure that it is intact and there is no contamination from rodents.

Storing food: •Follow the instructions on packaging. •High-risk foods need to be stored in a fridge at a temperature to slow down the growth of micro-organisms. Frozen foods should be stored in a freezer so that micro-organisms are dormant. •It is important to rotate the stock within a fridge and freezer so that foods are eaten within their use-by dates. This also helps to avoid throwing food away which is out of date. •Raw meats stored on the bottom shelf of the fridge to avoid any drip from the raw meat touching the cooked foods and causing cross-contamination. •All foods should be stored in the correct containers or sealed packages to avoid cross-contamination or damage to the food during storage.

Cooking food: The person cooking is following personal hygiene rules e.g. wearing a clean apron, cleaning hands before handling food, making sure long hair is tied back. •The area where food is being prepared should also be clean e.g. wiping surfaces with antibacterial spray, ensuring all equipment is clean. Any frozen foods should be thoroughly defrosted before cooking to ensure that the centre of the food is cooked thoroughly. •High-risk foods should be cooked to 75°C to ensure that harmful micro-organisms, such as Salmonella, are destroyed and to help prevent food poisoning. •A food probe could be used to ensure that this temperature is reached in the centre of food e.g. chicken.

Key words: Buying and storing food



- **Ambient storage:** The food is stored at ordinary room temperature – usually about 20–21°C.
- **Shelf-life:** This is how long a food product will last before it becomes unsafe or unpalatable [not nice] to eat.
- **Use-by date:** It is not safe to eat the food after its use-by date.
- **Best-before date:** This tells you that after this date, a non-high-risk food will still be safe to eat, but may have begun to go stale (changed in texture and flavour). After the best-before date the food may not be at its best quality.
- **Temperature danger zone**: The danger zone is from 5 to 63°C. This is the temperature range in which bacteria grow rapidly.
- **Core temperature:** This is the internal temperature food must be heated to which to ensure it is cooked properly. A minimum core temperature of 70°C for 2 minutes (or an immediate reading of 75°C).

Points to look for when buying:

Fresh Fruit and vegetables • A good, bright colour • A firm, crisp texture (not wilted or soft) • An unblemished smooth skin • No mould growth • Not too much soil on the skin of root vegetables • No damage • Stored so air can circulate freely • Buy only when you can see the quality of the fresh produce • Buy food in season.

Fresh meat • Not too much fat • A bright red or pink colour for beef, lamb or offal • Creamy-white to pink clean flesh for poultry • A fresh smell • Moist flesh, but not wet, slimy or dried out • A firm, springy texture • No risk of cross-contamination • Stored at the correct temperature of less than 5°C • Do not buy more than you need as it can deteriorate quickly.

Fresh fish: • Bright red gills • Firm flesh • A fresh smell, no fi shy smell • Clear, shiny eyes that are not sunken • Scales firmly attached, not loose and flaking off • Moist (but not slimy) skin • Bright, natural colouring • White fish should be a pearly colour • Shellfish should be intact; shells should not be broken

Personal hygiene rules when preparing + cooking food. Wash hands, wear clean apron, tie back or cover hair, do not spit, sneeze or cough over or near food, wash hands after using toilet, handling raw eggs, meat, poultry, fish, shellfish or rubbish, don't wear jewellery, never smoke when cooking, don't put finger in food and lick fingers, don't double dip.

Campylobacter Found in dirty water, raw poultry + meat. Milk. Incubation 48—60 hours. Diarrhoea, abdominal pain, nausea, fever

E.coli—beef (minced), raw milk, dirty water. Incubation = 12—24 hours. Diarrhoea, abdominal pain, vomit, fever + kidney damage

Salmonella—raw + undercooked poultry, eggs + meat, raw milk. 12—36 hours. Diarrhoea, abdominal pain, vomiting, fever

Listeria—soft cheese + made from unpasteurised milk; salad veg., pates. 1—70 days. Flu-like symptoms.

Staphylococcus aureus—people Hands, nose, mouth, skin. 1—6 hours. Abdominal pain, vomiting, low body temperature

Avoiding Cross contamination—Bacteria can spread. Occurs when juices from raw meats or germs from unclean objects touch cooked or ready-to-eat foods. • **Supermarket,** check food stored separately; keep apart in shopping trolley + bags. • If using reusable bags, place raw foods in plastic bag to prevent juices leaking. • Keep raw meat, poultry and seafood on the bottom shelf of fridge in a sealed container or bag to ensure juices don't drip and cause contamination. • Keep eggs in the original carton and store on shelves of the refrigerator. • Store reusable bags in a clean, dry place + and often with hot, soapy water. Avoid leaving reusable shopping bags in the boot of vehicle. • **Preparing food:** Wash hands thoroughly with warm, soapy water for 20 seconds before, during and after handling raw meats + foods or other high-risk foods. • Wash plates between uses or use separate plates: for raw and another for cooked foods. • Place washed produce into clean storage containers, not back into original ones. • Never use the knife or preparation tool for raw meat, poultry or seafood to chop produce or ready-to-eat foods. • Use one cutting board for meat, poultry and seafood, and a separate cutting board for produce and ready-to-eat foods. • Use separate work surfaces for raw and cooked foods or be sure to wash the surfaces thoroughly between preparing raw and cooked food. • Cover prepared food to protect it from pests + dust. • Defrost frozen foods e.g. chicken thoroughly, in bottom of refrigerator on a tray to catch liquid that leaks.