Food safety & hygiene refers to the proper handling, cooking, and preservation of food in order to protect people from foodborne illnesses caused by microbes such as bacteria, fungi, parasites, and viruses.

If you've ever visited a restaurant only to come back with more than a taco in your stomach that's trying to exit both ends of your body, you know what this is all about.

Stomach aches, diarrhea, vomiting, fever, muscle aches, and more can be caused by a foodborne illness. This is why food safety is so important! If people avoid using proper food safety guidelines, they can cause themselves or others to fall very ill and, in more serious cases, even die!

BASIC INTRODUCTION TO FOOD SAFETY

- Food Hygiene
- Food Law

It's important to learn about proper food safety guidelines pertaining to the preparation of food. Everyone handling food has a legal responsibility to ensure food that is prepared and served to the customer is safe.

As a food handler you need to be aware of the potential risks involved in the preparation and service of food. Before a food handler commences work in a food environment, training should be carried out to include food hygiene and safety principles.

Food-related illness is often a result of poor management, ignorance or negligence of the people handling food. The impact of poor food hygiene on the consumer and the business could be significant if food hygiene rules are not followed. There is an expectation from the consumer that the food they eat is safe and that food handlers will take all reasonable care to protect them from a food-related illness.

Food handlers are constantly under scrutiny following some highly-publicised food hygiene contraventions and increased awareness of food hygiene regulations.

Food Law

- Food Handler Training
- Typhoid Injection

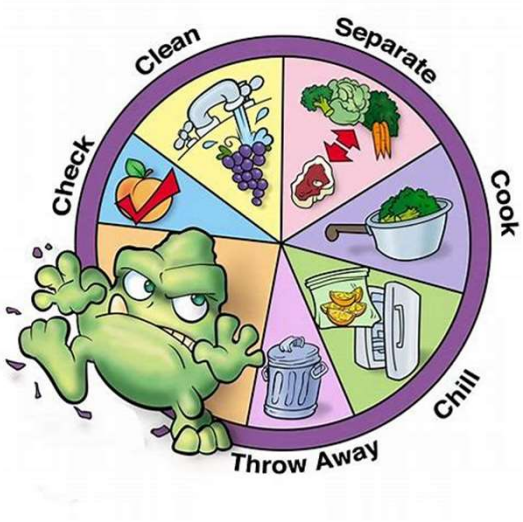
Under the Food Hygiene Regulation 2009, issued by the Ministry of Health Malaysia (MOH), it is mandatory for all food handlers to be trained in food handling course (Kursus Latihan Pengendali Makanan)

All Food Handler working in any food premises that failed to undergo food handling training will be fined. Food handlers include restaurant workers, street hawkers and all workers serving ready to eat food in the food and beverage industry.

Besides that, the requirement also include having all employees administered with the anti-typhoid vaccination.

Food Hygiene

- Health & Hygiene
- Food Preparation
- Kitchen & Pantry Equipment
- Temperature Control
- Slip, Fall & Trip Hazard (Safety)
- Refrigerator, Freezer & Storeroom



Food hygiene is more than just cleanliness, it includes:-

- Food protection from risk of contamination, including harmful bacteria, poison and other foreign bodies
- Preventing any multiply of bacteria to an extend which would result in the customer health or early spoilage of the food
- Ensuring that harmful bacterial are destroy during the preparation and cooking process
- Discarding unfit or contaminated food

Consequences of Poor Food Hygiene

- Health Issues
- Product Recall / Pest Infestations
- Loss of Production
- Reputational Damage (Brand Image)
- Reduce Staff Morale
- Prosecution (Legal Action)
- Decontamination Process

Consequences of food poisoning leads to the following:-

Health issues - Poor food hygiene practice will lead to those consuming the food to become severely ill, most likely with food poisoning and some time death

Product Recall (Pest Infestations) - If your poor hygiene practice has led to the contamination of food, you will have to pull back a range of different food products which have been contaminated, to stop individuals consuming them and subsequently becoming ill.

Lost of Production – Food has been destroyed needs to be reproduced which involved additional cost and manpower

Reputational Damage (Brand Image) - Poor hygiene practices will be heavily scrutinised. Therefore, the media and press will circulate the latest stories regarding poor food hygiene practices, which will result in a loss of respect for a food business.

Reduced Staff Morale - Those working for a food business which is unclean and practicing unhygienic food practices will begin to look elsewhere for work which is

respectable and isn't going to cause customer's harm. Encouraging employees to work in unhygienic conditions will result in reduced morale.

Prosecution (Legal Action) - Business is suspected of poor food hygiene practices, will be investigated by the local authorities (Ministry of Health Malaysia), may leads to close for food premises

Decontamination Process – Cleaning and replacement of damaged equipment may be required

Benefits of Food Hygiene Practice

- Good Reputation
- Productivity Increased
- Brand Protection
- Satisfied Customer
- Legal Compliance
- Conducive Working Environment
- Reduces risk of Food Poisoning
- Longer Shelf-Life
- Higher Staff Morale

The benefits of practicing good food Hygiene include:-

- Satisfied customers, therefore developed a good reputation, increases business and brand protection
- Compliance with the food safety legislation
- Lesser food waste
- Creates a good working condition, therefore higher staff morale and lower staff turn over. Which will promote productivity

Symptoms of Food Poisoning

Food Poisoning is an acute illness, commonly occurs between 1 to 26 hours after consuming contaminated or poisonous food. Such symptoms usually last between 1 to 7 days. There are various symptoms that causes by food poisoning, may include one or more of the following:-

- Abdominal Pain
- Diarrhea
- Vomiting
- Fever
- Dizziness

Population at High Risk of for Food Poisoning

Whether you become ill after eating contaminated food depends on the organism, the amount of exposure, your age and your health. High-risk groups include:

•**Older adults.** As you get older, your immune system may not respond as quickly and as effectively to infectious organisms as when you were younger.

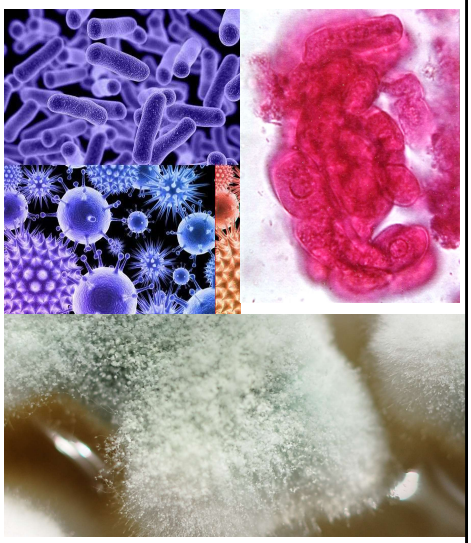
•**Pregnant women.** During pregnancy, changes in metabolism and circulation may increase the risk of food poisoning. Your reaction may be more severe during pregnancy. Rarely, your baby may get sick, too.

•**Infants and young children.** Their immune systems haven't fully developed.

•**People with chronic disease.** Having a chronic condition — such as diabetes, liver disease or AIDS — or receiving chemotherapy or radiation therapy for cancer reduces your immune response.

Microorganisms

MICROORGANISMS	Microorganisms are small, living organisms that can be seen only through microscope
Pathogens	Disease –causing microorganisms
Toxin	Poison



There are four types of pathogens that can contaminate food and causes food poisoning as follows:-

- Viruses
- Bacteria
- Parasites
- Fungi (e.g. Yeast, and Mold)

Where are bacteria found?

Bacteria can be found on **land, under water, in the air**, and some have even been found in outer space! Although they can be found in many places, bacteria are very particular in where they can live. Certain bacteria like areas with oxygen, while others do not. Some prefer heat, others prefer cold, and most prefer warm areas. Harmful bacteria are present in the following environment:

Soil – contains harmful bacteria so it is essential that all fruit and vegetables are carefully washed before use and that during storage; soil must not meet other food products prior to preparation and service.

Dust – It is important to ensure that all food products are stored covered to prevent them from being contaminated by dust in the air which contains bacteria.

Animals, birds and pests – carry harmful bacteria on their skins, in their coats, saliva, urine and faeces.

Raw food – should be handled and stored very carefully prior to and during food preparation as it is particularly hazardous; especially raw meat, shellfish, raw eggs and untreated milk.

Water – Under the Food Hygiene Regulations Act only potable water should be used in the food environment.

People – Food handlers should take extreme care when handling food if they have cuts and open wounds as harmful bacteria can be present. Brightly coloured waterproof plasters (blue) should be used in this instance to prevent the wound from contaminating the food. They are also highly visible should they fall into or onto food. Harmful bacteria is also present in the nose, ears, throat, skin and intestines of the food handler, which is why it is so important to wash your hands often during food production, preparation and serving processes, but more importantly, after visiting the toilet and after handling raw foods.

What is FAT TOM?

Factors that influence the growth of microorganisms

FAT TOM stands for:
•Food
•Acidity
•Time
•Temperature
•Oxygen
•Moisture

Food - It's high-protein foods like meat, poultry, milk, eggs and seafood that can harbour pathogens. These are the foods we consider "perishable," which means they need to be kept in the fridge or freezer or preserved such as — pickling, smoking, canning, and so on. To control any one of these factors to prevent food spoilage canning, oxygen is removed, and the food is heated to kill bacteria.

Acidity - pH values are computed on a scale of 0 to 14, with lower numbers being more acidic. Water is considered neutral, with a pH value of 7. Foodborne bacteria prefer a pH level in the neutral to the mildly acidic range. pH levels of 4.5 or lower are considered acidic

and will inhibit the growth of bacteria. For example, lemon juice is around pH 2 to 2.5; most vinegars are in the range of 2 to 3; jams and jellies range from 3 to 4.5, and ketchup is 3.5 to 3.9. Generally, anything with a pH value of lower than 4.5 does not need to be refrigerated. Pickling is a preservation technique that involves immersing food in an acidic liquid such as vinegar.

Time - Any food will go bad eventually, even if it's frozen or canned or made into jerky. But with preserved foods, we're talking about months or years. With perishable foods at room temperature, we're talking hours. Perishable foods (like fresh ground beef you just bought) can be kept at room temperature for only a very short time — no more than two hours in the aggregate. Meaning if you leave it out for an hour and then put it back in the fridge, that food can still only be out of the fridge for another hour altogether. It doesn't start over with a fresh two hours.
This is because bacteria reproduce very rapidly under normal circumstances. They do so by splitting themselves into two identical selves, which they can do several times an hour, as can each new one. Thus, a single bacterium can become millions in just a few hours. Ensuring perishable items aren't left out for more than two hours limits the bacteria's ability to reproduce. This is important because it's not just the bacteria themselves that can make you sick. In some cases, it's also the toxins they produce. You might kill the bacteria by cooking them, but those dangerous toxins will still be present.

Temperature - Bacteria prefer a nice moderate temperature. Too cold and they slow down, entering a sort of suspended animation in which they don't reproduce. They're not dead, they're just not making more of themselves. Or at least they're doing so much more slowly. Too hot and they get cooked, which kills them. Killing bacteria is a very effective technique for preventing them from reproducing. As a rule, heating food to 165 F for at least 30 seconds is enough to wipe out any dangerous bacteria it might contain. Temperature danger zone, the range of temperatures in which most bacteria thrive, extends from 41 F to 140 F. Your refrigerator or freezer will get you to 40 F and colder. For hot food, like on a buffet, you want it to stay at 140 F or hotter, which is too hot for bacteria. If it's first heated to 165 F, it's safe to hold hot food at 140 F. But if it dips below, you must reheat it.

Oxygen
Another thing bacteria need is oxygen. Confit is a classical technique

for preserving food from the era before refrigerators. Traditional duck confit involves cooking duck legs in duck fat, then storing them in a crock topped with a layer of fat. The solidified fat produces an airtight seal, depriving bacteria of oxygen. One of the most reliable ways of preserving food is by canning it, a process wherein air is sucked out of the container by steam pressure, which also seals the container shut. In commercial canning, food is mechanically sealed in an airtight can and then heated. In both cases, the container is airtight — no oxygen gets in or out.

Moisture - Require water to survive, so moisture is one of the main factors related to bacterial growth. Foods like dried beans and uncooked rice will last for a long time at room temperature. Indeed, drying foods is one of the earliest known methods of food preservation.

Types of food Contaminants

All foods are at risk of becoming contaminated, which increases the chance of the food making someone sick. It's important to know how food can become contaminated so that you can protect against it.

Chemical contamination refers to food that has been contaminated by some type of chemical substance. Because chemicals can be very useful when cleaning in the kitchen, they can easily contaminate food. Chemicals must be properly labelled and stored separately for foodstuff to minimise the risk of contamination. There are also chemicals that occur naturally in foods, like toxins in some fish, and in some cases, minimal chemical contamination might not actually lead to illness. However, the food handler must always be aware of the presence of chemicals in food and take all reasonable precautions to make sure that chemical contamination doesn't happen.

Biological contamination refers to food that's contaminated by substances produced by living creatures – such as humans, pests or microorganisms. This includes bacterial contamination, viral contamination or parasite contamination that's transferred through saliva, pest droppings, blood or faecal matter. Bacterial contamination is thought to be the most common cause of food poisoning worldwide, and the best way to protect against it occurring is by maintaining the best food safety practices.

Physical contamination refers to food that has been contaminated by a foreign object at some stage of the production process. These objects can injure someone and can also potentially carry harmful biological contaminants, which then cause illness. An additional consequence of physical contamination is the upset caused to the person who finds the object. Things like band-aids, fingernails and pieces of cooking equipment are the last thing you would like to find in your meal.

Food Poisoning Reason

- Pathogens (Bacteria, Virus, etc)
- Chemical (Detergent, Soap, etc)
- Metals
- Poisonous Plants
- Physical (Hair, Nail, Plastic, Rubber, etc)

he five main causes of food poisoning. The causes are: 1. Bacteria 2. Viruses 3. Chemicals 4. Metals 5. Poisonous Plants.

Cause # 1. Bacteria:
Bacteria are the main causative agent of cases of food poisoning. In some countries the bacteria are often referred to as 'bugs'. Bacteria are so small that they cannot be seen with the naked human eye. They are everywhere—they live in the air, in soil, in water, on and inside people, in and on the food that one cooks.

Not all bacteria are harmful; some bacteria are friends of chefs as they help in production of cheese and yoghurt. Such friendly bacteria are known as 'commensals'. Some bacteria help in decaying and rotting of food and are called 'spoilage bacteria'.

Many are pathogenic and the most common types found in the food are as follows:
i. Salmonella—found in eggs and poultry,
ii. Staphylococcus aureus—found on human skin, nose, ears, and hands,
iii. Clostridium perfringens—found in the faeces and sewage,
iv. Clostridium botulinum—found in fish intestines, soil; this bacteria is a

concern in the bottling and canning industries, as it can withstand high temperature,
v. Escherichia coli (e-coli)—found in manured vegetables, raw milk, and intestines of animals.

Bacteria enjoy temperatures between 5°C and 62°C. This is usually termed as 'danger zone'. So cold food should be stored and served at a temperature lower than 4°C and hot food at above 63°C.
Most bacteria will get killed in food that is held at 70°C but to ensure that food is cooked thoroughly we must cook the food till the internal temperature of food reaches 74°C.

Cause # 2. Viruses:
Viruses are even smaller than bacteria. For survival they must live in a host body. Viruses are responsible for illnesses as common as the common cold or as dangerous as smallpox and polio. Hepatitis is the most common problem in the food industry today.
Viruses have the ability to change form and this ability has led to a number of known strains of hepatitis, and in order to track them, the medical profession has given each strain an identifying letter, such as A, B, C, D, and E.
Virus is usually spread through the faecal-oral route. One has to be very careful of purchasing sea food and the same must be procured from trustworthy sources as most of the seafood is bred in sewage polluted waters. However, thorough cooking will kill the virus. The vegetables grown in sewage polluted waters are also a prime cause of viral food infections.

Cause # 3. Chemicals:
Chemical poisoning, metal poisoning, and poisonous plant poisoning are all caused by carelessness or ignorance of the commodities that are being handled. Always read the instruction labels for use of cleaning materials and store them away from food in a specific storeroom or an area designated for the same.

Many a times, it has been seen that the cleaning chemical is stored in empty mineral water bottles and sometimes in busy operations one can easily mistake it for water, especially if the chemical is colourless and odourless.
It is the prime responsibility of the executive chef to ensure that the kitchen is always maintained with regards to repairs and maintenance. Ripping of paint on the ceiling can also be disastrous if it falls on food.

Cause # 4. Metals:
Metal poisoning is not very common; however, occasionally finding a piece of

metal in food was quite common until a few years ago. These metals were found in commodities such as rice, wheat, pulses, etc. Some foods react to metals such as copper, for instance, while deep-frying of food, using a copper tool in the hot oil will make people sick. Similarly, cooking of yoghurt or acidic food in a copper vessel should be avoided.

Cause # 5. Poisonous Plants:
Toadstools, red kidney beans that have not been cooked thoroughly, rhubarb leaves, deadly nightshade, and many other plants and their related products cause food poisoning.

Cause # 6. Physical: Personal Grooming by the food handler

High Risk Food

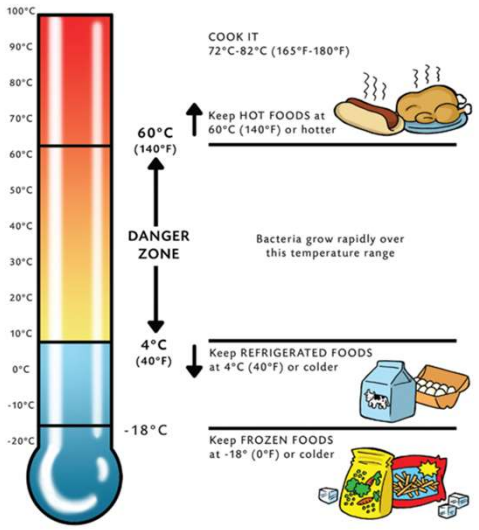
High risk foods are ready to eat foods that support the multiplication of pathogenic bacteria that could be harmful. It is important to handle and store high risk foods separately from raw foods to prevent the risk of cross contamination.

High risk foods include:
•Cooked meat and poultry.
•Smoked salmon.
•Cheesecake.
•Prepared salads and vegetables.
•Cooked sliced meats.
•Cooked chicken pieces.
•Milk, cream, ice cream.
•Meat gravies, sauces, pâté and meat pies.
•Eggs – especially foods made with raw egg, such as mousse and mayonnaise.
•Seafoods such as shellfish, cooked prawns and oysters.
•Cooked rice, pasta, cooked potato and vegetables that aren't high in protein.

Low Risk Food

Acid food, high sugar, salt & fats, dry products include preserved foods not require refrigerator, ambient storage is considered low risk food

Food Danger Zone



"Danger Zone" (40 °F - 140 °F)

Leaving food out too long at room temperature can cause bacteria (such as *Staphylococcus aureus*, *Salmonella* Enteritidis, *Escherichia coli* O157:H7, and *Campylobacter*) to grow to dangerous levels that can cause illness. Bacteria grow most rapidly in the range of temperatures between 40 °F and 140 °F, doubling in number in as little as 20 minutes. This range of temperatures is often called the "Danger Zone."

Keep Food Out of the "Danger Zone"

Never leave food out of refrigeration over 2 hours. If the temperature is above 90 °F, food should not be left out more than 1 hour.

•Keep hot food hot—at or above 140 °F. Place cooked food in chafing dishes, preheated steam tables, warming trays, and/or slow cookers.

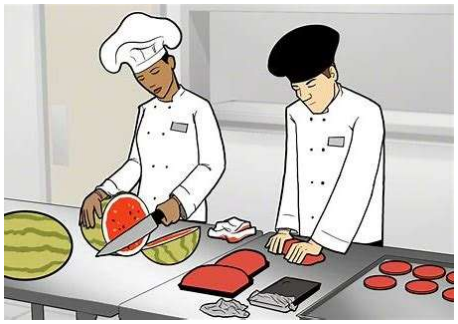
•Keep cold food cold—at or below 40 °F. Place food in containers on ice.

Cross Contamination

Cross-contamination is the transfer of bacteria from: raw food, unclean utensils or unclean surfaces, to: ready-to-eat food, clean utensils or clean surfaces. Cross contamination can easily and quickly happen if hands are not clean Equipment & surfaces are not cleaned between batches (e.g. mixers, knives, cutting boards, benches and display units). Insects or rodents have contact with raw food products and cooked or ready-to-eat products meet each other (stored without lid) may cause cross contamination.

Dos to prevent cross contamination

- During Food Preparation
- During Storage



During Food Preparation Hands, utensils and equipment such as cutting boards can become contaminated with bacteria from raw food. If these things, once contaminated, are then used to prepare ready-to eat or cooked food, without first being thoroughly washed, food can become cross-contaminated. As ready-to-eat food or cooked food is not cooked again the bacteria present will be consumed and may cause food poisoning.

During Storage Bacteria from raw food can contaminate ready-to-eat or cooked food if these foods are not stored separately. If they are stored in the same refrigerator, raw food should always be stored in the lowest part of the refrigerator and ready-to-eat or cooked food on the shelves above. This prevents liquids from the raw food dripping on to the cooked food. Food should always be stored in clean nontoxic washable containers with a tight-fitting lid or be covered with foil or plastic film.

Equipment to Food

- Do use separate cutting boards and utensils for raw and cooked food
- Do clean and sanitise equipment, utensils, preparation benches & sinks correctly between batches and at the end of production - Do allow dishes to air dry instead of using a tea towel which could be contaminated

- Do throw away any cracked or chipped crockery

Food Handler to Food
- Do follow good personal hygiene and have good personal habits;
- Always wash hands with soap and water or change gloves after carrying out different tasks

Food to Food
- Do wash raw fruits and vegetables thoroughly to remove soil and contaminants before cutting
- Do store food in clean containers and cover open food with lids;
- Do store and prepare raw products and cooked or ready-to-eat products away from each other to prevent contamination

Environment to Food
- Do report any sightings of pests or pest droppings to your supervisor