



INDIAN
INSTITUTE OF
PUBLIC HEALTH
HYDERABAD

fssai



ESSENTIALS OF FOOD HYGIENE – I

RSPH
ROYAL SOCIETY FOR PUBLIC HEALTH
VISION, VOICE AND PRACTICE

LEVEL I – BASIC FOR FOOD HANDLERS

ESSENTIALS OF FOOD HYGIENE - I

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ACKNOWLEDGEMENT

Indian Institute of Public Health, Hyderabad thanks the Food Safety & Standards Authority of India, for giving us the opportunity to develop this material. In particular, we are grateful to Dr. P. I. Suvrathan, Chairperson and Shri. V. N. Gaur, CEO, FSSAI for their valuable guidance, encouragement and support in this work. We also acknowledge the support of other FSSAI staff especially, Shri Asim Choudhary, Director (Administration), Shri S.B. Dongre, Director (F&VP), Dr. Dhir Singh, ADG and Dr. J. P. Dongare, Marketing Officer. Their inputs during the review process have been extremely valuable.

We gratefully acknowledge the support of our partner institutes, the Royal Society for Public Health (RSPH), UK and the National Institute of Nutrition (NIN), Hyderabad, India who have helped develop the training curriculum and content. This work would not have been possible without the support of Prof. Richard Parish, Chief Executive, Royal Society of Public Health, UK, Dr. B. Sesikeran, Director, and Dr. V. Sudershan Rao, Senior Scientist, National Institute of Nutrition, Hyderabad. The Department of Health, UK provided financial support to meet the costs of Dr. Christopher Suter and Mrs. Sara Shackleton.

The team is also thankful to Dr. P. Sucharitha Murthy, Food Safety Commissioner & Director, Institute of Preventive Medicine (IPM), Government of Andhra Pradesh and Smt. Seema Vyas, Food Safety Commissioner and Commissioner Food and Drugs, Maharashtra, Mr. A. Sudhakar Rao, Joint Food Controller and Mrs. Shailaja Devi, Chief Public Analyst, State Food Laboratory, IPM, Government of Andhra Pradesh, Ms. Rini Sanyal, Consultant, Amarchand & Mangaldas for participating in the CDC workshops and reviewing this material.

Our thanks to the artist, Mr. Sujit Mitra for developing the illustrations.

Last but not the least, we are grateful to the administrative staff at IIPH, Hyderabad who supported us throughout this process.

INTRODUCTION

Food is an important part of everyday life, and has a significant influence on our culture and tradition. Indian food choices, eating habits as well as cooking methods and practices vary from region to region reflecting the rich diversity of foods in the country. Increasing food choices, advances in food technology and changing lifestyles have influenced the way people buy and consume food. These changes have also increased the risks of food poisoning and have made food safety a priority for all governments. Food poisoning is usually caused by human error. It occurs when people store, handle or prepare food incorrectly.

This book forms part of the reading material for a food safety training programme and has been developed for the Food Safety and Standards Authority of India (FSSAI). The book was written with the intention of providing food handlers in the catering sector, with the essential, practical information to enable them to provide safe food to consumers. It is relevant to food handlers working in hotels, resorts, restaurants, bakeries, fast food joints, mobile carts/vans, and anybody involved in catering business or services in India.

Emphasis has been placed on the measures necessary to control the most common reasons for food borne illness. Some of the sections include Food Poisoning and its Causes, Personal Hygiene, Hygiene Control, Temperature Control, High Risk Foods and their storage. This book is a useful guide and can be read on its own or as part of the FSSAI's level II training programme.

It is the authors' intent to explain the concepts which underlie food safety in a simple and straightforward way. They believe that the main motivation for adopting good working practices is to understand why these practices are necessary.

Knowledge is the key to producing safe and wholesome food.

Section 1: FOOD POISONING AND ITS CAUSES

This section describes ‘food hygiene, food poisoning and food contamination.

Food safety is concerned with acute and chronic hazards that make food injurious to the health of consumers. For food to be safe, it must be free from hazards to health.

FOOD HYGIENE

Food Hygiene is the action taken to ensure that food is handled, stored, prepared and served in such a way, and under such conditions, as to prevent – as far as possible – the contamination of food. Good food hygiene is essential to ensure that the food prepared/sold by businesses is safe. Food safety and hygiene are important both to safeguard consumer health and the reputation of food businesses.

FOOD POISONING

Food Poisoning is a common, often mild but sometimes very serious illness resulting from eating contaminated food or drink. The main symptoms are diarrhoea and/or vomiting, often accompanied by nausea (feeling sick) and stomach pain. The onset of symptoms (diarrhoea, vomiting) is usually sudden and may start within 2 hours of food intake but sometimes there may be an interval of several days. The illness typically lasts 1 or 2 days but sometimes can continue for a week or more.

Food poisoning is weakening and extremely unpleasant for anyone. However, certain groups of people like **infants, pregnant women, elderly people and those with weak immune systems** are at higher risk of suffering serious consequences from food poisoning. Such groups are often referred to as “**at risk**” groups.

There are more food poisoning cases being reported in the media every day. Some factors which may have contributed to this increase are:

- The culture of eating out - Poor standards in food establishments can lead to an increase in food poisoning.
- Greater availability of ready-to-eat foods - Hazards may be created by problems with temperature and hygiene control in the distribution chain of ready-to-eat foods.
- Lack of care in following the rules for the safe storage and preparation of food.

CONTAMINATION OF FOOD

Food contamination occurs by substances not intentionally added to food. These may compromise food safety and cause harm to a consumer. Such substances may be chemical, physical or biological.

CHEMICAL (For example, chemical poisons like insecticides)

Chemical poisons such as insecticides get into food and toxic metals may enter food during processing. Poisonous plants (and fungi) like some types of mushrooms and seafood/fish produce chemicals or toxins which can cause illnesses if consumed incorrectly.

PHYSICAL (For example, undesirable substances in food)

Reports of 'foreign bodies' such as dead rats, insects and pieces of glass in food get wide publicity although they are rare events. Physical contaminants such as these are usually detected by the consumer and the food is not consumed. However, substances like glass or staple pins used for packing can be dangerous. These incidents rarely cause food poisoning but are, of course, highly undesirable.

BIOLOGICAL (For example, bacteria their toxins and viruses)

Biological hazards include microorganisms/microbes which are small organisms that can be seen only through a microscope. The most

common types of microorganisms are bacteria and viruses. Bacteria are the most common cause of food poisoning. Although viruses will not be discussed here, it is important to note that many of the measures that prevent contamination by bacteria also reduce the risk of viral infection.

Bacteria

Bacteria are small living organisms often known as ‘germs’. They are so small that it is impossible to see them without a microscope. Bacteria are everywhere: in soil, dust, water, the air around us and on our bodies. It may take only a small number of bacteria to cause illness such as typhoid fever or food poisoning. Some food poisoning bacteria release toxins which are poisons produced as the bacteria grow in food or in the intestine.

Most bacteria are harmless and some are even beneficial to man like those in our intestines that aid digestion. Certain bacteria are needed to manufacture products such as cheese, curd and for the fermentation of batter used in the preparation of *dosas* and *idlis*. Another family of bacteria, called food spoilage bacteria, can cause food to smell, to lose texture, flavour and generally to decay. The food becomes so unpleasant that people will not eat it.

Some people have symptoms of illness when they eat certain non-contaminated food because they suffer allergic reaction to these particular foods (e.g. groundnuts).

How Bacteria Grow

Bacteria must have the following FOUR conditions to live and grow:

FOOD	MOISTURE	WARMTH	TIME
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1. Food

Certain foods - mostly those with high protein content – are particularly rich in nutrients and contain moisture. When kept in warm conditions these foods provide a perfect environment for bacterial growth. Examples of such foods are meat, seafood/fish, milk, eggs, and their products.

Foods containing sugar, salt or acid - such as jam or pickles - discourage the growth of bacteria. Some food as have preservatives (chemical substances) added to them to restrict the growth of bacteria.

Bacterial growth may also be affected by the presence or absence of oxygen.

2. Moisture

To grow, bacteria need moisture and this can be found in many foods.

Bacteria are less likely to survive in dried food such as powdered milk or dried eggs but any bacteria that do survive under such dry conditions begin to grow again if fluids are added to the food.

One of the reasons why sugar and salt discourage the growth of bacteria is that they take up the moisture that is then not available to the bacteria. Similarly, when food is frozen its moisture turns into ice and is not available to the bacteria.

3. Warmth

Bacteria that cause food poisoning will grow at temperatures between 5°C and 63° C. They grow most quickly at a temperature of around 37°C, which is the normal temperature of the human body. For this reason, the range of temperatures between 5°C and 63°C is known as the **Temperature Danger Zone**.

Bacteria that cause food poisoning will grow rapidly in food that is allowed to remain in the Temperature Danger Zone, for example, at room temperature.

Temperatures outside the Danger Zone are less suitable for these bacteria. Although bacteria grow in warmth they are usually killed by **heat**. Most bacteria are killed by temperatures of **at least 70°C** (at this temperature food is too hot to place in the mouth) provided this is reached at the centre of the food and is held **for a sufficient time**.

However, some bacteria and their toxins (poisons) require exposure to higher temperatures for longer periods of time before they are destroyed.

In **cold** conditions (the temperature inside the refrigerator), bacteria do not grow or grow only very slowly. At very low temperatures some bacteria will die, but many will survive and grow again if warm conditions return.

Pasteurization is a method of destroying bacteria by rapidly heating the food to a sufficiently high temperature for a specified period of time. Milk and milk products are examples of food treated in this way.

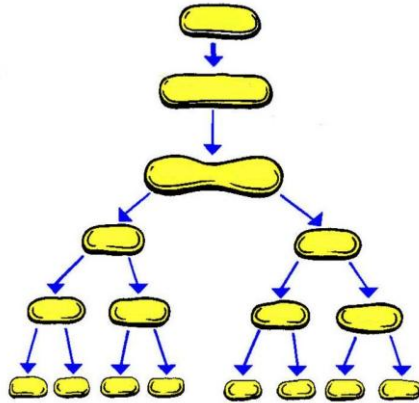
STORE READY-TO-EAT FOODS THAT MAY SUPPORT BACTERIAL GROWTH BELOW 5°C OR ABOVE 63°C

4. Time

Given moisture and warm food, bacteria simply need **time** to grow. It is often carelessness that allows them the time they need, such as when food is allowed to remain in the Temperature Danger Zone.

Each bacterial cell multiplies by splitting itself into two so that **1** bacterial cell becomes **2** bacterial cells. Each of these **2** bacteria then split to make **4** bacteria. Each of the **4** bacteria split into two again, making **8** bacteria, and so on.

If the temperature is suitable, bacteria will reproduce in this way every 10–20 minutes. Some take even less time.



Multiplication of Bacteria

This means that after reproducing at around this rate for only 4 or 5 hours, one bacterium will have multiplied into many thousands of bacteria. In reality, the severity of food poisoning will be even greater because contaminated food usually carries considerably more than one bacterium at the outset.

Bacteria are invisible to the naked eye and do not usually cause any change to the appearance, smell or taste of food. An individual cannot therefore, rely on the senses to tell if food is contaminated by them.

SOURCES OF FOOD POISONING BACTERIA

If food is to be protected from bacteria it is important to know where they come from and how they come to be present in the food we eat.

Most bacteria come from animal and human sources.

1. RAW FOODS

Many bacteria live in the intestines of animals. The animals concerned usually have no symptoms and just carry the bacteria. Thus bacteria can

be transferred to meat that will be used for eating, particularly during faulty slaughter, if the intestines/stomach is ruptured.



For this reason, it is wise to think of all raw meat, poultry and seafood/fish, as well as the fluids that come from them, as already carrying many food poisoning bacteria before they arrive in the food area. Raw

meat, poultry and seafood/fish are frequent sources of food poisoning outbreaks.

Other raw foods that may carry food poisoning bacteria are eggs - both inside and on the shell - and seafood/fish. Unpasteurized milk may also contain dangerous bacteria.



In fact, many raw foods, including those used in salads, are naturally contaminated by bacteria from the soil. When raw foods are handled or prepared, it is important to follow the rules for good hygiene practices.

2. WATER/ICE

When used in the preparation of food (including ice), water may also be contaminated with biological, chemical or physical hazards.



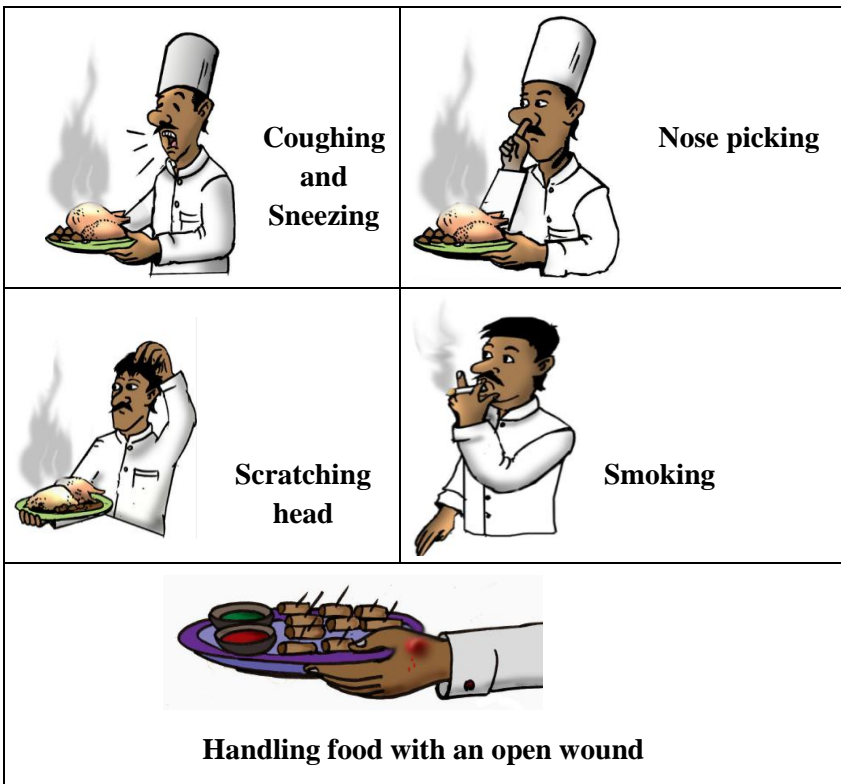
Contaminated water is the usual source of many food related diseases such as cholera and other *diarrhoeal* diseases.

Contaminated water will create a public health risk if it is used for drinking, cleaning, processing food or washing utensils and work surfaces.

3. PEOPLE

Bacteria that can cause food poisoning are carried in several areas of the human body – for example, skin, nose, throat, mouth, ears, hair and finger nails. Bacteria that cause food poisoning can also be present in intestines and thus in faeces (stools).

People infected with food poisoning bacteria often have no symptoms and are referred to as ‘carriers’ because, although not feeling ill themselves, they can transfer the infection to foods with their hands unless they are careful in their personal hygiene.



Some ways in which bacteria are introduced into food by food handlers

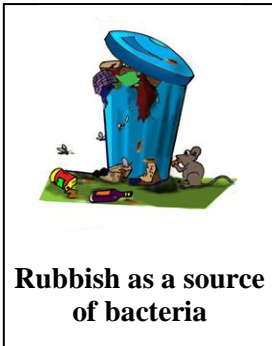
Careless food handling is one of the causes of bacterial contamination – with bacteria being transferred from hands, mouth, nose through sneezing, coughing, smoking, eating, drinking, touching or scratching sections of the body like hair, nose, mouth, ear etc. Bacteria are also present around cuts, grazes, scratches or boils.

4. PLACES

Bacteria can also harbour in places such as equipment (cutting boards, slicers, mixers, grinders etc.), utensils and work surfaces/counters which may directly come into contact with food.

5. OTHER SOURCES WITHIN THE ENVIRONMENT

Pests such as insects (flies, cockroaches, ants etc.), rodents (rats, mice) and birds (crows, pigeons) all carry bacteria on their bodies and in their urine and droppings. They can infect food or places where food may be placed. Prevention and control of these pests is essential.



Pets, too, carry bacteria on and in their bodies and should not be allowed into food areas.

Rubbish and waste food provide ideal conditions in which bacteria can live and reproduce because they are warm and are left undisturbed for several hours. Hence waste must be disposed of in a proper manner.

THE MAIN SOURCES OF BACTERIA ARE RAW FOODS, WATER, PEOPLE, PLACES, PESTS AND RUBBISH

Section 2: HYGIENE CONTROL

This section gives details of action that should be taken to prevent food becoming contaminated.

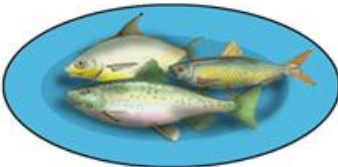
Hygiene control is the adoption of practices which will reduce the risk of clean food becoming contaminated. The aim of hygiene control is to *prevent the spread* of bacteria.

Clean food can be contaminated:

- through contact with contaminated foods, particularly raw meat, poultry and seafood/fish;
- through contact with work surfaces and equipment;
- by the food handler;
- by pests and waste; and
- by water/ice.

FOOD-TO-FOOD CONTAMINATION

It can be assumed that raw meat, poultry and seafood/fish are heavily infected with bacteria when brought into the food area. So, raw meat, poultry and seafood/fish including their juices should be kept well away from other foods.



Other raw foods also carry bacteria that will infect clean food if they are transferred through contact by touching or spills. Special care is to be taken with **seafood/fish, eggs and soil from vegetables**. Bacteria on the *shell* of an egg will be transferred to the hands of the food handler.

To prevent contamination from raw foods the food handler should:

- identify separate parts of the work area for dealing with

Raw meat, poultry or seafood/fish

and

other foods,

- place potentially contaminated foods away from foods that are ready to eat;
- use different refrigerators for storing raw meat and other foods. If only one refrigerator is available, keep the raw meat on the bottom shelf.

EQUIPMENT-TO-FOOD CONTAMINATION

Equipment and work surfaces can easily become contaminated by **foods** (particularly raw meat, poultry and seafood/fish), **pests** and even by the **food handler**. Then the contaminated surface or equipment will pass on the bacteria to food with which it comes into contact.



Any items that have come into contact with raw meat, poultry and seafood/fish or their juices should be treated as contaminated. E.g.: work surfaces, chopping boards, rolling pins, utensils, trays and equipment such as mincers, slicers and knives. These items often retain minute particles of raw food that can harbour bacteria.

It is important to remember, that work surfaces and equipment that look clean may have become contaminated by insects or even humans. The bacteria can never be seen but they may be there!

Therefore, the food handler must:

- immediately and thoroughly clean and sanitize all equipment and work surfaces where raw meat, poultry and seafood/fish have been handled;

- keep utensils and equipment used in the preparation of raw meat, poultry and seafood/fish separate from those used for other foods; and
- maintain a high standard of general cleanliness of work surfaces and equipment.

Colour coding

Separation of utensils and equipment can be achieved through colour coding. With colour coding, items of equipment such as knife handles, chopping boards and wiping cloths are given different colours to show when and where they should be used.

Example of a colour coding system

COLOUR	Knives, chopping boards, cloths etc. to be used for
RED	Raw meat and poultry
BLUE	Fish
YELLOW	Cooked meats
GREEN	Vegetables
ORANGE	Salad and fruit
WHITE	General purpose/ bakery

Wiping cloths

Wiping cloths pick up bacteria when they are used for cleaning. Once on a cloth, the bacteria can easily be transferred to other parts of the food area. There is a high risk of contamination if the cloth is used for wiping areas where raw meat, poultry and seafood/fish have been lying and is then used somewhere else.

So, although wiping cloths are used as a means of keeping things clean they can just as easily become a means of *spreading* bacteria.

The food handler should always:

- keep separate wiping cloths for use with different kinds of foods;

- keep wiping cloths used in raw food areas out of other food areas;
- use disposable wiping cloths, if available;
- work with clean cloths -boil cloths frequently.

FOOD HANDLER-TO-FOOD CONTAMINATION

To reduce the risk of contaminating food, the food handler must:

- use clean tongs, plastic gloves, food bags or food wrapping paper to pick up items of food;
- carry food in containers, or on trays or plates;
- avoid touching parts of dishes and cutlery that will come into contact with food;
- touch food as little as possible with bare hands;
- use cutlery only once for tasting food- then wash it thoroughly before re-using; and
- not lick fingers to separate wrapping paper or blow into a food bag to open it.

**Food
handler
using clean
tongs to
handle food**



**Food
handler
using bare
hands to
handle
food**

WATER CONTAMINATION

Water contamination can result in health hazards ranging from mild gastrointestinal distress to serious bacterial diseases which can sometimes be fatal for the consumer. Thus, it is important to use safe water.

Water which is free from germs, dirt and other harmful chemicals is termed as safe drinking water. Safe water should be used for all of the following purposes:

- drinking;
- cooking;
- processing of all food;
- washing equipment, utensils, containers, kiosks etc;
- washing hands; and
- preparing ice.

Freezing does not remove chemical hazards nor does it prevent several types of biological hazards in water. Further, even if ice is made from clean water originally, incorrect or insanitary crushing procedures, transportation and storage may lead to contamination. Contaminated ice will introduce hazards to foods and beverages when added to them.

The food handler should:

- take care not to put hands or fingers in the stored drinking water. Stored water should be kept in a clean place;
- empty and clean all water containers including water dispensers regularly and dry them (by turning upside down) at the end of a day's sale wherever possible;
- filter and boil water for ten to twenty minutes, if the quality is doubtful. This will kill the germs that cause cholera and other diseases;
- make ice with potable water; and
- not store other food in the same container used to store ice intended for consumption.

OTHER WAYS OF CONTAMINATING FOOD

Prepared food should be safely stored at the correct temperature and removed only a short time before consumption. But even in this short 'stand out' time there can be contamination by **pests**, particularly flies and from bacteria in **waste food** or in the atmosphere generally.



Keeping food covered

Therefore prepared food should:

- be kept covered;
- be kept away from a window or waste bin; and
- not be placed where cleaning is taking place.

KEEP CONTAMINATED SOURCES AWAY FROM UNCONTAMINATED FOOD

Section 3: PERSONAL HYGIENE

This section explains why strict standards of personal hygiene are necessary and how these can be achieved.

PERSONAL RESPONSIBILITIES

Bacteria live in and on the human body and can enter into food in the workplace if people do not maintain high standards of personal hygiene. The food handler can be a direct source of contamination when bacteria spread through his/her hands, face, head, clothing, and jewellery.

HANDS

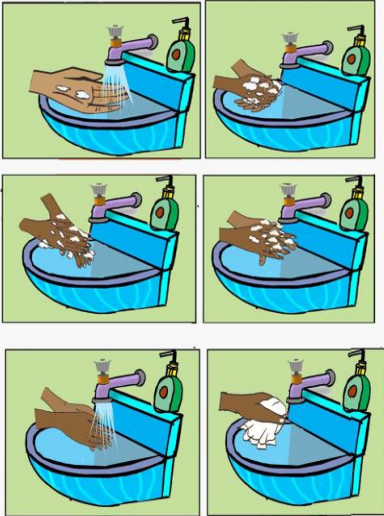
One of the easiest ways for bacteria to spread through the food area is through the hands of the **Food Handler**.

Hands come into direct contact with food more than any other part of the body. The food handler's hands also touch and can contaminate work surfaces, trays, crockery and utensils which in turn may transfer the bacteria to food.

Thus, it is important for the food handler to **always wash hands thoroughly** using hot water and soap (preferably liquid soap). All parts of the hands and wrists must be washed under running water. It is just as important to dry hands thoroughly.

The six steps of hand washing (shown in picture) are:

- using warm water and soap;
- making a lather;
- rubbing back of hands and fingers;
- rubbing in between fingers, around thumbs and fingertips;
- rinsing with clean water; and
- drying hands thoroughly on a clean towel, and turning off the tap with a towel.



Steps of Hand Washing

It is best to wash hands with warm water but if not available cold or lukewarm water is acceptable when used with soap. Though it is ideal to wash hands with soap and water, several people do not have access to soap or even detergent. In their absence, it is acceptable to use coal ash as a substitute for soap to wash hands. A bucket and a tap or a bucket and a pitcher can be used where running water is not available.

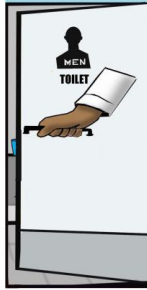
Hands must always be washed:

- before entering the food area, before touching any food and often during food preparation;
- after handling raw meat, poultry, seafood/fish, eggs or vegetables;
- after using the toilet or touching any surface in a public place;
- after coughing into hands or using a handkerchief;
- after touching the face, hair;
- after handling waste or cleaning (handling chemicals);
- before and after eating;
- after changing a baby's nappy;
- after playing with pet animals;
- after touching any wound on the body; and
- after smoking.



HANDS MUST BE WASHED

**After touching
any surface in a
public area**



**After
Smoking**



**After
Cleaning**



**After
eating**



**After handling
garbage**



After playing with pets

Bacteria can collect under finger-nails. Nail polish may flake off and contaminate food and false nails may become 'physical contaminants' in food. Thus **nails** should be kept short and clean and no nail polish should be applied.

FACE AND HEAD

Bacteria live in the nose, mouth, throat and ears of humans and can be transferred to food, work surfaces and equipment by the food handler. Bacteria also live in hair and on the scalp. Unwashed hair carries more bacteria. Bacteria from the food handler's hair can easily fall into food.

The food handler should:

- avoid coughing or sneezing into the food;
- avoid touching face and head particularly mouth, nose and ears;
- keep hair covered with a net or a hat;
- wash hair frequently; and
- never comb hair in a food area or while wearing protective clothing.

Food handlers must wear suitable clean clothing. Protective clothing should be worn where appropriate, but it must be kept clean.



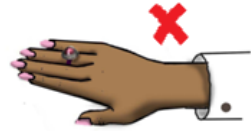
Everyday clothes can bring bacteria into the food area. The purpose of protective over-clothing or kitchen uniform is to prevent contamination from this source. But bacteria can also be spread if the over-clothing or uniform is soiled.

Food can be protected from the risk of contamination if the food handler:

- wears clean protective clothing where appropriate; and
- does not wear protective clothing (apron) away from work.

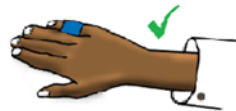
JEWELLERY

It is not a good idea to wear jewellery in a food area. Bacteria and food can gather on items such as rings and bangles. The area of skin underneath the jewellery warms up thus further encouraging the growth of bacteria. Similar rules apply to watches: if a watch must be worn, it should be removed before washing hands so that the wrists and forearms also can be washed. Earrings, finger-rings and gemstones may fall into food.



WOUNDS

Wounds - cuts, grazes, scratches and boils - can quickly become infected with germs. The best way to prevent them from spreading to the food that is being handled is to make sure that all such wounds are properly covered.



The food handler must:

- keep all wounds covered by waterproof Band-Aids; and
- inform supervisor about wearing a Band-Aid as they may not be allowed to handle food.

NO SMOKING OR CHEWING OF TOBACCO

One must not smoke cigarette/beedi, chew tobacco or spit while handling food, or in an area where food is prepared. This may lead to contamination of food and thus each one has a duty to adopt good personal hygiene practices.



Hands can pick up bacteria either from the mouth or cigarette/beedi end. Bacteria can be transferred to a work surface when the cigarette is laid down. Cigarette ash can fall into food.

REPORTING ILLNESS

If the food handler feels unwell or suffers from stomach disorder, cold or cough, eye or ear discharge, it is important to report this to the supervisor. If someone living in the same place as the food handler is suffering from diarrhoea it must also be reported to the supervisor or employer.

The employer may require other illnesses to be reported too.



FOLLOW GOOD HYGIENIC PRACTICES

Section 4: WASTE DISPOSAL AND PEST CONTROL

This section describes the importance of appropriate waste disposal procedures and preventive actions for controlling pests.

WASTE DISPOSAL

Food waste and garbage are sources of food contamination and odours which attract insects and rodents. Suitable provision must be made for the removal and storage of waste. Garbage accumulation can be a breeding place for pests. It must not be allowed to accumulate in food handling, food storage, and other working areas and the surrounding environment.

The food handler should:

- separate non-biodegradable waste such as plastic cans and covers from biodegradable waste before putting them into respective bins;
- separate liquid and solid wastes. Liquid waste and waste water should be emptied into the nearest sewer or drain;
- cover dustbins, clean them regularly, sanitize them and deposit them at the assigned public garbage collection point;
- clean all garbage cans which have been used for storage as well as any equipment which has come into contact with the waste after disposal.

PESTS AND FOOD

Three kinds of pests are commonly found in places where food for human consumption is prepared or stored:

- Rodents - such as mice and rats.

- Insects - such as houseflies, cockroaches, ants and a variety of other insects associated with food.
- Birds - such as crows, pigeons and sparrows.



These pests eat and spoil food. They also transfer to the food the food poisoning bacteria they carry on their bodies and in their excreta.

PREVENTING ACCESS

Pests seek food, warmth and shelter. Steps should be taken to keep them out.

The food handler should:

- keep doors and windows closed as far as possible;
- use fly screens on windows;
- inspect the delivery bags, boxes, cartons for signs of pests;
- find the routes by which pests gain access.

DENYING PESTS FAVOURABLE CONDITIONS

We can never be sure that pests will be kept out. But the pests' opportunities for contaminating food and infesting the workplace can be limited.

To do this, the following good working practices can be adopted:

- food particles and spillages should promptly be removed from work surfaces and floors;
- unclean utensils and equipment should not be left lying around;
- a high standard of general cleanliness should be maintained;
- any food that requires being left to 'stand out' should be covered;
- food should not be left out overnight;

- dried foods should be stored in containers with tight lids (this will also prevent moisture entering the food);
- all food storage areas should be regularly checked; and
- waste bins should be emptied regularly throughout the day and certainly at the end of each day.

FINDING PESTS

The following *signs should be looked for*:

- droppings;
- greasy trails at the base of walls and around equipment;
- marks on food or small mounds of food debris;
- nibbled wrappings, holes in cardboard containers;
- pest carcasses;
- unusual smells and noises; and
- damage to woodwork (mice and rats' nibble).

Any food that is suspected to have been contaminated by pests should be got rid of

The food handler starting work early in the morning should be particularly vigilant in looking for the tell-tale signs - many pests do their work at night. If signs of pests are found or suspicion raised that the workplace is infested the supervisor must immediately be informed.

Any poisons and chemicals used to control pests must be handled with great care, kept away from food and be stored in a secure place.

PEST CONTROL STRATEGY - PREVENT ACCESS, DENY FAVOURABLE CONDITIONS, REPORT ANY SIGNS OF PESTS

Section 5: TEMPERATURE CONTROL

This section specifies the action needed to avoid mistakes while controlling the temperature of food.

TEMPERATURE AND BACTERIA

Bacteria will grow rapidly in foods like milk, *khoya*, *paneer* and meat that are left within the Temperature Danger Zone: **5°C - 63°C**.

Bacteria do not grow, or grow only very slowly, at temperatures *below* **5°C**. They do not grow at temperatures *above* **63°C**.

Correct temperatures are important in controlling bacterial growth.

The idea behind correct temperature control is to keep food out of the Temperature Danger Zone.

The rules for achieving this are quite simple:

- food should be cooked thoroughly;
- keep hot food hot and cold food cold;
- keep prepared food out of the Temperature Danger Zone;
- reheated cooked food must be ‘very hot’ throughout;
- food should be refrigerated;
- bulky items should be thawed completely before cooking;
- dry stores must be cool, dry, clean and ventilated;
- store food off the floor.

COOKING FOOD

Bacteria are killed by heat. This is why food must be cooked thoroughly - most bacteria will not survive in food that is cooked at a temperature of **at least 70°C**. This temperature must be reached *throughout* the food **including the centre** and be held for **sufficient time**. Food which is cooked outdoors should be protected from dust and sun.

All meat, poultry and sea food/fish must be thoroughly cooked because of the likelihood of bacterial contamination. The larger the joint of meat, the longer it will take for the heat to reach the centre. If the cooking is not at a high enough temperature and for long enough, the centre may not be heated sufficiently to kill the bacteria. However, just enough warmth may reach the centre of the food to keep it within the Temperature Danger Zone so enabling food poisoning bacteria to grow rapidly.

The need for sufficiently high temperatures reaching the centre of the food must be kept in mind at all times.

It is also bad practice to add a freshly made batch of soup, sambar, gravy or stock to a quantity made earlier but only partly used. 'Topping up' is dangerous particularly when it continues over several services. During this time there will almost certainly be occasions when the temperature of the 'ever-cooking' pot will drop below the 63°C required for safety. Then the bacteria will multiply rapidly in the rich, warm, liquid food. It is much safer to prepare soups, gravy and stock in small quantities and discard anything left over at the end of the day.

HOT FOOD SHOULD BE KEPT HOT AND COLD FOODS COLD

Keeping hot foods hot and cold foods cold till they are consumed minimizes the opportunity for harmful bacteria to multiply.

It is ideal to consume food as soon as it is cooked, provided the cooking temperatures have been sufficiently high. If, however a short time should lapse between the time the food is ready and the time it will be eaten, it is necessary to use equipment that can hold the food at temperatures of 63°C or above. Examples of such equipment are heated food service counters, thermal food containers, steam tables etc. Such equipment should be heated till at least 63°C before loading. If this is

not possible, the food should be fully cooked and at 63⁰C at the time of loading. Such equipment should not be used to heat up cold or partially heated food.

Many foods that are eaten cold have sufficient nutrients and moisture to enable bacteria to grow quickly. Fresh milk, butter, cheese, frozen vegetables and meat are examples.

The rules for food that is eaten cold are:

- It should be kept refrigerated until as near as possible to the time of consumption;
- It should be handled as little as possible;
- It should be kept away from other foods, particularly raw foods;
- It should be kept covered.

KEEPING PREPARED FOOD OUT OF THE TEMPERATURE DANGER ZONE

If food is not going to be served within a very short time of its being cooked it should be cooled to **less than 10°C within 90 minutes** of the end of cooking. It must be refrigerated as soon as cooling is complete.

Quick cooling is important. In dropping back from its high cooking temperature to the cooled state the food will pass through the Temperature Danger Zone. It must spend as short a period as possible in the 'Zone' because bacteria may have survived the cooking process and will multiply if given time.

Rapid cooling will be aided:

- by dividing food into smaller portions;
- by the cooked foods being transferred to a cold utensil that is then immersed in ice-cold water;
- by the food being placed in the coolest part of the workplace (providing this does not carry the risk of contamination).

RE-HEATING OF COOKED FOODS

Reheated cooked foods - notably milk products, poultry and meat are the cause of many cases of food poisoning. Food handlers often make the mistake of thinking that because food has already been cooked it is free of bacteria and that 'warming up' will be sufficient. In fact, some bacteria may not have been killed by the cooking. Or, following cooking, the food may have become contaminated by a food handler's hands.

If food contaminated by one of these means is *only lightly warmed instead* of being thoroughly reheated, bacteria will have ideal conditions for growth.

These guidelines are to be observed for food that is to be reheated:

- The food from the refrigerator should not be removed in advance of reheating the food;
- The food should be handled as little as possible and kept covered and clear of other foods;
- Large items should be divided into smaller portions;
- The food should be heated to at least 70°C at its core for at least two minutes;
- Food should be served quickly following reheating;
- Cooked food should not be reheated more than once.

REFRIGERATION

A refrigerator should operate at between 1°C and 4°C. Placing food in a refrigerator does not kill the bacteria that the food may be carrying but the low temperature means that *warmth* - one of the requirements for bacterial growth - is not present. If the food is removed from the refrigerator into room temperature the bacteria will begin to grow again.

Cooked food should not be kept at room temperature for more than 2 hours. All food that is cooked and perishable should be promptly refrigerated.

Foods should be refrigerated for only short periods of time, the duration varying from food to food. Most foods fall within the 1-5 days' range but a few can be refrigerated for longer. Package labels often mention the maximum periods of refrigeration. Food should not be refrigerated beyond its 'use-by' date. Some examples of storage periods of different foods are given in the table.

FOOD	DAYS
Uncooked Meats	2-3
Cooked Meats	1-2
Gravy	2
Milk	1-2
Paneer	15-20
Greens	3
Salad vegetables	5
Soft fruits	2
Cheese (hard)	6 months

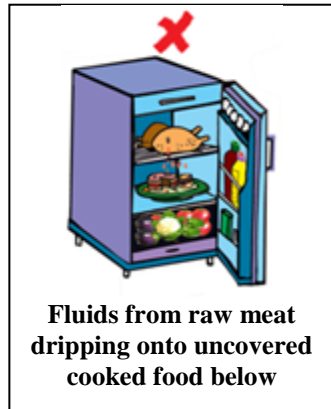
Examples of refrigerated storage periods

If refrigerators are not available, alternate options to lower temperature can be explored (storing in insulated boxes/thermal containers, using cold water/ice, placing in cool, ventilated places etc.)

Points to remember about refrigeration:

- Raw meat, poultry and seafood/fish are to be kept away from other foods - especially cooked meat and cooked poultry.
- The most perishable foods like meats should be in the coldest part of the refrigerator.

- Perishable foods should be returned to the refrigerator immediately after use.
- Nothing - particularly raw meat, poultry and seafood/fish - should be allowed to drip on to food below. Cooked food should be placed above raw food, or separate refrigerators should be used for cooked and raw food, if possible.
- Cooked food should NEVER be placed in the refrigerator immediately after cooking: It should be allowed to cool first.
- All food should be covered as far as possible.
- Food should not be crowded into the refrigerator - Enough room should be allowed for cold air to circulate (When packing refrigerated display units or freezers, care should be taken not to fill above the relevant 'load line' or obstruct air inlets).
- Refrigerator doors should be opened as infrequently as possible and quickly closed.
- The refrigerator should be defrosted regularly to prevent the build-up of ice. Frost free refrigerators should be used wherever possible.
- The temperature of the refrigerator should be checked regularly to see that it is between 1°C and 4°C (See temperature Record sheet below).



TEMPERATURE RECORD SHEET				
Refrigerator No. _____				
Temperature range 1°C - 4°C				
Date	Time	°C	Comments	Signature

FREEZING

Freezers keep food at a temperature (-18°C to -25°C) well below freezing point. Freezing denies bacteria the warmth they need to grow. The coldness also turns any moisture in the food into ice (water in a form that bacteria cannot use).

Some bacteria will die as a result of freezing but others will survive even though they will be unable to grow. Surviving bacteria will grow if the temperature rises towards the Temperature Danger Zone.

The length of time food can be stored in a frozen state depends on the type of food and the rating of the freezing unit. Although frozen food may not become contaminated it may deteriorate in flavour and character if stored too long. Different foods have different storage times ranging from 2 to 12 months. The supplier of the food can be checked with, if there is no knowledge on how long it can remain frozen.

Points to remember about freezing:

- The temperature of the food should be lowered in the freezer to -22°C;
- The temperature of the freezer must not rise above -18°C;
- All food should be wrapped, labelled and dated;
- Food should be stored neatly within the freezer and not overloaded; and

- Old stock should be used before new - maximum storage periods should be known.

THAWING FOOD

Small items of food such as thin chops, fish cutlets, vegetables, and many convenience foods can be cooked from frozen without being thawed first.

But this cannot be done with **poultry, meat and bulky items of food**. In general, these foods **MUST** be completely thawed before cooking begins. Unless complete thawing occurs, the temperature at the core of the food may not reach a high enough level during the cooking process to kill bacteria. Thawing can also cause problems when the outer surface of food warms up while the centre is still frozen, as bacteria can begin to grow.

Food is completely thawed once it is soft and there are no ice crystals present. The legs of properly thawed poultry can be moved quite easily. Many microwave ovens have a defrosting facility which must be used strictly according to the manufacturer's instructions.

STORAGE OF FOOD

All dry foods, such as flour, rice and pulses and all canned food, should be stored in a room or cupboard that is cool, dry, clean and ventilated. Deliveries must be checked to ensure that goods that will be stored are free from odours, dampness or other forms of soiling and do not harbour pests.

Food should be stored on shelves – there should be no food at floor level – to reduce the risk of contamination by pests and to make the floor more accessible for cleaning.



KEEP FOOD AT SAFE TEMPERATURES

Section 6: CLEANING AND DISINFECTION

This section describes some of the methods available for cleaning and disinfecting utensils and the workplace.

CLEANING THE WORKPLACE

Cleaning should achieve two things:

- the removal of grease, food debris and dirt; and
- the destruction of microorganisms (disinfection).

Cleaning of the workplace can be divided into two broad categories:

'clean-as-you-go' and *'scheduled cleaning'*

CLEAN-AS-YOU-GO applies to cleaning that must be done very quickly after soiling occurs. The aim is to prevent contamination or injury to staff, or simply to keep working areas clean and tidy.

Examples of this type of cleaning are:

- washing and sanitizing a chopping board, knife, spoon etc. immediately after use;
- cleaning up a floor spillage just after it has happened.



Clean floor spillage as soon as it occurs

SCHEDULED CLEANING refers to cleaning tasks carried out at regular intervals. Food businesses should have a timetable which

specifies all the details for each item to be cleaned. Examples of scheduled cleaning duties are:

- cleaning the kitchen floor (DAILY);
- cleaning shelves in the dry store (WEEKLY).

Effective cleaning will be achieved if the following are considered:

- what is to be cleaned? Is it '*clean-as-you-go*' or '*scheduled*'? How often must it be cleaned, and at what times?
- who is responsible for the cleaning?
- what is the most appropriate type of energy to be used: physical or mechanical (e.g. elbow grease, machinery), chemical (e.g. cleaning and disinfection solutions) or thermal (e.g. heat, steam or hot water)?
- what cleaning equipment and chemicals are to be used? Where are these materials to be stored?
- how can the cleaning be done safely? Is any special protection needed (e.g. rubber gloves) or are any other precautions necessary?

CLEANING AND DISINFECTION CHEMICALS

Chemicals are available to enable proper standards of cleaning and disinfection to be maintained. Usually the chemical is added to water to make the cleaning solution.

DETERGENTS are chemicals that will dissolve grease and assist the removal of food debris and dirt. Detergents do not kill bacteria.

DISINFECTANTS are chemicals designed to destroy bacteria. They reduce the number of bacteria to a safe level. Disinfectants are not effective in removing dirt and grease. Disinfectants which have a very strong smell that might taint food must not be used on any surfaces or equipment that comes into direct contact with food. However, it is very important that these surfaces are properly disinfected using a suitable chemical solution or steam or hot water (over 82°C).

SANITIZERS are chemicals combining the role of both detergent and disinfectant. They are designed to remove grease, dirt and destroy microorganisms by disinfecting at the same time.

Disinfection by HEAT is an effective way of killing bacteria for example, using very hot water (80°C-85°C). Chemical disinfectants and sanitizers can be used in addition or in situations where hot water is not available. However they are less effective in water that is not hot and on surfaces that have not received a preliminary clean using hot water and a detergent.

It is a popular myth that the use of disinfectants achieves perfect hygiene. They are useful in reducing the numbers of bacteria on surfaces that come into contact with food, as well as for floors and toilet areas. Disinfectants used must be suitable for work areas and must not taint food.

When using cleaning solutions the food handler should:

- follow the 'Instructions For Use' including those for dilution and storage;
- make up fresh, hot solutions frequently: dirty or cool water makes the chemicals less effective;
- wear rubber gloves or other protective clothing when necessary;
- not store chemicals within the food area or where they may warm up; and
- NEVER mix different chemicals - they become less effective when mixed and poisonous gases may be produced.



DISH WASHING

Crockery, cutlery and utensils should be cleaned immediately after use. Cleaning can be by hand or by machine.

WASHING BY HAND

The most hygienic way to wash by hand is with TWO stainless-steel sinks side by side. The dishes must be washed in one and rinsed in the other. If two sinks are not available, the same sink can be used to clean and then rinse or the sink can be used to wash and rinsing can be done in a separate bowl of hot water. If a sink is not available, a bucket with a tap or a bucket and a pitcher can be used. Rinse water should be changed frequently, when dirty or cooled. Rinsing is important. Laboratory tests have shown that dishes that are not rinsed are covered with large numbers of bacteria.

The following steps should be adopted when dish-washing:

1. Left-over food should be removed.

This can be done by scraping and rinsing under running water.

2. Dishes should be washed in hot water and detergent.

In the first sink, items are placed into hot water (50°C - 60°C) and detergent, and scrubbed with a tough nylon-bristled brush.

3. They should be rinsed in very hot water.

In the second sink (or in the bowl) items are rinsed in very hot water (75°C - 80°C) before being stacked to dry. As well as killing bacteria and removing detergent, rinsing in this way makes the items hot enough to dry quickly on coming into contact with the air. This avoids the need for drying cloths which can spread bacteria if they become soiled.

4. They should be dried.

After rinsing, the items should be left to drain in a clean, dry area, well away from any dirty washing water, until they are clean, dry and without, smears.

WASHING BY MACHINE

There are several types of dish and utensil washing machines available but they all follow the stages of cleaning just mentioned - left-over food is removed from the items to be washed which are then stacked in the machine. Washing is by hot water and detergent followed by rinsing and disinfecting by hot water sprays or steam.

Correct loading of these machines is essential. Items should be stacked neatly so that the cleaning solution can reach them. Cups, glasses and jugs should be stacked upside-down to avoid collecting water.

Dishwashers must be properly maintained, and the recommended salts, powders and rinse aids used in the correct amounts. A machine will only clean effectively if it operates at the correct temperatures. One that fails to do so is a hazard.

CLEANING WORK SURFACES

It is vital that surfaces upon which food is prepared are kept clean and bacteria-free for each new job. '*Clean-as-you-go*' applies but there may also be a '*scheduled*' requirement to clean the surfaces at the daily start of work. Work surfaces should be left clean and clear at close of work.

The stages of cleaning are:

1. remove food particles and spillages using a damp cloth;
2. use a solution of detergent and hot water to remove grease and general soiling;
3. rinse the surface thoroughly using hot water;
4. apply a suitable disinfectant in hot water, allow sufficient time for the solution to do its work;

5. rinse again using hot water and leave the surface to dry. Alternatively, dry the surface using clean towels.

If the soiling is very light stages '2' and '3' may be omitted but if the surface has been in contact with raw meat, poultry, seafood/fish or eggs this should not be done.

CLEANING OTHER SURFACES

Telephones, and handles on doors and refrigerators, are examples of surfaces where contaminated hands may deposit bacteria which can be picked up by other hands. Include such surfaces in the cleaning schedule.

CLEANING EQUIPMENT

The food handler should not attempt to clean equipment unless he/she has been trained and authorized to do so.



The basic steps are:

1. Disconnecting the machinery from any power source before commencing cleaning. Extra care has to be taken if blades are removed.
2. Removing all waste foods. Washing and disinfecting all parts.
3. Reassembling the machine. Particular care should be taken if there is a moving part that could fly off if not properly refitted.
4. Re-disinfecting all parts of the machine that will come into contact with food.
5. Ensuring that all guards have been refitted.

FLOORS, WALLS AND CEILINGS

Floors can be cleaned either by using a machine scrubber or by manual scrubbing using hot water and detergent. Where a hand scrubber or mop is being used, it is advisable to work with two buckets. One should hold the cleaning solution; the other should hold plain hot water for

removing dirty water and soil from the hand scrubber or mop head as cleaning proceeds. Following scrubbing, the floor should be rinsed using a cloth, detachable-head mop or machine. Hot water aids quick drying.

All areas of the floor should be cleaned paying particular attention to parts where food residues may have lodged.

Where cleaning is required during the day this can usually be done by mopping. Food spillages should be cleaned up as they occur.

A wet floor is a hazard to staff: during cleaning and drying a warning notice should be displayed. It is important that a floor is left clean and free from food residues at the daily close of work. Dirty floors are an invitation to pests to take up residence.

Walls and ceilings should be free of dirt, litter, and moisture. Corners and places that are hard-to-reach should also be cleaned routinely. Most oil-based painted walls can be satisfactorily cleaned using hot water and a detergent. A disinfectant should be used daily for wall areas where splashes and stains may occur such as behind sinks or work surfaces.

Ceilings can be cleaned with a vacuum cleaner, ceiling broom or with the help of a broom tied with old flannel cloth. These devices can be used to dust the ceiling from one end to the other end. Stained areas can be cleaned with the help of a sponge and detergent.

DUSTING AND SWEEPING

Dry dusting and sweeping can fill the air with dust particles that may well be carrying bacteria. A moist cloth should be used - never a dry duster - for ledges and shelves. For floors, a clean damp cloth should be wrapped around the brush head if no better alternative exists.

SCRUBBERS, MOPS AND CLOTHS

Scrubbers, mops and cloths become contaminated with bacteria during cleaning. They must be thoroughly washed and disinfected frequently. Mop heads and floor cloths should be changed regularly.



WASTE BINS

Waste bins can become breeding grounds for insects and rodents, their contents providing the food and shelter these pests need.

WASTE BINS WITHIN THE FOOD AREA

Bins and bin stands must be washed down and disinfected regularly, as part of the cleaning schedule. The floor area around bins must be cleaned at least daily.

EXTERNAL WASTE BINS



'Outside' waste bins must be positioned as far away from the food area as possible and must have lids or covers to limit access by pests.




The area around the waste bins should be kept tidy: Waste material should not be left stacked up *outside* the bin. The area should be hosed down after each collection. During the summer months it may be necessary to disinfect the bins or to spray them with insecticides.



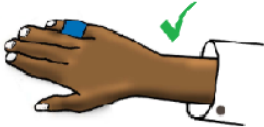
CLEAN THOROUGHLY!




***CLEANING DONE BADLY SIMPLY SPREADS
THE BACTERIA!***




Appendix: HYGIENE RULES



'WHAT SHOULD I DO?'		'WHY SHOULD I DO IT?'
<p>WASH YOUR HANDS</p> <ul style="list-style-type: none">• Before entering the food area• After using the toilet• Between handling raw meat/ poultry/ fish/seafood/ eggs• Before and after touching food• After coughing into your hands or using a handkerchief• After touching your face or hair• After carrying out any cleaning or handling rubbish		<p>To stop bacteria from spreading and contaminating food.</p>
<p>Avoid touching your nose or coughing or sneezing over food</p>		<p>Many of us carry <i>bacteria</i> in our nose and throats which can cause illness. Don't add your own bacteria to food</p>



<p>Try not to touch food with your hands. Whenever possible use clean tongs to handle food and plates or trays to carry it</p>		<p>The less your hands are in direct contact with food, the less chance there is of contamination occurring</p>
<p>Avoid touching those parts of dishes or cutlery that come into direct contact with food</p>		<p>Bacteria on your hands may be transferred to food via the dish or cutlery</p>
<p>Keep your hair covered with a net or hat and do not comb your hair in a food area</p>		<p>Your hair and scalp carry many bacteria that can fall into food</p>






<p>Keep finger-nails short and clean and do not wear nail polish</p>		<p>Bacteria can collect beneath long nails and get into the food you handle. Nail polish can come off in the food</p>
<p>Do not wear jewellery (watches, bangles, earrings and rings with stones).</p>		<p>Bacteria can collect on items of jewellery or stones or metal may fall into the food. Hand/wrist washing is more thorough if you do not wear a watch or bangles.</p>
<p>Keep cuts, grazes and boils covered with a waterproof bandage</p>		<p>Wounds such as these are often infected with bacteria. They must be properly covered to prevent the spread of bacteria.</p>

<p>Inform your supervisor if you have:</p> <ul style="list-style-type: none">• A stomach upset• Cough, cold or eye or ear discharges• A sore or a wound (even if it is covered by a waterproof dressing)• Family or close friends have diarrhoea		<p>If you are suffering from any of these conditions you may contaminate food</p>
<p>Wear clean protective over-clothing</p>		<p>Your own clothing may carry bacteria</p>
<p>Do not smoke or eat in a food area</p>		<p>Bringing cigarettes or food to your mouth contaminates your hands. This spreads to food. Also, cigarette ash may fall into food</p>

<p>Keep raw and cooked ready-to-eat foods separate, especially raw meat/poultry and cooked meat/poultry</p>		<p>Raw foods can spread bacteria to other foods that will be eaten without further cooking. Keep raw and cooked ready-to-eat foods apart when handling and storing them</p>
<p>Keep food at the correct temperature during storage and preparation.</p>		<p>Ready-to-eat foods (e.g. meat, poultry, gravy etc.) provide bacteria with the nutrients and moisture needed to grow. Bacteria multiply at a very fast rate in the Temperature Danger Zone (5°C to 63°C)</p>
<p>Cook food thoroughly so that the centre is heated to a temperature of at least 70°C for a sufficient length of time and the juices run clear.</p>		<p>This is necessary to kill bacteria that may cause illnesses</p>
<p>When food is cooked, serve at once or keep it really hot until it is served, or cool it quickly and refrigerate if it is to be eaten later</p>		<p>To limit the time the food spends in the Temperature Danger Zone and thus prevent the growth of bacteria</p>
<p>Plan ahead: do not prepare food too far in advance or take it out of the refrigerator too soon</p>		<p>To reduce the risk of food being held at temperatures in the Temperature Danger Zone</p>

<ul style="list-style-type: none">• Frozen foods should be thoroughly thawed such as, raw meat, poultry, and fish/seafood.• They should not be refrozen after thawing.		<p>Meat may be cooked on the outside but, if it is not completely defrosted, the centre of the food may not reach the temperature required to destroy bacteria during cooking</p> <p>Bacteria in the food will have multiplied during thawing. These bacteria will not be killed by refreezing and they will become active when the raw food is thawed again for a second time</p>
<p>Keep food covered whenever possible</p>		<p>To protect it against contamination</p>

<p>Always ensure that the workplace is clean before preparing food</p>		<p>Thorough cleaning is necessary to kill any bacteria already present</p>
<p>Only use clean kitchen utensils and equipment and clean them thoroughly, before and after use. Use clean wiping cloths</p>		<p>Utensils and equipment may have become contaminated by bacteria which can be transferred to food. Dirty cloths spread bacteria</p>
<p>Never mix different cleaning chemicals</p>		<p>This can make the mixture ineffective and may also produce poisonous gases</p>

<p>‘Clean as you go’. Any surfaces or equipment that have been in contact with raw food and any spillages must be cleaned up at once</p>			<p>To avoid the risk of contamination</p>
<p>Compile a cleaning schedule for the entire workplace</p>			<p>You should have a list of ALL tasks that must be done, how and by whom, and a timetable for doing them</p>
<p>Find out about food safety controls in your workplace and carefully follow instructions relating to hazard analysis and safe catering procedures</p>			<p>All food handlers must play their part to reduce the risks of bacterial, chemical or physical hazards contaminating food because they could cause harm to the consumers</p>
 <p>E. Coli</p>			

GLOSSARY

1. **Bacteria** are small living organisms often known as ‘germs’. They are so small that it is impossible to see them without a microscope. Bacteria are everywhere: in soil, dust, water, the air around us and on our bodies. It may take only a small number of bacteria to cause illness such as typhoid fever or food poisoning.
2. **Clean-As-You-Go** applies to cleaning that must be done very quickly after soiling occurs. The aim is to prevent cross-contamination or injury to staff, or simply to keep working areas clean and tidy.
3. **Contamination** is the presence of unwanted substances in the food. These can be physical, chemical or biological contaminants.
4. **Detergents** are chemicals that will dissolve grease and assist the removal of food debris and dirt.
5. **Disinfectants** are chemicals designed to destroy bacteria. They reduce the number of bacteria to a safe level. Disinfectants are not effective in removing dirt and grease.
6. **Food Handler** is any person working in or for a food service establishment who engages in food preparation or service, who transports food or Food containers, or who comes in contact with any food utensils or equipment.
7. **Food Hygiene** is the action taken to ensure that food is handled, stored, prepared and served in such a way, and under such conditions, as to prevent – as far as possible – the contamination of food.
8. **Food poisoning** is a common, often mild but sometimes very serious illness resulting from eating contaminated food or drink. The main symptoms are diarrhoea and/or vomiting, often accompanied by nausea (feeling sick) and stomach pain.
9. **Food safety** is the concept that the food will not cause harm to consumer when prepared and/or eating in accordance to intended use.

10. **HACCP** (Hazard Analysis Critical Control Points) is a systematic approach to identification, evaluation and control of food safety hazards.
11. **Hazard** is defined as anything that can cause harm to a consumer.
12. **Hygiene control** is the adaptation of practices which will reduce the risk of clean food becoming contaminated.
13. **Microorganisms:** Microorganisms/ microbes are small organisms that can be seen only through a microscope. The most common types of microorganisms are bacteria and viruses.
14. **Pasteurization** is a method of destroying bacteria by rapidly heating the food to a sufficiently high temperature for a specified period of time.
15. **Sanitizers** are chemicals combining the role of both detergent and disinfectant. They are designed to remove grease, dirt and destroy microorganisms by disinfecting at the same time.
16. **Scheduled Cleaning** refers to cleaning tasks carried out at regular intervals. Food businesses should have a timetable which specifies all the details for every piece of equipment to be cleaned and all parts of the structure to be cleaned.
17. **Temperature Danger Zone** is the range of temperatures (between 5 to 63°C) at which most bacteria multiply rapidly. Keep food out of the temperature danger zone.
18. **Viruses** can be seen only under a very powerful microscope as the viruses are even smaller than bacteria. They multiply in living cells, not in food. Some viruses can cause foodborne illness; examples include gastroenteritis and hepatitis A.

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