PERSONNEL HYGIENE

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PERSONNEL HYGIENE

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INTRODUCTION

Personnel hygiene is probably the most important factor which is relevant to food safety. Lack of personnel hygiene procedures in a food facility could lead to serious contamination of food products due to physical, chemical or microbiological dangers. For example the published literature confirms that food poisoning outbreaks can be caused by contamination from personnel, and reinforces the need to ensure strict personnel hygiene procedures in the food industry. Guzewich and Ross (1999) reviewed published scientific literature for the period 1975-1998 and concluded that food workers, particularly those that were ill, could serve as the source of infection in food poisoning outbreaks and that hand contact with food was a mode of contamination.

The main purpose of this e-book is to increase the awareness level of food handlers in order to understand the importance of their role in food safety. After the conclusion of this e-book there should be a clear understanding of what personnel hygiene really means and the ways to achieve it.

The main sections of this e-book are:

1. Personal hygiene
2. Good hygiene practices
3. Health and medical screening
4. Employee training: training program and content of training

The main objectives to be achieved by this e-book are:

- To describe the basic principles and reasons for effective personal hygiene
- To present an effective personnel hygiene model in food business, but most importantly:
- [redacted] contact with food are not likely to contaminate food by:

  – maintaining an appropriate degree of personal cleanliness;

  – behaving and operating in an appropriate manner (Codex Alimentarius, 2003).

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PERSONAL HYGIENE

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Chapter Objectives:

- To define personal hygiene in terms of food safety
- To present the basic principles of personal hygiene
- To set the main goals of personal hygiene
- To present current EU Regulations relevant to personal hygiene

1.1
DEFINITION OF PERSONAL HYGIENE

Personal hygiene is the implementation of rules and procedures that a food handler should follow in order to ensure the safety of the food products. The maintenance of a high personal hygiene level depends on the following elements:

- **Personal health status**. No person suffering from, or being a carrier of a disease likely to be transmitted through food or afflicted, for example, with infected wounds, skin infections, sores or diarrhea is to be permitted to handle food or enter any food-handling area in any capacity if there is any likelihood of direct or indirect contamination. Any person so affected and employed in a food business and who is likely to come into contact with food is to report immediately the illness or symptoms, and if possible their causes, to the food business operator.(Reg. 852/2004, Chapter VIII)
- **Personal cleanliness**. Every person working in a food-handling area has to maintain a high degree of personal cleanliness.
- **Suitable and clean protective clothing**. Every person working in a food-handling area has to wear suitable, clean and, where necessary, protective clothing.
- **Personal behavior**. Every person working in a food-handling area should comply with the rules in order to promote food safety.

1.2
GOAL OF PERSONAL HYGIENE

The basic goal of personal hygiene in a food handling facility is to reduce or eliminate the risk of contamination of food products. The contamination could be indirect or direct (depending on whether there is a physical contact with the food or not) and could be due to the following factors:

- Physical
- Chemical
- Microbiological

Food industries are obliged to [redacted] in order to ensure the implementation of employee and visitor personal hygiene practices. Such practices shall result in the sanitary handling and delivery of safe and quality products to customers.

1.3
EU REGULATIONS RELEVANT TO PERSONAL HYGIENE

- **Reg.** [redacted]-
  sonal hygiene.
- **Codex Alimentarius**, Recommended, Code of Practice - General Principles of Food Hygiene, CAC/RCP 1-1969, Rev. 4-2003 (Section VII).

2
GOOD HYGIENE PRACTICES

AUTHORS:

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Chapter Objectives:

- To present Good Hygiene Practices in terms of food safety;
- To set the basic rules for a food handler in food industry in order to achieve high level of personal hygiene;
- To describe the importance of the role of every food handler in terms of food safety;
- To present easy rules and procedures that a food handler should follow in a food industry.

2.1
HAND WASHING

Hands are usually in direct contact with food products, so there is a major possibility that food poisoning bacteria could be transferred from hands to food. This fact could result to serious contamination of food products. Thorough hand washing of every food handler reduces the possibility of contaminating food with bacteria (The Food Hygiene Handbook for Scotland, 2016).

Hands washing and disinfection procedures always use hot water, liquid soap and disposable paper towels.

Every food handler should wash his/her hands regularly throughout each working day and especially:

- After using toilet
- When entering the food facility
- After a break, lunch, smoking
- [redacted]er handling row food, including eggs
- Before handling ready to eat [redacted]
[redacted] throwing away garbage [redacted] waste
- After putting on or changing clothes
- After getting in touch with animals, or handling boxes, or waste contaminated by birds dropping
- After cleaning or handling of dirty cloths, crockery etc.
- After coughing or sneezing
- After contacting with nose, ears, hair, mouth etc.
- After cleaning – disinfecting
- After getting in touch with anything dirty (e.g money, external packaging, flowers, etc.)
- After dealing with an ill customer or a baby's nappy.

Handwashing procedure:

Washing basins must be provided with hot and cold water, soap and drying facilities. The correct hand washing procedure is essential to prevent food contaminating. All necessary places

should have a protocol for proper hand washing. (Higijenski minimum, 2016).

First step:

Figure 1 - First step in handwashing

The hands should be washed right up to the elbow using running hot water (35 ^{0}C to 45 ^{0}C) in order to remove all the lather, bacteria and dirt.

Second step:

Figure 2 - Second step in handwashing

Apply sufficient liquid soap with antibacterial activity (with disinfectant) to ensure a good lathe.

Third step:

Figure 3 - Third step in handwashing

Rub hands together vigorously for 10 to 15 seconds while ensuring that dirt [redacted] and under the finge[redacted]ils and from the surfaces [redacted] the hands and arms. Rub the [redacted] your hands, between your fingers, and under your nails. Scrub your hands for at least 20 seconds.

Fourth step:

Figure 4 - Fourth step in handwashing

Rinse your hands well under clean, hot [redacted].

Fifth step:

Figure 5 - Fifth step in handwashing

Dry thoroughly with paper towel. [redacted] towel is a quick and easy effective hand drying technique. [redacted] relies on the paper absorbance and physical action of the user [redacted] be contaminated with negative bacteria. Turn off faucet handles with paper towel. Use a paper towel to touch the door handle when exiting the lavatory. Reusable towels should not be used.

As fingernails may harbor bacteria, they must be kept short and clean. Nail polish and false fingernails may contaminate food and should not be used.

2.2

CLOTHING AND CLEANLINESS OF CLOTHING

The [redacted]
"Every person working in a food handling area shall maintain a [redacted] clean, and where appropriate, protective clothing." These Regulations also state that "adequate changing facilities for personnel must be provided where necessary".

In order to protect food products from contamination (microbiological or physical), employees are obliged to follow a strict dress code policy according to food industry's instructions.

Food handlers should keep all parts of their body and clothing clean, and should have suitable protective clothing provided by the employer.

Protective clothing and footwear includes working clothes overcoats, gloves, aprons, hats, caps, protective shoes, gumboots or plastic protection for shoes. In areas where food is handled, protective clothing should fully cover personal clothing. Protective caps should be used to fully cover hair and facial masks should cover the beard and mustache.

Protective clothing should completely cover or replace personal clothing. Food handler should wear clean, washable, light colour protective clothing without external pocket provided by the employer. Press studs or velcro fastening should be preferred over buttons.

Food handlers should be informed about Good hygiene [redacted]ctices and apply all relevant regulations in daily jobs, [redacted] suitable protective clothing and the application of high standards of personal cleanliness. They should always change protective clothing when they get dirty; avoid wiping hands on clothing, especially after handling raw food.

Protective clothing should be suitable for carrying out work and should cover ordinary clothing. Shirt and shirt gloves should not be slipped and in case of short sleeves, only the forearm should be visible. Appropriate footwear should be used in order to prevent slipping and ensure the protection of the feet.

Protective clothing should never be worn outside of the food premises, especially when visiting the toilet. Food handlers should change when leaving the production area or when leaving their work area or even when visiting the canteen.

Personal and protective clothing should never be stored in the production area unless they can be stored in suitable lockers/wardrobes.

Plastic aprons worn over clothing may offer extra protection in situations with high levels of humidity.

Food handlers should use disposable gloves where necessary. In this case the same principles of good hygienic practices apply as in the case of bare hands. Gloves shall be replaced when it is recommended by hygiene practices or when they become contaminated. If gloves are used incorrectly, the risk of contamination by a gloved hand is the same as a bare hand. Gloves can provide an effective barrier between the hands of food handlers and the food products they handle.

Proper Use of Gloves: (ASSETS)

1. Hands should be washed and dried thoroughly:
   - Before wearing gloves
   - When changing to a new pair of gloves
   - After removing the gloves

2. A new pair of gloves should be worn:
   - When changing tasks (e.g. when moving to a new work station, after handling raw meats, before handling ready-to-eat foods such as sandwiches, after cleaning duties, etc.).
   - After sneezing or coughing, blowing nose, or touching hair. Hands must be washed after gloves have been removed.

- As frequently as possible. A pair of gloves should not be worn for more than 4 hours. Prolonged use of gloves can result to excessive perspiration on hands, which provides ideal conditions for bacterial growth on the skin.

3. Disposable gloves should be used only once.

4. Durable re-usable gloves must be washed and sanitized between tasks and stored carefully after removal to prevent contamination.

5. Protective gloves should always be worn by employees:
   - Who have cuts, sores or rashes on hands.
   - Who wear orthopedic support devices on the hands that cannot be adequately cleaned, such as casts and braces.
   - Who wear artificial nails or fingernail polish.

Protective footwear could be necessary either for health or for safety reasons. Protective footwear should be appropriate for the working area in order to provide maximum levels of safety. Food handlers should ensure that the shoes are comfortable and well fitting, with appropriate non slip soles and easily cleanable. They should be stored in cleanable racks in the changing room.

Working boots will be required where wet processing or cleaning is carried out. Footwear should be colour coded wherever possible as a reminder of the hygiene requirements of each production area.

All visitors should comply with the use of protective clothing and footwear. Disposable protective clothing and plastic overshoes should be available for visitors.

Food handlers should wear a suitable head cap. Hair may confine certain kinds of bacteria which may prove to be a serious food contamination risk. Food handlers should regularly keep their hair clean and keep their hair under protective cap

during their job. Protective caps should always be put on before entering the food premises and always away from food preparation area. Long hair should be tied back. The protective caps, hats or scarves, which are used should be clean and completely cover the hair. If a food handler has a beard or a mustache, he should wear a protective cover (a facial mask for example).

Most protective clothing is nowadays made from a blend of 65% polyester and 35% cotton. This is proven to be really appropriate for food industry and can be efficiently cleaned using modern laundry equipment. An adequate supply of clean protective clothing is important. Everyone should have at least a weekly change; some will require a daily change depending on their working area and job description. Washing of the protective clothing depends on the policy of each company – clothing could be washed at home by each worker or at a laundry house. However if workers are instructed to wash their clothes at home, they should be trained to apply the laundry procedure according to HACCP principles.

2.3

PROHIBITED CLOTHING/MATERIAL

Food handlers should not wear jewelry and strong smelling perfume or aftershave as it may damage foods especially those with a high fat content. Food handlers should not wear watches, earrings, jeweled rings or brooches because small pieces of metal may end up in food products and present a serious physical hazard. Such clothing and material may contain dirt and bacteria, which can contaminate a food product.

2.4

PERSONNEL BEHAVIOR - DESCRIPTION OF GOOD AND BAD EMPLOYEE (IN TERMS OF FOOD SAFETY)

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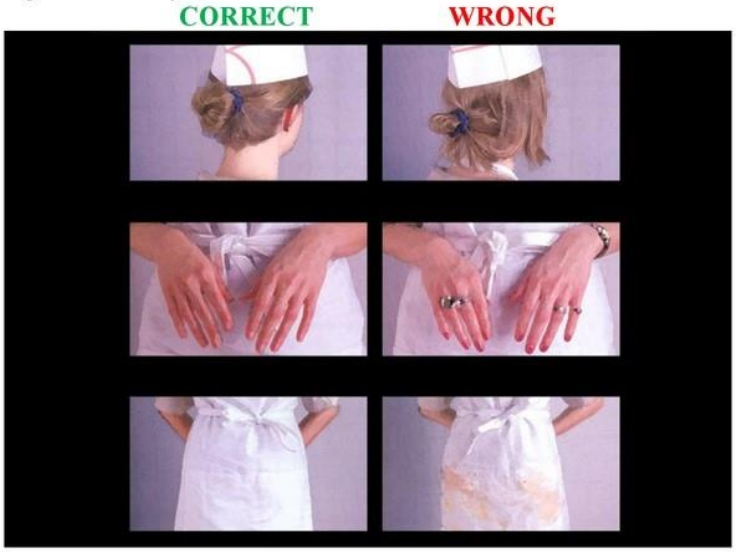
behavior
example:

- sneezing or coughing over unprotected food.

Personal effects such as jewellery, watches, pins or other items

, 2003)

Figure 1-Examples



A good employee that handles food:

- Is always clean
- Washes his / her hands often according to hand washing instructions
- Takes care of his/her health (health certificates / examinations)
- Reports to his / her supervisor in case of an illness that could be transmitted through food
- Wears a proper and clean work outfit
- Wears necessary protective equipment (gloves, head caps, footwear, etc.)
- Avoids bad personal habits which could contaminate food directly or indirectly
- Knows how to handle food in order to protect food safety
- Supervises and guides his / her colleagues when needed

Figure 2 – Example of good employee

A bad employee that handles food:

- Is dirty
- Does not wash his / her hands often according to hand washing instructions
- Does not wear disposable protective gloves or other necessary protective equipment
- Does not report to the supervisors when he / she suffers from a disease that is transmitted through food
- Has infected wounds, pimples, etc. which are not covered
- Does not wear clean work outfits
- Gets in touch with things which could contaminate food
- Has bad personal habits which could contaminate food directly or indirectly
- Does not cooperate and does not handle food properly

Figure 3 – Examples of cases where hand washing is required

2.5

HANDLING OF FOOD PRODUCTS

Food whether from plant or animal origin harbors foodborne pathogens. Consequently, food products need to be handled in a proper way in order to ensure that they do not become contaminated and that the bacteria which [redacted] exist in each food product are not allowed to grow.

[redacted] handling depends mainly on the category of food (raw or cooked/ready to eat).

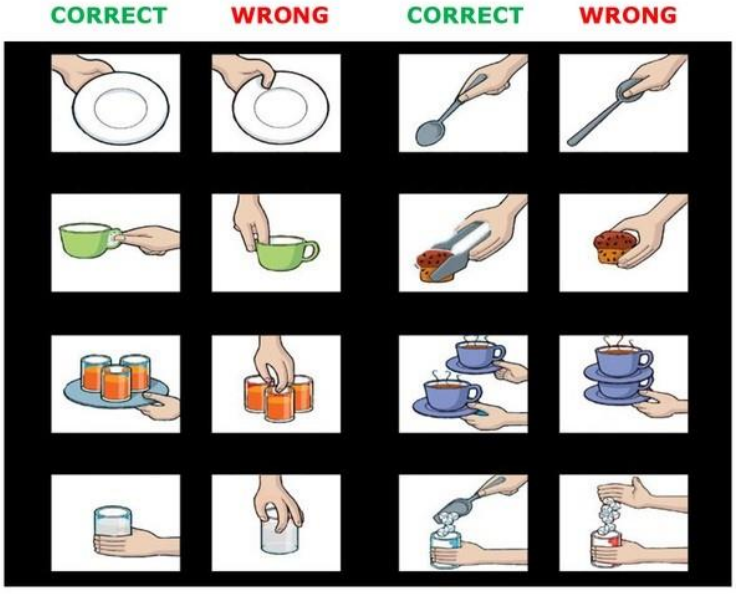
- [redacted], could [redacted] with bare hands (provided that [redacted]
- Cooked or ready-to-eat food products should be handled with utensils such as tongs, spoons, spatulas or disposable [redacted].

It is critical to apply Good Hygiene Practices (GHP) in all stages from production until consumption. GHP and proper handling of food should be applied to the following cases:

1. During delivery
2. During transportation
3. During storage
4. During food preparation (washing, cutting, mixing, etc.).
5. During food processing (heating, cooking, etc.)
6. During cooling-freezing
7. During serving/disposal of food products and serving utensils

Figure 1 – Example of handling during serving food

Figure 2 – Example of handling of serving utensils



2.6

INSTRUCTIONS FOR VISITORS

Visitors to food manufacturing, processing or handling areas should, where appropriate, wear protective clothing and adhere to the other personal hygiene provisions in this section. (Codex Alimentarius , 2003)

The basic rules that should apply to all visitors that enter a food handling a are:

- Visitors shall take all reasonab measures and precautions to prevent contamination and to ensure general personal cleanliness.
- If any of the visitors has a boil, open sore or an infected area on his/her hands, arms or face, he/she should notify company representative before entering the food processing ea.
- No sleeveless shirts, shorts, cutoffs, tank tops or open-toed shoes are allowed in the facility. When appropriate or required, oute garments, such as aprons, shall be worn.
- Hands should be washed a d sanitized before entering the facility. Hands should also be washed after contact with any art of the face, nose or mouth.
- All jewelry, including watches, necklaces, chains, bracelets, exposed piercings, earrings and rings are to be removed efore entering the food processing area.
- A hair net should be worn at all times, by all visitors in the processing area, and shall cover all exposed hair. Hats, bandannas, shirts or other types of hair restraints are not allowed. Beard nets shall be worn to cover beards and ustaches of any length.
- No food, drink, gum or candy is allowed in the food ocessing area.
- Smoking is permitted only in designated areas and never in the food processing area.
- Chewing tobacco is n permitted in the food facility.
- No visitor shall curry pencils, pens, tools, cigarettes, gum etc. in their breast pockets.
- **Visitors are obliged to follow the rules that apply in a food facility in order to promote Good Hygiene Practices and high level of Personal Hygiene.**

3

HEALTH AND MEDICAL SCREENING

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Chapter Objectives:

- To present basic medical examination required for a food handler in Jordan
- To describe the procedure of issuing a Health Certificate in Jordan
- To present the most important foodborne illnesses and their consequences
- To set the basic rules/instructions for safety of the workers in food industries

3.1

HEALTH CERTIFICATE-MEDICAL EXAMINATION OF PERSONNEL

3.1.1 Introduction

"People known, or suspected, to be suffering from, or to be a [redacted] indicated."(Codex Alimentarius, 2003).

Employers should ensure that all employees who directly or [redacted] food safety and public health.

Each food handler should undergo medical examination conducted by a registered medical practitioner.

The main aim of this guideline is to prevent the introduction of [redacted].

3.1.2 Definition

Food handler: Any person dealing directly or indirectly with packaged and unpacked foods or with equipment or Food products or food contact surfaces, thus requiring compliance with the application of food safety requirements

Food handling includes: Food receipt, food storage, food processing, food cooking and catering, food service and food transportation

Health certificate: A certificate attesting a person's good health and free from communicable and infectious diseases.

3.1.3 Certified food handler

A food handler can be certified as fit if all findings are normal or there is no risk to food safety.

All food handlers and workers that contact food directly or indirectly in an establishment should have a valid health certificate according to the established instructions.

Medical examination for food handlers should be conducted every six months according to **article 14 paragraph 1 from the Law of crafts and industries no 16 year 1953**. However, at any time, a certified food handler is excluded from work and should undergo re-examination if one of the following conditions arise:

- [redacted]
- Diarrhea
- Vomiting
- Fever
- [redacted]
- [redacted].)
- Secretion from ears, eyes or nose.

Food handlers or workers that are suspected to be suffering from infectious illnesses should be reported and excluded from food handling.

3.1.4 Medical Examination

3.1.4.1 OBJECTIVE

The main objectives of medical examination among food handlers are:

- To ensure that all food handlers are not carriers of any pathogens related to foodborne diseases

- To [redacted] in contact with food are not likely to contaminate the food
- To ensure that [redacted] products in Jordan are safe and do not pose any risk of foodborne diseases to the consumers.

3.1.4.2 Food handler categories obliged to issue health certificate

Food handlers working in one of the following categories of food producing or food processing or food selling establishments are obliged to issue a health certificate:

- Bakery and public ovens;
- Cold stores;
- Sweets, jams, hallawah and tahini;
- Preserved fruits and pastries;
- Ice-cream, beverages, and Ice shops, storage and factories;
- Fish shops;
- Fruits and vegetables storage and shops;
- Pasta factories;
- Shops selling milk, butter, cheese and dairy products;
- Olive presses and olive oil stores;
- Manufacture of edible oils and grease;
- Sugar refineries and sugar and molasses factories;
- Fruits and vegetable canning, preserving factories and shops;
- Public markets and supermarkets;
- Vinegar manufacturing;
- Shops dealing with the manufacturing, selling, storing, packaging or preparing of foods;
- Butchery and meat shops and factories;
- Breweries, alcohol, beverages;
- Restaurants, cafes, cafeterias and tea shops;
- Dairy and cheese factories;
- Butter factories and stores;
- Slaughterhouses.

3.1.4.3 Medical examination types

Medical screening includes the following examinations (indicative list – not strictly limited):

Physical examination:

- Fever
- Jaundice
- Skin infection on hands, arms, face
- Boils, sties or septic finger
- Secretion from eyes, ears, nose or gums/mouth

Lab examination:

- **Blood test:**
  - ✓ Typhoid
  - ✓ Hepatitis A
  - ✓ Tuberculosis
  - ✓ HIV (for foreign workers)

- **Feces test:**
  - ✓ Eggs of worms and parasites
  - ✓ Harmful intestinal bacteria (*salmonella* and *shigella)*

- **X-ray for chest:**
  - ✓ Tuberculin test for pulmonary tuberculosis

- **Smear pharynx test**
  - ✓ *Staphylococcus*
  - ✓ Diphtheria (for ice-cream workers)

- **Other tests:**
  - ✓ Any additional tests which the doctor deems necessary in order to proceed to the issue of the

health certificate (free from communicable and infectious diseases).

3.1.5 Issuing of Health certificate

According to Law of crafts and Industries No. 16 of 1953 Article 14, the worker is not allowed to handle food directly or indirectly , unless he/ she is medically examined and has obtained a certified health certificate, which proves that he/she is free from communicable and infectious diseases.

Health departments of Ministry of health in Jordan are responsible for the medical examination and issuing of health certificates. However Health and Occupational Control Departments of the Greater Amman Municipality are responsible for lab examination and issuing of health certificates in the governorate of capital (Amman) of Jordan.

Health certificate format should be according to the format determined by the Ministry of health.

Jordan Food and Drug Administration cooperatives along with Amman Municipality and Ministry of health are responsible for inspection and controlling of the validity of health certificates of food handlers and workers.

3.2

FOODBORNE ILLNESSES

Foodborne diseases, especially those caused by pathogenic organisms, remain a serious problem in all countries. Diarrhea is a feature of most of these diseases and up to 70% of all episodes of diarrhea may result from the ingestion of contaminated food and water.

The Center for Disease Control and Prevention estimates that about 1 in 6 Americans (that's 48 million people!) gets sick, 128,000 are hospitalized, and 3,000 die of foodborne diseases each year. The causes of food poisoning vary from year to year as the environment changes. For example, the number of cases from 2006 to 2013 involving *E. coli 0157, Salmonella, Listeria* and *Yersinia* remained relatively consistent. However, illnesses caused by *Campylobacter* have increased by 13 percent and *Vibrio vulnificus* by a whopping 75 percent. Luckily, there are some signs of improvement, such as a slight decrease in *Salmonella* infections over the last years (2010 to 2013).

Most foodborne illnesses are preventable. That means the hospitalizations and deaths related to these illnesses are mostly preventable, too. Reducing food poisoning by just 1% would prevent approximately 500,000 Americans from getting sick each year; reducing it by 10% would prevent about 5 million individuals from getting sick.

3.2.1 DEFINITION AND NATURE

The term "food poisoning" has often been used in some countries, but it is an expression that can sometimes be restrictive or misleading. *Foodborne illness* or *foodborne disease* are now the generally preferred terms. Foodborne disease can be defined as: "any disease of an infectious or toxic

nature caused by or thought to be caused by the consumption of food or water"(WHO, Basic Food Safety for Health Workers, 1999). The illnesses caused by foodborne microorganisms, principally bacteria, are associated with gastrointestinal symptoms of nausea, vomiting, stomach pains and diarrhea.

These facts vary, but it is generally believed that in developed countries less than 10%, or even only 1%, of cases of foodborne illnesses ever reach official statistics. Statistics from both developed and developing countries show an increasing trend in foodborne illness over recent years.

In developed countries exposure to biological or chemical contaminants is often much lower than in developing countries. The general overall improvement is due to increased restriction of the use of toxic chemicals and pesticides that persist in the environment, and improved control of environmental pollution.

Several different types of organisms can cause foodborne illness. Bacteria are the most important and mostly well-studied foodborne pathogens. A key factor is their ability to multiply in food, thus increasing the hazard they pose. Filamentous fungi (moulds) can also grow in foods and some produce toxic substances called mycotoxins.

A number of human viruses can be transmitted by food and human diseases caused by protozoa, helminths and nematodes that are animal parasites are problems of emerging importance in a number of countries. These differ from most bacterial foodborne illnesses - the causative organism does not multiply in the food itself. Table 1 shows the main causes of foodborne illnesses.

Table 1 - Causes of foodborne illness

INTRINSIC HAZARDS	**Examples**
Natural toxins or anti-nutritional factors	oxalic acid (rhubarb, spinach)
	alkaloids
	solanine (potatoes)
	dioscorine (yams)
	cyanide (cassava, lima beans)
	haemagglutinin (red kidney beans)
	protease inhibitors (legumes)
	phytic acid (bran)
	amatoxin, psilocybin and others(toxic Mushroom)
EXTRINSIC HAZARDS	**Examples**
Chemical Contamination	dioxins, PCBs
	heavy metals (Cd, Hg, Pb, ...)
	pesticides residues, hormone residues
Biological Contamination	**Bacteria**
	causing infection e.g. *Salmonella*
	causing intoxication e.g. *C. botulinum*
	Parasites
	helminths e.g. roundworms
	protozoa e.g. *Giardia lamblia*
	Viruses e.g. Hepatitis A

	Viruses (SRSVs)
	Fungi/mycotoxins e.g. aflatoxin
	Algae (e.g.dinoflagellates leading to paralytic shellfish poisoning

3.2.2 ECONOMIC IMPACT OF FOODBORNE ILLNESS

Foodborne illness is a major burden on any country economy. Costs arise from a number of different sources and are incurred both by the individual and by society at large. These costs include loss of income by the affected individual, cost of health care, loss of productivity due to absenteeism, costs of investigation of an outbreak, loss of income due to closure of businesses and loss of sales when consumers avoid particular products.

In 1989 it was estimated that the total cost of bacterial foodborne illness to the United States economy was US$ 6,777,000,000. In developing countries, where the problem of diarrheal disease is far greater, the effect on economic activity and development can only be far more severe.

In developing countries, diarrheal diseases, particularly infant diarrhea, are a major public health problem. It has been estimated that annually some 1500 million children under five years of age suffer from diarrhea and over 3 million die as a result (Motarjemi Y. et al, 1993). The immediate cause of death from diarrheal disease is usually the dehydration that results from the loss of fluid and electrolytes in diarrheal stools, but diarrhea can also have other serious health consequences. It may lead to malnutrition since food intake is reduced either as

a result of loss of appetite or the withholding of food, and those nutrients that are ingested are poorly absorbed or simply lost by being swept out with the diarrheal stools and in some way, will lead ultimately to premature death . Where the infectious dose is high, the food vehicle can play a very specific role in the illness. Depending on the food's composition and conditions of storage, a pathogen present at low and possibly harmless levels may grow to numbers sufficient to produce illness.

3.2.3 HEALTH CONSEQUENCES OF FOODBORNE ILLNESS

For most adults in the industrialized world, incidents of foodborne illness are unpleasant but are generally mild and self-limiting indispositions that are restricted to gastroenteritis and are not usually life threatening.

Exceptions occur with particularly susceptible individuals such as very old or very young people, pregnant women or those who are already very sick or weak for some other reason. These vulnerable groups constitute quite a large proportion of the population and for many of them diarrheal disease can be fatal.

A number of foodborne pathogens such as *Clostridium botulinum* are also associated with acute extraintestinal (systemic) disease. *C. botulinum* causes a severe neuroparalytic syndrome which is often fatal. Survival in cases of botulism is critically dependent on early diagnosis and treatment.

Sometimes extra-intestinal disease transmitted by food is particularly associated with certain susceptible individuals. For example, infection by Listeria monocytogenes can vary from a mild, flulike illness to meningitis and meningoencephalitis. It is particularly serious in pregnant women; the mother may

experience relatively mild symptoms but infection of the fetus can result in abortion, stillbirth or premature labour. Listeriosis is also more than 300 times more common in AIDS patients than in the general population.

3.2.4 INFECTIOUS DOSE

Infective pathogens can be introduced into the body from a variety of sources. In the past, it was thought that contaminated water was the main source of the pathogens that cause diarrhea. This is probably still true in many cases, but it has been shown more recently that food may also be the vehicle of contamination in up to 70% of cases. A sufficient number of cells must be consumed order to cause an illness. This is known as the infectious dose. The infectious dose varies from one organism to another and from person to person. For *Campylobacter jejuni* the infectious dose is thought to be quite low, while relatively high numbers of non-typhoid *Salmonella* are normally required to produce illness.

Bacteria cause foodborne illness by two mechanisms: infection and intoxication. The latter can also be caused by chemical contaminants and naturally occurring toxins.

3.2.5 INFECTION

Infection occurs when living bacteria are ingested with food in numbers sufficient for some to survive the acidity of the stomach, one of the body's principal protective barriers. These survivors then pass into the small intestine where they multiply and produce symptoms.

Infections can be invasive or non-invasive. In non-invasive infections, the organism attaches itself to the gut surface or epithelium to prevent itself from being washed out by the rapid flow of material through the gut. It then multiplies, colonizing the surface. In some cases, such as infection with enteropathogenic *Escherichia coli*, this produces changes in the

gut epithelium which reduce its absorptive capacity or cause fluid secretion. Colonizing bacteria can also produce enterotoxins; toxins that alter the function of the cells lining the gut and cause them to secrete water and electrolytes into the intestine to produce a profuse watery diarrhea. A notable example of this is cholera, but a similar sequence of events occurs with enterotoxigenic *E. coli* infections.

Invasive pathogens are not confined to the intestinal lumen but can penetrate the cells lining the gut. In some cases their penetration is limited to the immediate vicinity of the gut, as with the non-typhoid salmonellas. Some pathogens invade the mucosa of the large intestine rather than the small intestine, producing inflammation, superficial abscesses and ulcers, and the passage of dysenteric stools containing blood, pus and large amounts of mucus. In other cases, microbial invasion is not restricted to the gut's immediate locality and the organism spreads further through the body, producing symptoms other than diarrhea at sites remote from the gut itself, as for example in brucellosis, listeriosis, typhoid and paratyphoid fevers.

Illnesses caused by foodborne viruses and parasites are also broadly similar in that viable organisms gain access to their site of action in the body via the gastrointestinal tract.

3.2.6 INTOXICATION

In foodborne intoxications, the bacteria grow in the food producing a toxin. When the food is consumed, it is the toxin, rather than the microorganisms, that causes symptoms like *Clostridium botulinum* and *Staphylococcus aureus*.

A number of factors have contributed to this trend. Consumption of foods of animal origin such as meat, milk, poultry and eggs are recognized as more common vehicles of foodborne intoxication.

3.3

HEALTH AND SAFETY OF WORKERS IN FOOD COMPANIES

Workers in food processing plants are exposed to many potential risks and dangers due to improper training or misunderstanding or less knowledge about the plant safety regulations. Assessment of risks and their management is an important issue that must be considered in each food processing plant. This assessment is going to create [redacted] that enhances worker performance and human health through a balance of technology, organization, environment and distribution of tasks. When a company strives to improve occupational [redacted] equipment and work practices. However, the way that a company is organized has a major impact on the company's [redacted]

The most common risks are listed in the following categories:

- **Knife cuts and amputations** due to the use of knives, cutters, choppers and slicers or slips.
- **Falls** due to slippery floors and inadequate lights.
- **Burns and scalds** due to the contact with hot oils, utensils, open fires from ovens and steams
- **Electrical shocks** from cleaning tools or kitchen appliances
- **Back pains** due to heavy lifting or bad posture position
- **Redness and swelling and itching of skin** due to high temperatures, chemicals used in cleaning or food preparation
- **Coughing** due to inhalation of flour, dust, spices and additives

Occupational safety and health administration regulations within food industries could minimize these dangers and create a safe working environment. This could be succeeded by proper

and contentious training in safety measures and regulations that should be followed. The company and all workers must comply with these regulations in order to maintain safe surroundings and avoid any risks. Some useful safety tips that should be considered in order to minimize such potential risks are mentioned in the following chapters.

3.3.1 Implementing Safety Training for New Employees

Effective safety training provides the foundation for preventing occupational injury and illness. Workers, supervisors, and managers should be prepared to perform their jobs productively, ensure product quality, and practice safe behavior. These goals are only accomplished through systematic and focused training. Health and safety training for new employees should include the potential hazard of the job, training responsibility, reporting of hazards, emergency guide, safety and protective clothing and equipment, first aid kits and emergency room, cleaning, maintenance and company safety measures. Implementing a safety training program helps to succeed the following objectives:

- Increase safe behaviors among workers.
- Increase early reporting of potential hazards before injuries occur.
- Reduce absenteeism.
- Improve employee morale.
- Enhance relations between employees and management.
- Decrease time loss claims and injuries on the job (when combined with organizational improvements).

3.3.2 Training on personnel hygiene

Personnel hygiene training should include:

- Hand washing good practices
- Daily shower, good dental hygiene, short clean nails etc.
- Clean clothing
- Protective clothing, for example gloves, hair caps, etc.
- Prohibited clothing, for example rings, watches, jewelers, etc.
- Immediate reporting for any sudden cut or illness

3.3.3 Guardrails and Floors

Slips and falls are [redacted] of the greatest risks for workers in food processing plants. [redacted] these types of incidents:

1. [redacted].).
2. Ensure that walking surfaces provide enough friction for the slippery materials in a workplace.
3. [redacted].

In addition, guardrails must be placed around elevated platforms and open surface dip tanks. Guardrails must be securely attached and rails and mats must be in good condition.

3.3.4 Ventilation and lightening

Food industries should have both localized and general ventilation systems to protect workers from air contaminants. The local ventilation should remove exhaust from equipment and other contamination from the air. These systems must be located around the source of air contamination. General ventilation, including windows, fans and roof ventilators, for the building is also required in order to maintain low levels of air

contaminants. Lights, either natural or artificial or both, and emergency lights should be adequate in order to ensure workers safety.

3.3.5 Equipment, machine guarding and maintenance

Equipment should be checked regularly in order to make sure that it is in good condition and regular maintenance should be followed according to manufacturer instructions. Electrical equipment must be grounded and examined for any defects. Knives and other tools must be kept clean and sharp and should be properly stored when not in use. Any moving machine part that may cause injury must be safeguarded. Any safety hazard should be either controlled or eliminated. Machinery-related injuries are often severe, causing crushed hands and arms, severed fingers, blindness, even death. Proper guarding from machine hazards is essential to protect workers from needless and preventable injuries.

3.3.6 Personal Protective Equipment

Workers should wear non-slip, closed shoes while performing their duties in order to prevent slips and falls. Additional personal protective equipment varies depending on the worker's role in the plant. For example, workers who use knives to cut food should be provided with metal-mesh gloves, wrist and forearm guards and aprons. Workers exposed to hazardous chemicals must be provided with gloves, goggles and a respirator. In addition, ear plugs are required for workers near loud machines. Occupational hearing loss is preventable by controlling the intensity and/or duration of noise exposure in the workplace. If any workers are exposed to noise at an average of 85 decibels (dBA) or more, a hearing loss prevention program is needed.

3.3.7 Safe and hygienic Practices

Workers must follow regulations to maintain a safe environment. This includes regularly inspecting the equipment they work with and immediately cleaning up any spills, including water, to prevent falls. Hand-washing facilities must be available close to all workers who handle hazardous substances, such as ammonia, or possibly infectious materials, such as raw meat. In addition, employers should provide safety training so that workers are aware of potential dangers in the plant and how to prevent injury and illnesses. Furthermore workers should know basic hygienic practices and efficient use of sanitizers in order to avoid contamination of food and spreading of infection.

3.3.8 Working in confined space

There are many confined spaces in the food processing industry. Typical examples are silos, tanks, mixing vats, and storage bins. Fatalities in confined spaces constitute a recurring occupational tragedy. Confined space has limited means of entry or exit (e.g., only one way out), large enough that a person can enter and not designed to have people continuously in the space (e.g., elevator shaft, pit). Potential hazards in such places should be identified and managed. Some examples of these hazards are:

- Hazardous atmospheres (lack of oxygen, hazardous air contaminants, etc.)
- Unexpected power sources (inadvertent ways for equipment to be started)
- Physical barriers or limitations to movement (including exit and entry)
- Instability of stored product
- Mechanical or electrical hazards.

Each type of confined space has different safety and regulatory requirements. However, some tips to prevent confined space problems are:

- Evaluate the workplace in order to determine if there are confined spaces.
- Take measures to prevent workers from entering confined spaces.
- Label all confined spaces with a sign or other notation.
- Write a detailed entry process for employees who need to enter a confined space.
- Train workers to recognize what constitutes a confined space, and the hazards they may encounter while entering or working in a confined space.
- Test all confined spaces before entry to determine whether the atmosphere is safe. Testing should be performed by a trained and knowledgeable person.
- Evaluate confined spaces for the following:
    1. Oxygen level, flammability and known or suspected toxic substances.
    2. Methods for isolating the space - either by mechanical or electrical means (i.e., double block and bleed, lock-out, etc.).
    3. Ventilation of the space.
    4. Work procedures, including use of safety lines attached to the person working in the confined space.
    5. Personal protective equipment required (clothing, respirator, boots, etc.).
- Assign a person to remain outside of the confined space.
- Define rescue procedures before entry.
- Continuously monitor the space to determine whether the conditions have changed due to the work being performed.

4

EMPLOYEE TRAINING

AUTHORS:

- **Dr. Ebraheem Suliman Al-Tahaat (Jerash University)**

Chapter Objectives:

- To present the parts of basic training material on personnel hygiene
- To set employer and employee responsibilities regarding training
- To present examples of training formats and training programmes established by employers
- To emphasize on the role of training in order to achieve a high level of personal hygiene

10

All food handlers, including nursery and nursing h 10 e [redacted], should [redacted] to reduce / [redacted] thus preventing food-borne illnesses. The importance of proper storage, prevention of cross-contamination and good personal hygiene is emphasized.

After completing the course, participants should be able to:

1. discuss food borne illness as a threat to their business and the food service industry, in general;
2. outline general characteristics of potentially hazardous foods;
3. discuss the relationship between personal hygiene and food contamination;
4. identify ways to prevent and reduce time and temperature abuse of food and cross-contamination in the flow of food through an establishment;
5. describe proper cleaning and sanitizing methods.

The company is responsible for making sure that employees are trained and understand the importance of good hygiene and the impact of their behavior and habits on the safety of the food products they handle.

All employees should receive training when required, including:

- when they are hired
- before starting new job duties
- when policies or procedures change
- when there is a need to reinforce current policies and procedures

Repeatable training should be performed at least once a year. Training needs to be provided in a language that employees understand.

A written training program helps to ensure that requirements are communicated in a consistent way.

The food facility's training program should include:

- a list of employees and positions that require hygiene training
- the training material used to train employees, including written procedures and other resources
- the frequency of training (including repeatable training)

- a list of employees that have received training
- a record of each employee's training history, including:
  - the employee's name
  - the date of training
  - a description of the training provided (for example, subject, training materials used, format)
  - the name of the trainer or training provider

A variety of training formats can be used, including:

- one-on-one or group instruction;
- job description;
- coaching or mentoring;
- videos;
- presentations;
- on-line courses;
- review of company policies, standard operating procedures (SOPs) and sanitation standard operating procedures (SSOPs).

4.1

CONTENT OF TRAINING MATERIAL

- Healthy personnel in terms of food safety
- Signs and symptoms of infectious diseases
- Ways of contaminating food by personnel
- Personal hygiene – Good hygiene practices
- Hand washing
- Protective clothing
- Protective Equipment
- Instructions for visitors

4.2

GOALS OF TRAINING

- ***To identify typical signs and symptoms of infectious diseases***

- Some pathogens, for example Salmonella typhi, Shigella species, E.coli generic and O157:H7, Noro virus and hepatitis A virus have a high infectivity (the ability to invade and multiply in the body), and virulence (the ability to produce severe diseases).
- Operators should instruct employees to report any active case of illness to their supervisor before beginning work.
- Supervisor should be familiar with the signs and symptoms

- ***To be able to provide protection from a lesion***

- Any lesion that contains pus, such as a burn or an infected wound that is open or draining and is located on parts of the body that might have contact with product or product harvesting, sorting, packing equipment, increase the risk of contamination.
- the lesion cannot be effectively covered then the employee should not be working in any aspect with fresh product, utensils, or other food contact surfaces or equipment.

- **To understand the conditions of contaminating food and vice versa**

- When a food handler suffers from infectious diseases
- When a food handler has symptoms of gastrointestinal illness
- By wounds or lesions
- When a food handler is in contact with ill individuals
- By hand contact
- Contaminated food could infect personnel as well

- ***To understand the importance of good hygiene***

- Understand the impact of poor personal cleanliness and unsanitary practices
- Good hygiene protects food handlers from illnesses
- Good hygiene reduces the risk of contamination of food products
- Good hygiene could prevent a large number of illnesses

- ***To understand the importance of hand washing and proper hand washing techniques***

- Many of the diseases that are transmissible through food may be harbored in the employee's intestinal track and shed in feces
- Contaminated hands may also transmit infectious diseases
- Teach employees proper hand washing techniques

- ***To train personnel how to use protective clothing, footwear and equipment depending on each job description***

- Protective clothing material and accessories
- Cleanliness of clothing
- Protective footwear
- Protective equipment
- Prohibited clothing/accessories

- ***To ensure good hygienic practices are followed by visitors***

- Visitors dress code and entry permission
- Visitors should be provided with necessary clothing/footwear/equipment
- Instructions for visitors regarding food safety

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Bacteria

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-H-

HACCP

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Hazard

Head cap

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Visitors' instructions

Glossary

Cleaning: The removal of soil, food residue, dirt, grease or other objectionable matter.

Contaminant: Any biological or chemical agent, foreign matter, or other substances not intentionally added to food which may compromise food safety or suitability.

Contamination: The introduction or occurrence of a contaminant in food or food environment.

Disinfection: The reduction, by means of chemical agents and/or physical methods, of the number of micro-organisms in the environment, to a level that does not compromise food safety or suitability.

Foodborne illness: Any disease of an infectious or toxic nature caused by or thought to be caused by the consumption of food or water

Food handler: Any person who directly handles packaged or unpackaged food, food equipment and utensils, or food contact surfaces and is therefore expected to comply with food hygiene requirements

Food hygiene: The measures and conditions necessary to control hazards and to ensure fitness for human consumption of a foodstuff taking into account its intended use.

Food Safety: The assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use

Good Hygiene Practices (GHP): Set of requirements to prevent contamination of food in order to provide safe food to the consumers

HACCP: A system which identifies, evaluates, and controls hazards which are significant for food safety.

Hazard: A biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect.

Health certificate: A certificate attesting a person's good health and free from communicable and infectious diseases.

SOPs: A set of step-by-step instructions compiled by food business to help employees carry out routine operations

SSOPs: Written documents of procedures or programs used to [redacted].

Abbreviations

HACCP: Hazard Analysis Critical Control Point

RDN's: Registered Dietitian Nutritionists

SOPs: Standard operating procedures

SSOPs: Sanitation standard operating procedures

WHO: World Health Organization

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