Health Extension service

Level-III

Learning Guide-19

Unit of Competence	**Promote and Implement Hygiene and Environmental health**
Module Title	**Promoting and Implementing Hygiene and Environmental health**
LG Code:	**HLTHES3 M05 LO4-LG-19**
TTLM Code	**HLTHES3 MO5 TTLM 0919v1**

LO4: Provide information on food and drink hygiene and safety

Instruction Sheet	Learning Guide 19

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Promoting Food Hygiene and Safety
- Identifying Food Born Diseases
- Promoting Food Protection and Preservation
- Educating Hygienic requirements of Food and Drink Establishments
- Identifying Hygiene and safety requirements for food of Animal Origin

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, **upon completion of this Learning Guide, you will be able to**:

- Promote Food Hygiene and Safety
- Identify Food Born Diseases
- Promote Food Protection and Preservation
- Educate Hygienic requirements of Food and Drink Establishments
- Identify Hygiene and safety requirements for food of Animal Origin

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4”.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3 and Self-check 4” **in page -6, 9, 12 and 14** respectively.
5. If you Learned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, Operation Sheet 2 and Operation Sheet 3 ” **in page -15.**
6. Do the “LAP test” **in page – 16** (if you are ready).

Information Sheet-1	Promoting Food Hygiene and Safety

4.1. Food Hygiene and Safety

4.1.1 Principles in Food Hygiene and Safety

Hygiene: - is the set of practices associated with the protection of health. Important feature **food hygiene** refers to many practices that needed to maintain the quality of food from production to consumption.

Food Hygiene: - means all conditions and measures necessary for ensuring the safety, wholesomeness, and fitness for consumption of food at all its stages i.e. from its production, processing, storage, distribution preservation, and service. (WHO/FAO).This is referred to as from "farm to fork" or "from farm to table", because it includes every stage in the process from growing on the farm, through harvesting, storage and distribution, to finally eating the food. It also includes the collection and disposal of food wastes.

Food safety is a scientific discipline describing handling**,** preparation and storage food in ways that prevent food borne illness. This includes a number of routines that should be followed to avoid potentially severe health hazards. The tracks within this line of thought are safety between industry and the market and then between the market and the consumer. In considering industry to market practices, food safety considerations include the origins of food including the practices relating to food labeling, food hygiene, food additives and pesticide residues, as well as policies on biotechnology and food and guidelines for the management of governmental import and export inspection and certification systems for foods. In considering market to consumer practices, the usual thought is that food ought to be safe in the market and the concern is safe delivery and preparation of the food for the consumer.

- F**ood hygiene: -** refers to the practices that prevent microbial contamination of food at all points along the chain from farm to table.
- **Food safety: -** is a closely related, but broader concept that means food is free from all possible contaminants and hazards.
- A traditional way of eating food at the household level in Ethiopia, injera with wot (sauce), is Usually this type of meal is safe, because it is a food that is prepared to eat immediately.

- **The five key principles of food hygiene, according to WHO, are:**
  1. Prevent contaminating food with pathogens spreading from people, pets, and pests.
  2. Separate raw and cooked foods to prevent contaminating the cooked foods.
  3. Cook foods for the appropriate length of time and at the appropriate temperature to kill pathogens.
  4. Store food at the proper temperature.
  5. Do use safe water and cooked materials
- **The specific objectives for food hygiene are to:**
  - Prevent food spoilage i.e. changes that make food unfit for consumption due to microbial or chemical contamination

- Inform and educate people about simple and practical methods of keeping food safe to protect them against food borne diseases.
- Protect food from adulteration (intentional contamination).
- Ensure proper practice in the food trade to prevent the sale of food that is offensive or defective in value and quality

- **Food**

  Food is any solid or liquid, when eaten and absorbed by the body produce energy, promotes the growth and repair of tissue; promotes resistance against diseases or maintains and regulates these processes. Food consists of edible materials such as meat, bread and vegetables; it may be raw (like fresh fruit) or cooked, processed or semi-processed. Food is a nutritious substance eaten by us to maintain our vital life processes. It is a fundamental need, a basic right, and a prerequisite to good health

- **Kinds of Food**

  a) **Perishable foods:** food items that have a short storage life and will become spoiled or contaminated if not preserved and handled properly e.g. fish, meat, milk; eggs, vegetables; creamy cake; and the like.

  b) **Semi-perishable foods:** food items that have a medium storage life and will become spoiled or contaminated if not preserved and handled properly bread, fruits

  c) **Non-perishable foods (stable foods):** foods which are not easily spoiled or contaminated e.g. dry foods; canned foods; sugar and cereals.

  d) Wholesome food: food, which is sound, clean and free from harmful ingredients – it is suitable for human consumption.

  e) **Food hazard:** food that is contaminated with biological, chemical or physical agents and, if eaten, will cause ill health.

- **Classifications are important for:**
  a) Proper storage identification
  b) Food service to the consumer's safety needs
  c) Identification the food media for bacterial growth
  d) Identification of food hazard and critical control points

- **Food that is not safe to Eat**
  - Although food is essential for life and good health, there are some foods that are not safe to eat.
  - Food must be labeled correctly. When any label, writing or other printed or graphic matter on a food container is false or misleading this is known as **misbranding**.
  - Misbranding violates food safety regulations and is unlawful.

- **Food labeling should include the following facts about the food:**
  - ✓ Character (type of food)
  - ✓ Origin (country)
  - ✓ Constituents or ingredients (what is in the food)
  - ✓ Amount in the container
  - ✓ Date of production and expiry date (this is the date when the food is no longer safe to eat)
  - **Adulteration** is when the normal content of the food has been intentionally changed by adding something to it that is not essential or minimizing something that is essential for nutritive value, for example, diluting milk with water and selling it as whole milk.

Adulterated food could be unsafe for a number of reasons. These include poor nutrition, for example, watered-down milk is not as nutritious as whole milk. Unsafe ingredients may have been used, for example, unclean water or other harmful ingredients might have been added.

- **Contamination** is the undesired presence of harmful microorganisms or substances in food. Food can be contaminated by unhygienic practices in storage, handling and preparation and may compromise food safety and palatability.
- **Potentially hazardous food** is sometimes used to describe perishable foods because they are capable of supporting the rapid growth of microorganisms. If microorganisms are allowed to multiply, this will have the potential to cause disease if the food is eaten.

4.1.2 Principles of Safe Food Preparation

- **The key principles for safe food preparation are outlined below**.
  - Choose foods that are not easily damaged by transportation, accidents or by storage.
  - Cook foods thoroughly, especially meat because this can help to kill any microorganisms that might be present in the food
  - Eat cooked foods immediately after they are cooked, rather than leave them out and eat later
  - Delays in eating cooked food can lead to the growth and reproduction of microorganisms in the cooked foodstuff.
  - Store cooked food carefully at an appropriate temperature.
  - Either it should be kept cold, ideally in a refrigerator, or it should be kept hot.
  - If food must be reheated, be sure to reheat it thoroughly.
  - Avoid contact between raw and cooked food.
  - Wash hands properly before handling food and before eating.
  - Keep all kitchen surfaces and utensils meticulously clean.
  - Protect food from animals including insects, rodents and other animals.
  - Use safe water in food preparation and for washing fruits and vegetables to be eaten raw.

4.1.3 Food Contamination and Spoilage

A. **Food Contamination**

1. **Microbial food contamination**
   - Prevention of microbiological contamination is an important function in food preparation

- **Avoiding microbial food contamination**
  - Food handlers should follow these strategies:
  - Thorough hand washing before and during food preparation, especially after using the toilet, and handling raw food or waste.
  - Soap/ash sanitizer and clean water should be available for hand washing at convenient locations.
  - Sick food handlers should not prepare food! One sick person can cause a food borne disease outbreak, particularly where people are in crowded or unsanitary living conditions.

- Raw and cooked foods should be separated, because raw foods are a source of microorganisms and can decontaminate prepared foods.

2. **Chemical contamination of food**
   - Attention also needs to be given to possible chemical contamination of food. Food can be contaminated through the misuse or mistaken handling of chemicals, including pesticides, bleach and other cleaning materials.
   - All chemicals (detergent, disinfectant, sanitizer) used in the food preparation area should be removed before food preparation begins, to prevent any chemical contamination of the food.

- **possible sources of chemical contamination are:**
  - Reusing containers which have been used for chemicals
  - Using chemical sprays (e.g. to kill cockroaches) in areas where food is exposed
  - Accidentally adding chemicals, which have a texture similar to table salt or sugar during food preparation; they should always be stored separately.

B. Food Spoilage

- Food spoilage: is alteration of food in color, odor, taste, and texture, consistency due to food decomposition, decaying, rotten, and fermentation.
  - ✓ Food spoilage makes the food unsuitable, unhealthy, and undesirable for eating. It is of more aesthetical than disease causing (contaminated food). It is the reciprocal of fresh food‘.
- Causative agents of food spoilage (Etiology): bacteria fungi, insects, food enzymatic action (autolysis), reaction with the surrounding of (food oxidation)
- Conditions for food spoilage: aerobic condition, suitable temperature, suitable pH, moisture, time exposure.
- Health impact of food spoilage: food shortages and degrade the dignity of freshness i.e. food wholesomeness leading to unacceptable by consumers.
- Food spoilage is the process of change in the physical and chemical properties of the food so that it becomes unfit for consumption. Food spoilage is any undesirable change in food.
- Most natural foods have a limited life: for example, fish, meat, milk and bread are perishable foods, which mean they have a short storage life and they easily spoil. Other foods also decompose eventually, even though they keep for a considerably longer time.
- The main cause of food spoilage is invasion by microorganisms such as fungi and bacteria.
- Spoiled food is not only the problem of health but also has economical crisis when we dispose the unhealthy food items because of poor handling or the autolysis conditions.

4.1.4. Factors affecting Food Spoilage

- The growth of microorganisms in food products can be affected by extrinsic and intrinsic factors:

A. Extrinsic Factors
- Extrinsic factors are factors in the environment external to the food, which affect both the microorganisms and the food itself during processing and storage.
- Extrinsic factors include temperature, humidity and oxygen.

B) Intrinsic Factors
- Intrinsic factors exist as part of the food product itself.

- For example, meat has certain characteristics that may promote the growth of certain microorganisms.
- PH, Moisture content, Nutrient content, Structure of food items are the common intrinsic factors that affect the growth and multiplication of microorganisms in foods.

4.1.5 Infectious agents and Food Diseases

- Infectious agents are organisms that can be transmitted from one person to another person in the chain of infectious disease transmission. Those infectious agents that can cause diseases are often referred to as pathogens (pathogenic 'means disease causing).
- Many infectious agents (bacteria, viruses, fungi and protozoa) are microorganisms that are too small and cannot be seen with the necked eyes, except with a microscope.
- The adult stages of disease-causing parasites (helminthes or worms) may be seen with the naked eye, but their eggs and immature stages are seen only with microscope. Microbiology is the science that deals with the study of microorganisms.
- Although infections often result in disease, it is also possible to be infected with a pathogen and still appear healthy. Either this is the disease has not yet had time to develop, or the person's immune system is keeping it under control.
- The infectious agent can still be transmitted to others, example spreading into food that handled by infected food handlers.
- The majority of food borne diseases (those caused by infectious agents transmitted to people in the food we eat) are due to bacteria, but viruses, parasites and toxins are also can cause food borne diseases. Food contamination is the conditions of food that pathogenic micro organisms grow and multiply on it.

- **Bacteria**
  - Bacteria are the most abundant of all organisms. Bacteria are unicellular organisms (made of one cell) and are very small in size, ranging from 0.5 to 5.0 micrometers (μm).
  - Bacteria reproduce asexually. This means that they do not need a partner to reproduce, but simply divide into two, producing two new bacteria.
  - There are pathogenic bacteria capable of causing human illness and food spoilage, but there are also beneficial species of bacteria that are essential to good health and a healthy environment.
  - For example, beneficial bacteria live in our gut and help us digest our food; some bacteria are used to produce foods such as yoghurt and cheese; and others break down wastes in the environment.
  - Some bacteria are capable of forming highly resistant and endurable structures called spores. Spore form bacteria are resistant to heat, freezing, drying, chemicals and other adverse environments.

- The spores can survive the normal processes of food storage and preparation. Two examples of spore-forming bacteria important in food contamination are Bacillus and Clostridium.
- Temperature, humidity, oxygen and water are important for bacteria to grow and multiply. Under favorable conditions a growing bacterial population can double at regular intervals ranging from about 15 minutes to several hours.
- The numbers of bacteria in food can increase rapidly and soon become hazardous to health, particularly if the food has a favorable temperature and water content..

- **Avoiding Food Contamination**
  - You now know that food can be contaminated from sources in the natural environment, people, food preparation surfaces and utensils, raw and uncooked food, animals, pests and waste material.
  - To prevent contamination, food production and preparation operations need to be carefully controlled.

4.1.5 Routes of Microbial Contamination of Food

- Bacteria are a major source of microbial contamination of food, i.e. the undesired presence in food of harmful microorganisms or the harmful substances they produce. Viruses, parasites and fungi are also able to contaminate food and cause food borne illnesses in humans.

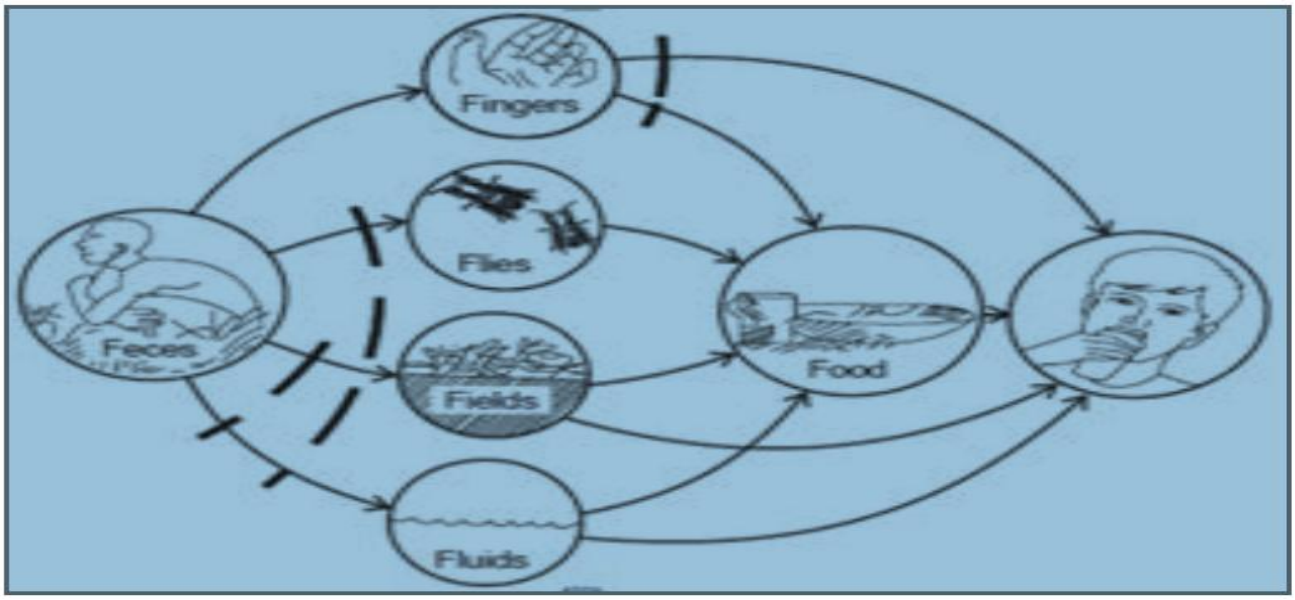

Figure 1.1:- Routes of disease transmission

- **Rout of microbial contamination includes:**

1. Air and Dust

- Microorganisms are found everywhere in our environment. Many types can be found in air and dust and can contaminate food at any time during food preparation or when food is left uncovered.
- Imagine a kitchen where food is prepared and stored in rural communities, and think how easily microorganisms in the air and dust could contaminate the food.

2. Soil, water and plants

- Many microorganisms present in soil and water may contaminate foods. Microorganisms also grow on plants and can contaminate food if care is not taken to remove them by washing or inactivate them by cooking.

- Soil is a particularly rich source of Clostridium bacteria. Faces may contaminate water. Faces may also contaminate plants if untreated sewage has been used as a fertilizer.

3. Gastro Intestinal Tract (GIT)

- The intestines of all humans and animals are full of microorganisms, some of which are beneficial but others are pathogenic. Bacterial pathogens such as Salmonella, Campylobacter and Escherichia coli are common examples.
- Contamination of foods by faecal material is the major cause of food poisoning events. This includes indirect contamination, for example from people's hands if they prepare food without washing their hands after visiting the latrine/toilet.

4. Food handlers

- The term food handler can be applied to anyone who touches or handles food, and this includes people who process, transport, prepare, cook and serve food.
- The presence of microorganisms on the hands and outer garments of food handlers reflects the standard of hygiene in the environment and the individuals 'personal hygiene.
- The microorganisms transmitted to foods by food handlers may come from the hides of animals, soil, water, dust, gastrointestinal tracts and other environmental sources.
- In food preparation at home, food borne microorganisms can be introduced from the unwashed hands of people who are infected by bacteria and viruses, and who cook and serve the food to family members.

5. Food utensils

- Food utensils are cutting boards, knives, spoons, bowls and other equipment used in food preparation, which may become contaminated during food processing and preparation.
- For example, in families where there is no access to running water, the food utensils may not be properly cleaned, stored and handled, and may become a major route of food contamination.

6. Cross-contamination

- Cross-contamination of food is the transfer of harmful microorganisms between food items and food contact surfaces.
- Raw food products and microorganisms may contaminate prepared food, utensils and surfaces. These can be transferred from one food to another by using the same knife, cutting board or other utensil without washing it between uses.
- A food that is fully cooked can become re-contaminated if it touches raw foods or contaminated surfaces or utensils that contain pathogens.

▪ **For example, you should never:**

- Allow raw meat to touch cooked meat
- Put cooked meat on a cutting board that has just been used for raw meat without cleaning it first
- Store raw meat on a shelf above cooked meat so that it could leak blood

7. Poor personal hygiene

- Poor personal hygiene of food handlers is another major factor in food contamination and similarly poor hygiene of consumers also.

- The most important contaminants of food are the 0microorganisms excreted with faeces from the intestinal tract of humans. These pathogens are transferred to the food from faecal matter present on the hands.
- We have already mentioned failure to wash hands after visiting a toilet as a source of food contamination. Can you suggest other times when food handlers should wash their hands?
- Hands should be washed before starting work on preparing food, and after touching any food, surface or equipment that may be contaminated (e.g. after handling raw meat).
- Bad personal habits like scratching your hair and nose with your fingers also contribute to food contamination. Sneezing and coughing spreads contaminants and microorganisms through the air and on to uncovered food, and on to surfaces and hands that can transfer the infectious agents into food.

8. Pests

- Foods can be damaged and also contaminated by pests. Many stored grains are lost through the damage done by pests, including termites (mist), beetles, locusts, cockroaches, flies and rodents such as rats and mice.
- Pests can damage and contaminate foods in various ways like boring into and feeding on the insides of grains, or tunneling into stems and roots of food plants.
- For example, weevils cause large losses of stored grains, especially in warm and humid conditions such as in lowland areas of Ethiopia.
- Pests also damage the protective skin of foods allowing microorganisms to get inside the food and causing it to rot re quickly.
- Pests can pollute food with their excreta and with bodies and body fragments when they die. They also transfer microorganisms on to food while walking on it.
- Flies and cockroaches readily move between wastes and foods, transporting microorganisms with them as they go.
- Domestic animals like cats and dogs can contaminate food, food stuffs and food utensils if not protected to reach.

Figure 1.2:- Insects can leave dirt, excreta and possibly pathogenic microorganisms if they are allowed to move slowly on food

4.1.7 Communication and Education

- Your principal role in food control is to communicate with your community and educate people about food hygiene. You may also have responsibility for inspection of food and drink service establishments.
- Effective food control must combine training, education and community outreach programmers with the effective enforcement of legal requirements.

Self check #1	**Written test**

Direction: Matching

"A"	"B"
1) Adulteration	**A.** Dry foods & canned foods
2) Non-perishable foods	B. Bread & fruits
3) Perishable foods	C. Diluting milk with water
4) Semi-perishable foods	D. Meat, milk & creamy cake
	E. Food Spoilage

Note: Satisfactory rating 4 points unsatisfactory below 4 points

You can ask you teacher for the copy of the correct answers

Answer Sheet

Score _____

Rating _____

Name: _____ Date: _____

Short Answer Question

1._____

2._____

3._____

4._____

4.2 .Food Born Diseases

- Food borne diseases are still a major public health concern all over the world today. They are responsible for many cases of adult illnesses and some deaths, but more importantly, contaminated food is a source of the acute diarrheal diseases that claim the lives of enormous numbers of children every day. Worldwide, about 2 million children under the age of five years die from diarrheal diseases every year.
- In developing countries like Ethiopia, the problem reaches great proportions for many reasons. Most basic among these are poverty and a lack of public health awareness. The problem of food borne disease is more serious among rural communities where there tends to be a lower level of awareness about the causes and prevention of food borne infection.
- Well-documented information is lacking regarding the extent of food borne diseases in Ethiopia because many cases are not properly diagnosed or not reported, and many people who are sick with food borne diseases do not visit health facilities.

- **Sources of Food Borne Diseases**

1) From raw foods: TB, brucellosis, staphylococcal and streptococcal infections from milk, beef tape worm from cattle raw meat, brucellosis from sick sheep; amoebiasis and giardiasis from raw vegetables;
2) From the environment: flied, rats, contaminated water and equipments;
3) from food handlers: skin lesions, spitting, coughing,
4) From sick animals: salmonellosis, brucellosis, streptococcal infections, staphylococcal infections, TB, tec.

4.2.1. Classification of Food Borne Diseases

- Food borne diseases are usually classified based on their causes. Accordingly, they are divided into two broad categories: food poisoning and food infections. Each of these categories is further subdivided based on different types of causative agent.

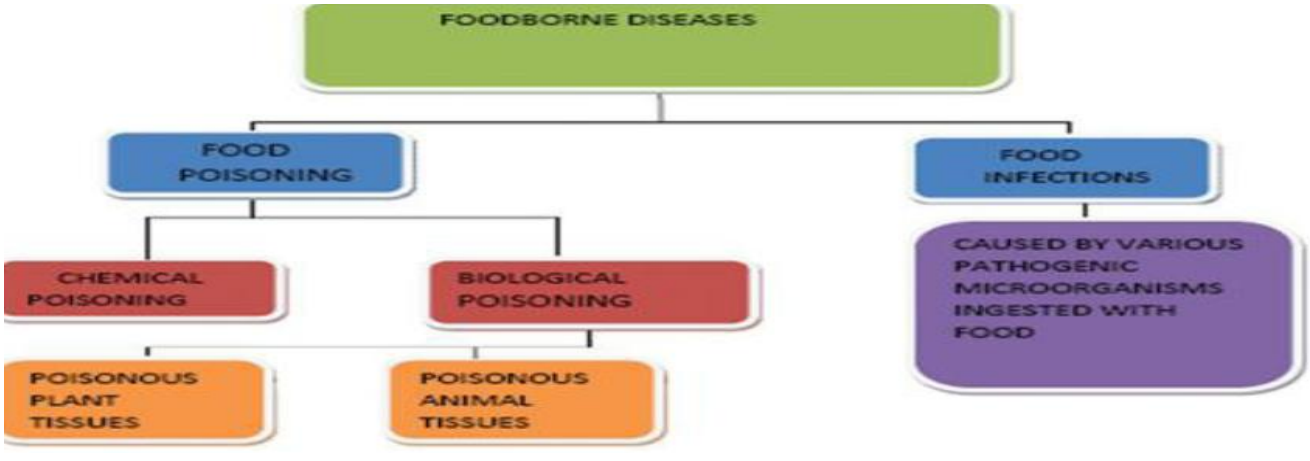

Figure 2.1: Classification of food borne diseases.

1. Food Infection

- It is a condition in which pathogenic enteric microorganisms enters the GI tract with contaminated food, multiplies, and attacks intestinal tissue, causing illness or infection.

- **Causative agent**: virus, bacteria, protozoa, and helminthes. Example: Infectious Hepatitis A; poliomyelitis; typhoid fever, shigellosis; amoebiasis, giardiasis; taniasis; ascariasis, etc., most live in soil, water, and animals.
- **Incubation period:** varies from a day to few weeks: 1-3 days for shigellosis and 4-12 weeks for taniasis in man. Grows well at body temperature (20-370C) and they are aerobic.
- **Common symptoms: -** usually depends on dose and host resistance; however, the common manifestations of infections are fever, bloody diarrhea, abdominal cramp, loss of appetite, weakness and the likes.

- **Mode of transmission**: Faeco-oral (5 Fs)
  - The Common methods of prevention and control of food infection is Control measures that targeted at the source of infection, at the environment and at the susceptible host.

2 Food Poisoning

- A condition in which a chemical agent, or a poisonous plant, or animal or bacterial **toxin** present in food before it is eaten causes intoxication when it is consumed.

- **The common ones are toxin-producing fungus**.

a) Chemical food poisoning:

- Intentionally and unintentionally induced heavy metals (lead, antimony, zinc, copper, and mercury), pesticides, insecticides, rodenticide, herbicides, fertilizers and the likes.
- Incubation period is usually less than one hour.
- Vomiting, diarrhea, and intoxication are common symptoms. Contamination in the crop field; accidental poisoning, from cooking metal containers; unauthorized use of additives; use of unclean sacks or contains used for chemical storage; migration of metals from metal containers to food in acidic condition.

b) Poisonous plant tissues and animal tissues:

- The usual media for intoxication is cereal grain such as wheat, barley, rice): fungus (from seeds of groundnuts and other seeds. Poisonous mushrooms and non-edible fishes are the common cause of food poisonous.

- **Microbial intoxication:**
  - Botulism (clostridium botulism), Cl. Perffringens, staphylococcal aurous are the common microbial intoxication of food poisoning.
  - The agent exotoxin produced in food before ingestion, the toxin and spore are heat resistant and forms enterotoxin at room temperature (18-25C0)
  - **Incubation period:** from one hour to 24 hours or 2-4 hrs for staphylococcus and 2-36 hrs for botulism.
  - **Source of infection:** canned food (fish, meat, edible fungus) for botulism and milk and its products, creamy cakes, infected person/food handler for staphylococcus poisoning.
  - **Clinical symptoms:** explosive onset, acute gastro-enteritis: vomiting, abdominal pain, watery diarrhea, nausea, headache and the like.
  - **Mode of infection:** spore and vegetative forms of bacteria in the course of growing at favorable environment (pH, moisture, and room temperature) produces enterotoxins and the contaminated (intoxicated) food is eaten.

❖ **Control measures of food poisoning:**

a. Sterilization of canned foods; boiling and cooking of suspected food for long duration;

b. Prevention contamination from animals and soil;
c. Pasteurization of milk;
d. Personal hygiene;
e. Food handler's health;
f. Animals health;
g. pH and moisture control; food storage temperature control;

4.2.2. Management of Food Born Diseases

- The management approach to patients with food borne diseases depends on the identification of the specific causative agent, whether microbial, chemical or other.
- There are many different kinds of food borne diseases and they may require different treatments, depending on the symptoms they cause.
- Many episodes of acute diarrheal disease are self-limiting and require only fluid replacement and supportive care.
- If an antibiotic is required, the choice should be based on the clinical symptoms and signs. Patients with severe diarrhea and vomiting may need oral rehydration salts (ORS) and antibiotics.
- In the most severe cases, for example in a cholera epidemic, intravenous fluids may have to be given containing glucose and normal saline to support rehydration.
- If the disease is due to food poisoning, there may be a need to give an antitoxin, or other antidote to neutralize the effect of the toxin, if such medicines exist or can be accessed in time.
- These more specialized interventions can only be done at a health facility. However, the limitations of health facilities in rural areas may restrict the choice of the specific management approach.
- As a Health Extension service provider, you should educate the members of your community on how to recognize the symptoms of food borne diseases, and to seek advice and supportive treatment from you.
- If there are a large number of cases, you should document them and report them as soon as possible to the District Health Office.

Self check #2	Written test

Direction:- Choose the correct answer from the given alternatives

1) Sources of Food Borne Diseases
   A. Raw food B. Environment C. Food handlers D. All

2) It is a condition in which pathogenic enteric microorganisms enters the GI tract with contaminated food and causing infection
   A. Food infection B. Food poisoning C. Chemical poisoning D. None

Note: Satisfactory rating 2 points unsatisfactory below 2 points

You can ask you teacher for the copy of the correct answers

Answer Sheet

Score _____
Rating _____

Name: _____ Date: _____

Short Answer Question

1._____

2._____

4.3 Food Protection and Preservation Methods

4.3.1 Food Protection, Storage and Preparation

- Food protection
  - Food protection methods are measures taken to protect food from being contaminated by any agent.

❖ **All food must be protected at all times during storage and preparation from the following contaminants**:

- ✓ any water that is not known to be safe, including overhead leaks and drips
- ✓ dirty hands
- ✓ coughing and sneezing
- ✓ dust and soot
- ✓ flies, rodents and other vermin
- ✓ insecticides and other chemicals
- ✓ unclean utensils and work surfaces
- ✓ Cigarette smoke.
- ✓ coughs and sneezes
- ✓ Insects.

- The most important way of preventing contamination is by adopting good food handlers' hygiene. This is the term for a group of practices that should be followed at all times by anyone handling food at any stage of the food supply process.
- Food handlers' hygiene in retail and commercial premises where food and drink is sold to customers is of critical importance.

❖ The importance of promoting good food handlers' hygiene:-

- To prevent food contamination and spread of disease.
- To ensure the good health of people eating the food.
- To protect the health of the food handler.
- Anyone handling food should avoid bad habits such as scratching, touching the hair, nose or mouth, having unclean hair, unclean and long fingernails, smoking and coughing or sneezing in food handling and preparation areas.
- Always wash their hands before starting to prepare food, and after every interruption, particularly after using the toilet. People who have skin infections, diarrhoea or sore throats should avoid handling food.

❖ There are other general principles for preventing food contamination:

- All water used in food preparation should be wholesome.
- All dishes, glasses and utensils must be kept clean by regular washing in clean water, clean utensils and should be kept covered.
- All surfaces that come into contact with food should be meticulously clean
- Food storage, preparation and serving areas should be free of pets, rats, mice and insects.
- Food should be covered, and kept separate from chemicals and poisons.
- Cloths that come into contact with dishes and utensils, and that are used to cover food, need to be changed daily and boiled before use.

❖ **Precautions for food storage**

- One critical aspect of food protection is appropriate food storage. Food storage areas should be well ventilated and illuminated, and protected from overhead drips.

- Floors, wall surfaces and tables should be easy to clean, and the floors should be well drained.

❖ **The storage area should be kept free from insects and vermin, by screening if possible.**

- Food should be obtained from approved sources and should come in its original container. It should be kept free from contamination once it has been received from the supplier.
- Processed foods are often safer than unprocessed, for example, pasteurized milk is safer than raw, untreated milk. Whether in the home or in commercial premises, once in the food preparation area, food should be kept on shelves or clean racks.
- These should be sufficiently high off the floor, at least 50 cm, and be spacious enough to prevent contact spoilage or contamination.
- This is especially important for storing raw and cooked foods, which must never touch each other, because raw food can contaminate the cooked food.
- Perishable and potentially hazardous foods that can be easily contaminated, such as milk and raw meat, should be stored at low temperature, preferably in a refrigerator at below 10oC. Frozen foods should be stored in a freezer below -18oC.
- The general rule for food storage is to keep hot foods hot and cold foods cold. Cooked foods should be eaten immediately, but if there is a delay the foods should be kept at a temperature higher than 60oC.
- Allowing cooked food to cool to room temperature allows microorganisms to start to grow and multiply therefore cooked food must be stored very carefully.
- If it cannot be eaten straight away, it should be kept as cold as possible, ideally in a refrigerator, to avoid growth of microorganisms.
- If food does have to be reheated, this must be done thoroughly. If food is only warmed and not reheated properly, microorganisms will multiply in it, so you need to heat it enough to destroy them. Infant foods should not be stored at all, but must be used immediately.

Figure 3.1:- Vegetables must be clean before cooking.

❖ **Precautions for food preparation**

- Food is particularly vulnerable to contamination while it is being prepared for eating. It is important to remember food handlers' hygiene and to ensure that all surfaces and utensils are clean.

- Foods intended to be eaten raw, such as fruit and some vegetables, must be washed carefully in clean, safe water.
- Food that is to be cooked must be cooked thoroughly to kill all pathogenic microorganisms. All parts of the food must reach a temperature of at least 70oC.
- You cannot tell how hot the food is just by looking, so it is important to cook the food for long enough to make sure that it is all cooked through.
- Cooking, as well as being a very important part of food preparation, is also used for preserving food and this is the subject of the next section.

Figure 3.2:- Food preparation surfaces and equipment should be kept very clean to avoid contamination.

4.3.2 Food Preservation

- Food preservation includes a variety of techniques that allow food to be kept for extended period of time without losing nutritional quality and avoiding the growth of unwanted microorganisms

- **There are three basic objectives for the preservation of foods:**
  - ✓ Prevention of contamination of food from damaging agents
  - ✓ Delay or prevention of growth of microorganisms in the food
  - ✓ Delay of enzymatic spoilage i.e. self-decomposition of the food by naturally occurring enzymes within it.

- For storing or preserving food, one or several of the living conditions needed for the growth of microorganisms have to be removed. Like humans, microorganisms need a source of food and water and they need a suitable pH and temperature to grow, so food preservation techniques aim to target these requirements.
- Food preservation depends on procedures which effectively manage the microbial content of foods and on processes that alter or delay the activities of enzymes in the food.
- The techniques may be applied separately or in combination. Their aims are to prevent contamination in the first place, to remove or reduce the numbers of contaminants, and to prevent microbial growth. We describe them below.

1. Dehydration by using of high temperature:-

a. Drying by sunlight: vegetables, cereals (traditional method)
b. Process heating (milk powder)
c. Smoking (fish, meat, cereals (bikil)

2. **Dehydration by chemicals**:

a) Salting in 18% brine solution (fish, meat)
b) Mixing or rubbing with a dry solid salt (butter, meat)
c) Dehydration by 65% sugar solution (fruits)
d) Pickling in concentrated natural acid solutions like vinegar(vegetables)

3. Use of temperature methods:

1 .pasteurization

- Is the killing of pathogenic microorganisms and spoilage microbes without appreciably destroying the useful flora and enzymes of milk.
  a) The methods are the holding (batch or vat) method: at 63C0/30 min contact time
  b) High temperature short time (HTST) or flash method: 720C/15 seconds
  c) Ultra high temperature (UHT 88): one second. All methods are followed by immediate cooling at<100C.

2 .Sterilization

- The killing of all pathogenic and non-pathogenic microbes by using very high temperature: about 120-1320C such food can be stored at room temperature for long period within the shelf life. Food canning is an example of Sterilization.

4. Use of low temperature:

- Refrigeration at 0-7.2C0 (32-450F)
- Best at 0-4.40C (32-400F)
- Freezing <00C
- Deep freezing <-180C

5. Use of pH regulation:

- Transformation of food into an acidic state: injera and bread baking, milk products (cheese), pickling (use of vinegar) and the likes. Most bacteria will not grow in pH<4.5
- Some other methods of food preservation are also used in the food industry.

Self check # 3	Written test

Direction:- Say “True” or “False”

1) The most important way of preventing contamination is by adopting good food handlers’ hygiene.
2) Pasteurization The killing of all pathogenic and non-pathogenic microbes by using very high temperature

Note: Satisfactory rating 2 points unsatisfactory below 2 points

You can ask you teacher for the copy of the correct answers

Answer Sheet

Score _____
Rating _____

Name: _____ Date: _____

Short Answer Question

1._____

2._____

Information sheet #4	Educating Hygienic requirements of Food and Drink Establishments

4.4 Hygienic requirements of Food and Drink Establishments

4.4.1 Definition of terms

- Food and drink establishments are places where an individual gets food in the form of breakfast, lunch, dinner or snacks, accompanied by some form of drink.
- The commonly served food in these establishments are foods of animal origin which are perishable foodstuffs, and need special attention during processing, preparation, transportation and storage to avoid them becoming contaminated and causing ill health to the consumer.
- Unhygienic practices in food and drink establishments affect the health of the clients.

4.4.2 Categories of Food and Drink Establishments

- Food and drink establishments provide food and drink services to a relatively large number of users in the form of breakfast, lunch, dinner or beverages.
- Food and drink establishments have a responsibility to provide safe food and drink to the consumers.
- The consumers have the right to demand safe food. Unless food is prepared and handled in hygienic conditions, it spreads food borne disease that could affect a large number of people at a time.
- The local government (kebele) takes actions to ensure the hygienic functioning of these establishments.
- The Ethiopian Regional and National hygiene and environmental health regulations can be exercised in the kebele by the presence of an appropriate expert who is authorized to enforce them.
- As a Health Extension Service provider, you can make a link with this authority through regular reporting to ensure that the necessary actions are taken to maintain safe practice.

❖ **There are several types of food and drink establishment in rural areas:-**

1) **Restaurants**: are food establishments that provide lunch and dinner (Figure 8.1) with accompanying drinks.
2) **Cafés or Tea houses**: provide hot drinks and snacks. Hot drinks include tea, coffee, milk, and macchiato. Snacks include Cakes, bread, bombolino, chornake and sambusa.
3) A local drinking establishment that offers a local light alcoholic beverage and common in rural areas of Ethiopia are includes **Tej bet, Tela bet,** Areki bet and the likes
4) **Grocery**: is an establishment that provides packed food, drink items and hot dishes
5) **Butchers shop**:- is a food establishment that offers meat for sale.
6) **Bakery**: is a food establishment that offers bread for sale.
7) **Hotel**: is a food establishment that offers all types of food and drinks in addition to bed room services.

Figure 4.1: A typical lunch served in an Ethiopian restaurant. **Figure 4.2**: A butcher‘s shop

4.4.3 Hygienic requirements of Food and Drink Establishments

1 Licensing

- The system for licensing food and drink establishments in kebeles. The woreda health office is responsible for this licensing system.
- As the local Health Extension Practitioner, you may be requested to do a preliminary assessment to check the hygienic requirements and report to the woreda health office
- Most categories of food and drink establishments can be licensed, though tela- bet and areki- bet do not require it because of their lower level of health hazards.
- The licensing procedure must follow regional and local regulations.

2 Locations of the Food Establishments

- Food establishments need to be well away from any source of hazards such as marshy areas, waste disposal sites and flooding.
- The site must be conveniently accessible to staff and consumers.
- The establishments should be at a distance from public institutes such as schools and health facilities. Access to clean air and natural lighting is also important.

3 Condition of the Building

- The space available must be adequate to provide the kind of service that the establishment carry out. Depending on the nature of the establishment, the space may include kitchen, dining room, drinking room, food storage sites, and utensil washing site.
- Building structures and their interiors should permit good hygienic practices, including protection against cross-contamination of food surfaces between and during operations.
- The provision of a window for each room should ensure adequate lighting. Structures within processing establishments should be soundly built of durable materials and be easy to maintain, clean and, where appropriate, disinfect. Floor and wall surfaces must be cleanable and washable.
- The surface of the walls must have a light color that maximizes the interior lighting. The roof must be cleanable and maintained free of dirt.

A. Dining rooms and coffee or tea drinking rooms

- The dining room should be very attractive in terms of its cleanliness, lighting and natural ventilation. The cleanliness of the walls, floor and ceiling must be acceptable and the chairs and tables must be in good repair. Leftover food must not be dropped on the floor but should be collected and disposed of in a garbage container.

B. Hotel bedrooms

- The cleanliness of the bedding (sheets, blanket, hard surfaces) and the cleanliness of floor, walls and ceiling are important. A chair and table are also useful for the client's comfort. A small waste bin must be available. Good ventilation and lighting are also essential components of a hygienic bedroom.

4 Sanitary Facilities

- Food and drink establishments need to offer sanitary facilities, which means hand washing facilities, latrines and urinals, proper solid and liquid waste management and washing detergents.
- The hand washing facility must have soap; a liquid soap is appropriate if this is available. Separate latrines for men and women are desirable.
- The number of these facilities depends on the number of clients visiting at peak hours. Generally, one hand washing facility and latrine for 30 clients per day is appropriate. Food handlers should be provided with a separate latrine, hand washing and changing wearing facilities at a convenient location. The availability of soap is essential for proper hand washing.

Figure 4.3: Soap is essential for proper hand washing

5 Accesses to Water

- Food and drink establishments require a sustained source of safe water to be used for personal hygiene, food preparation and utensil cleaning. A water tank is one option to ensure the availability of water at all times.

6 .Waste Management

- Food and drink establishments produce organic wastes such as food remains, and liquid wastes as a result of hand and kitchenware washing. These wastes need to be handled properly without contaminating or polluting the immediate environment. Specific information on waste management can be found in the study sessions later in this module.

7 Kitchens and Food Preparation Site

- The space and layout of the kitchen must be appropriate to accommodate the food preparation and kitchen processes. There must be separate sections for raw food preparation and handling cooked food.
- The presence of a window and a chimney is essential in order to manage the indoor air pollution that is caused by biomass fuel burning. The presence of facilities for washing hands and kitchenware is mandatory in a kitchen.
- Proper shelves for physically separating soiled and cleaned items are also a necessity. Food scraps and leftovers must be placed in a covered container. The floor and tables need to be cleaned frequently during the processes of food preparation and cooking.

8 Cleaning Dishes, Drinking utensils and Cutlery

- The cleaning of soiled dishes is an important way of preventing communicable diseases. The person who is the dishwasher must follow an established procedure.
- Dish 'in this section includes plates, cups, glasses, spoons, forks and other utensils.

A. **The three bowl method for cleaning soiled dishes**

- The manual cleaning process requires three vats or bowls, each with a capacity of 20–30 liters .Washing equipment such as detergent (powdered soap) and a scraping cloth, sponge or cleaning brushes are also necessary.

Figure 4.4:- Dish cleaning guidelines where there is no running water

B. Washing cups, glasses and spoons

- The principle of cup washing is the same as that of washing soiled dishes. The three bowl system should be encouraged but twobowls is also acceptable, with warm water and detergent in the first bowl and hot water in the second. The first wash cleanses the grease, while the second bowl sanities the cups. Cups must be dried with a clean piece of cloth or air-dried before use.
- The glass-washing facilities for birle in tej bet should use a three-bowl system. The first is used for washing with detergent, the second and third for rinsing. When cold and hot running tap water is available, sinks with two compartments/bowls are sufficient because the hot running water is used for rinsing and sanitizing

C. Washing cups, glasses and spoons

- The principle of cup washing is the same as that of washing soiled dishes.

- The three bowl system should be encouraged but two bowls is also acceptable, with warm water and detergent in the first bowl and hot water in the second.
- The first wash cleanses the grease, while the second bowl sanities the cups. Cups must be dried with a clean piece of cloth or air-dried before use.
- The glass-washing facilities for birle in tej bet should use a three-bowl system.
- The first is used for washing with detergent, the second and third for rinsing. When cold and hot running tap water is available, sinks with two compartments/bowls are sufficient because the hot running water is used for rinsing and sanitizing.

Figure 4.5: Washing glasses in a sink) with detergents, and cold and hot tap water.

9 Maintaining Hygienic Kitchen Equipment

- All surfaces that come into contact with food should be constructed of appropriate materials and are well-maintained.
- For example, wooden boards must be smooth and metal tables should be plain and not corrugated. Any surface that is cracked, scored or has an irregular surface is difficult to clean and may harbor dirt. Chopping and cutting blocks for preparing meat or vegetables must be kept clean and covered.
- All utensils and equipment must be protected from possible contaminants including dust, dirt, insects, rodents and overhead drips.
- Equipment and food containers should be made of materials with no toxic effect and be designed to ensure that they can be easily cleaned, sanitized and maintained.
- Surfaces such as chairs and tables that do not normally come into contact with food should also be clean and in good repair. Always use clean clothes to cover tables and change them whenever necessary.

10 Storing and Serving Foods

- Perishable food items are easily spoiled if stored at room temperature. Foods such as meat should be kept in a refrigerator that can keep the temperature below 10°C.
- Semi-perishable foods, such as potatoes and carrots, which are used on a daily basis, need to be stored on a well ventilated shelf.
- The serving of foods to clients should provide maximum health protection. Hot foods should be served while they are hot, and cold foods while they are cold

- Foods must be thoroughly reheated if they have been at room temperature for longer than 1 hour.

11 Vector control in the premises of food and drink catering establishments

- Vector management is a challenging task in food establishments. What vectors are you likely to find in kitchens and food storage areas of food and drink establishments? Flies, cockroaches and rats are commonly observed in these places.

4.4.4. Food Handlers Health and Hygiene

- The practice of good personal hygiene that you learned about in the previous session is essential for anyone who handles food, especially in food and drink establishments where many customers could potentially be affected.
- A sick food handler with symptoms of diarrhoea, eye and ear discharges, skin infections, open cuts and wounds, or coughing should not continue working.
- They must be treated and be completely recovered before returning to work.
- What are the main principles of food handlers'hygiene?
- To protect food from contamination and to protect the health of the consumers.
- Food handlers must use personal protective devices such as clean aprons, overalls or gowns, footwear and hair cover.
- As a Health Extension Service provider, you should be involved in training food handlers on food safety. The strict rules of hand washing after using the latrine or touching dirt and before handling food must be followed.
- Indicates some bad habits of food handlers that should be avoided.

- **Unhygienic practices by food handlers**
  - ✓ Poor personal hygiene practice
  - ✓ Unguarded coughing or sneezing
  - ✓ The habit of licking the fingers
  - ✓ Nose picking or fingering the nose
  - ✓ Handling of handkerchiefs
  - ✓ Working in street clothing
  - ✓ Spitting in food-handling areas
  - ✓ Uncovered hair
  - ✓ Smoking in kitchens
  - ✓ Ignoring hand washing before starting work, after handling contaminated materials, after breaks and after using toilet facilities

4.4.5 Sanitary Inspection in Food and Drink Establishments

- Health Extension Service Providers have the responsibility of safeguarding the health of the public by ensuring safe hygienic practice in food and drink establishments.
- Inspecting the food Establishments, (sanitary inspection) is a means of identifying or monitoring unsafe practices of food handling.

1. Purpose of the Inspection

- Sanitary inspection is a set of activities concerned with the preservation of public health and the investigation of environmental hazards in food establishments.

- Sanitary inspection aims to investigate and detect:
  - ✓ Food spoilage and its sources

- ✓ Food contamination and its sources
- ✓ Provision for hygienic procedures (dish and hand washing, food storage)
- ✓ Provision of sanitary facilities (latrine, water, shower, hand washing)
- ✓ The proper location of the establishment
- ✓ The hygienic practice of food handlers
- ✓ Proper waste management (storage, collection and disposal)
- ✓ The presence of vectors

- Sanitary inspections are carried out for two reasons: first:-
  - ✓ To provide education and advice to the owners.
  - ✓ Second, for providing a license if you are asked to do so in the absence of the woreda environmental health worker.

2 When to Inspect

- ➢ There must be a baseline survey of food and drink establishments using a survey checklist. Appendix 8.1 (at the end of this study session) is an example of the sort of surveillance form you could use for your survey.
- ➢ The survey result must enable you to classify the food establishments by hygienic status and to set priorities for inspection. You do not have to inspect tela bet and areki bet, as noted above, because of their lower hazard level.
- ➢ Each food establishment should be inspected at least once every year. However, since the number of food and drink establishments in the kebele setting is probably low, often less than ten, then inspecting each four times a year should be possible.

3 Informing the owners about the Sanitary Inspection

- ➢ It is always useful to warn the owners about your inspection visit, including the date, time and purpose. This is useful as your job is promoting food safety and hygienic practice, and your warning may encourage them to check and improve their practices.
- ➢ The kindness and help you get from the owner will facilitate your decisions about the appropriate hygienic instructions to give.

4 How and what to Inspect

- ➢ Upon arrival at a food and drink establishment, you should introduce yourself and announce politely the purpose of your inspection in order not to embarrass the owner.
- ➢ Interviewing food handlers, physical observation and the use of a checklist are the main tools for data collection. Information is also collected by interviewing the owner and the food handlers.
- ➢ The inspection starts by checking the physical presence of latrines and hand washing facilities meant for the clients.
- ➢ The inspection is based on the food preparation flowchart and is carried out in a sequential manner: food storage, kitchen, dining room and drinking rooms.
- ➢ The handling of raw food is inspected in the food storage room.
- ➢ The use of refrigerators for perishable food items (meat, eggs, juice, fruits and vegetables) is checked. Semi-perishable foods such as potatoes and onions need to be stored on shelves that are properly ventilated and free from any vectors.
- ➢ In the kitchen the use of detergents, the presence of three dishwashing bowls (or a sink with running water) and the practice of personal hygiene must be closely checked.

- There should be no vectors such as flies and cockroaches in the kitchen area. The food handler‘s health is rapidly checked by doing a physical examination for the presence of active infections (skin, eye, ear infections or nasal discharges).
- The proper use of apron, gown or overalls, hair cover and appropriate footwear by the food handler is also investigated.
- The strict separation of kitchen tables for cooked food items and raw food needs to be inspected. The presence of obvious indoor air pollution is also important to note.
- In the dining room, the condition and cleanliness of the tables, chairs, floor, walls, and ceiling should be observed. The presence of vectors and proper waste management facilities must be inspected in all parts of the food processing and serving areas.
- The proper handling of kitchen waste in a garbage container, and the presence of a waste bin in dining areas should be checked. As you make your inspection, record the information on the checklist.

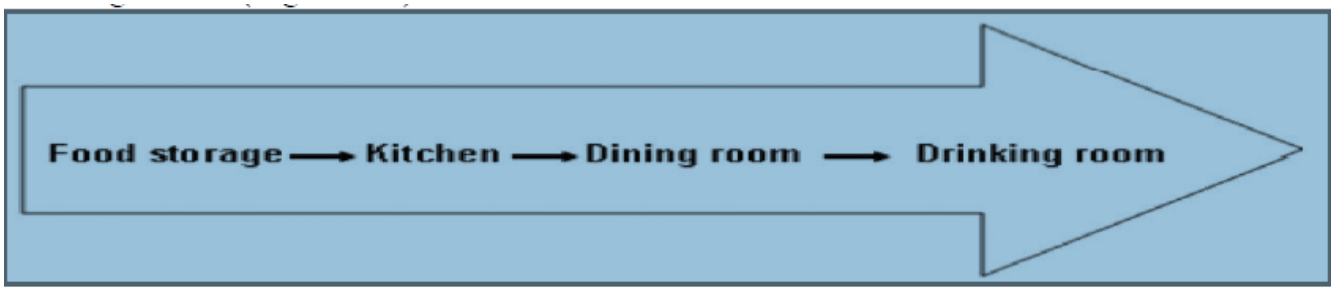

Figure 4.6:- the food inspection flowchart.

5. **Concluding the Sanitary Inspection**
   - Discuss your findings with the owner, and explain what hazards and unacceptable hygienic practice you have found. Please also point out what is good.
   - Explain clearly your suggestions for improvement and the urgency of the timescale. It is important that you educate and persuade the owner to implement your advice.
   - Tell the owner that you may revisit the food establishment in future to check what has been improved. You need to keep all the inspection reports for future reference and you should report to the kebele and woreda offices if improvement is not achieved after repeated efforts.

Self check #4	Written test

Direction:- Choose the correct answer from the given alternatives

1) Food establishment that offers meat for sale.

A) Restaurants **B)** Grocery **C)** Butcher's shop **D)** Bakery

2) All are Unhygienic practices by food handlers' **except**.

A) Poor personal hygiene practice **B)** Proper hand washing **C)** Unguarded coughing. **D)** None

3) Sanitary inspection aims to detect

A) Food spoilage **B)** Food contamination **C)** Provision of sanitary facilities **D)** All

Note: Satisfactory rating 3 points unsatisfactory below 3 points

You can ask you teacher for the copy of the correct answers

Answer Sheet

Score _____

Rating _____

Name: _____ Date: _____

Short Answer Question

1._____

2._____

3._____

Information sheet # 5	Identifying Hygiene and safety requirements for food of Animal Origin

4.5 Hygiene and safety requirements for food of Animal Origin

4.5.1 Meat hygiene

- Diseases transferred to humans from animals are known as zoonotic diseases.
- One route of transmission of zoonotic diseases is by the consumption of infected meat.

- **The most common zoonotic diseases found in Ethiopia are:**
  - ✓ Bovine tuberculosis
  - ✓ Anthrax
  - ✓ Salmonellosis
  - ✓ Hydatid disease
  - ✓ Trichinosis
  - ✓ Toxoplasmosis
  - ✓ Taenia saginata, beef tapeworm (kosso)
  - ✓ Taenia solium or pork tapeworm infection
  - ✓ Diphyllobothriasis, fish tapeworm
- **Abattoirs and meat transportation**
  - Abattoirs, also known as slaughterhouses, are establishments where livestock are killed prior to human consumption.
  - Slaughterhouses should be subject to inspection to ensure that the meat they produce is safe to eat. This includes inspection of live animals and of the slaughtered animal carcasses.
  - Before slaughter, the animals should be observed to check for any abnormalities in their appearance or behavior that could indicate sickness.
  - After slaughter, a qualified meat inspector who knows the signs of specific types of disease and in which organs they may be found should inspect animal carcasses.
  - If the carcass passes the inspection, it will be stamped with safe, indelible ink to indicate it has been approved for human consumption.
  - The carcass should be transported soon after slaughter, in a special vehicle, to a butchery or distribution centre. If such customized vehicles are not available, every precaution should be taken to avoid contamination of the meat during transport. Even if the meat travels in a wheelbarrow it should be kept absolutely clean.
- **Hygiene in the butchers shop**
  - Butcher‘s shops are the link between the inspected and approved safe meat, and meat products and the consumer. Therefore, the hygienic practices used for handling meat in these shops determine the health of the meat consumer.
  - The butcher‘s shops need licenses to operate, confirming that they meet all the handling specifications that ensure the safety of the meat.
  - The walls and floor should be constructed of durable material and be smooth, impermeable, easily cleanable and light-colored. There should be adequate ventilation and natural light.
  - The utensils should be clean and kept in an appropriate place.

- The butcher should wear a clean white gown, preferably with an apron and a white hair cover.

- **Meat preservation methods**
  - Meat is highly perishable, so it must be preserved properly. One way of doing this is to chill the meat in a refrigerator.
  - Temperatures for refrigeration of meat should be lower than the usually recommended 10oC and should be below 7oC for carcasses and below 3oC for offal.
  - For long-term storage, meat should be frozen. However, since most rural people do not have a refrigerator or freezer, they should use traditional preserving methods.

Figure 5.1:- the butcher wears a clean, white gown.

- **Your role in controlling tapeworm infection**
  - Ethiopia is a country with a lot of raw meat consumption and a high prevalence of tapeworm. Two rules must be enforced, and educating the community about them is an essential part of your role.
  - No one should offer any food for eating that is unsafe or unfit for human consumption.
  - Meat for sale not bearing the stamp of approval of the public municipal slaughterhouse should be considered unsafe for human consumption.
  - Additionally there are measures that you can recommend in the community. Abstaining from eating raw or inadequately cooked meat is a good control measure.
  - The Ethiopian dish of kitfo or lebleb kitfoǁ is not safe to eat. However, there are strong cultural reasons for this practice, so people may not take your advice.
  - The best control measure against meat -borne diseases (zoonosis) is to cook the meat thoroughly before consumption. Exposing meat to a temperature above 56oC inactivates any cysticercus bovis (beef tapeworm cysts) present.
  - Organized and strict meat inspection practices in abattoirs can ensure that meat is free from tapeworm infection as well as other meat borne diseases.
  - Finally, avoiding open defecation is a major control measure for zoonotic and other faeco-oral diseases.

4.3.2 Milk Hygiene

- **The provision of a safe supply of milk is of great importance for public health, with the following objectives:**
  - The improvement of nutritional status of infants, children, and mothers
  - The prevention of disease or physical defects arising from malnutrition

- The prevention of communicable, zoonotic disease transmission
- The control of milk adulteration.

- **Sources of Milk- Borne Diseases**
  - Disease organisms in milk are derived from the dairy animal itself, the human handler, or the milk-handling environment.
  - What human behaviors might result in milk contamination?
  - Poor personal hygiene by the food handler including activities such as coughing, sneezing or scratching over the milk, and allowing objects, particularly fingers, to come into contact with the milk.
  - In terms of the environment, the milking and milk-handling processes must be carried out hygienically, avoiding contamination with soil, manure, animal hair or dirt from the cowshed.
  - The milk containers must be clean and disinfected. Bovine tuberculosis, Brucellosis, Q (query) fever Anthrax are the common diseases that may be transmitted from milks of cows.
- **The need of Milk Hygiene**
  - Milk sanitation i.e. the protection of milk from dirt and contamination is essential to prevent milk infection.
  - Boiling, Sterilization, Drying, and Pasteurization are the common methods of making milk safe. Clean milk is a necessity, and is possible by using good milking hygiene.
- **Hygienic milk production**
  - Animals must be clean and healthy
  - Milking should be done away from the herd
  - The milk handler should also be clean and healthy
  - S/he should wear clean outer garments during milking or processing the milk
  - The milking room should be clean, ventilated and dustless
  - Utensils and equipment for milking and milk handling must be clean
  - Immediately before milking the udder and teats of the cow must be washed with clean lukewarm water and dried with clean cloths a separate one for each cow.
  - Immediately after milking, the milk must be removed from the shed, placed in a clean and covered receptacle and kept in a cool place

Figure 5.2:- milking a clean and healthy cow

4.5.3. Poultry and Egg hygiene

- Poultry consumption has greatly increased in recent years .
- Due to poor hygiene, poultry and poultry products are responsible for a number of food borne illnesses including salmonellosis, staphylococcal food poisoning and botulism.
- Less common diseases include psittacosis or ornithosis,n also known as parrot fever, which is a zoonotic disease caused by the bacterium Chlamydophila psittaci, and 'bird flu' which is a viral disease that can affect both poultry and people.

Figure 5.3:-Healthy; well kept poultry are good sources of protein from eggs and meat.

- **Poultry keeping and processing**
  - Correct sanitation procedures involve all stages in the operation from live poultry pens to retail establishments, including processing, packing, storage and transportation.

- Whether in large-scale commercial production, or domestic poultry keeping, the poultry handlers must be healthy and maintain food handlers' hygienic practices. In the poultry farm, the housing, feed and water supply must be safe. The plant and equipment must be cleaned daily.
- In particular, any dead birds must be removed from coops. During processing, hygienic methods of killing and dressing must be used.

- **Handling eggs**
  - Although most freshly laid eggs are sterile inside, the shells soon become contaminated by faecal matter from the hen and the lining of the nest. When collecting eggs, any visible dirt should be rubbed off the shells. During handling, contamination can also arise from washing water and from any packing material. However, some eggs will be spoiled on the inside, generally because of cracks in the eggshell through which bacteria can enter.

Figure 5.4:- These eggs are clean and have no cracks.

- **It is important to test for egg spoilage, and this can be done in the following ways.**

1. Inspection
- Eggs should first be inspected for cracks, leaks, stains or dirt on the exterior and general bloodiness or translucent spots in the yolk when candled (see below). You are looking for freshness, soundness, size and cleanliness of the shell.

2. Shaking
- A fresh egg makes no sound, but a stale (bad) egg makes a sound when shaken.

3. Candling
- This is performed by holding the egg between the eye and a light such as a candle flame or the sun. As the shell is translucent, you can assess the internal quality and the size of the yolk.

4. Floating
- Fresh eggs usually sink to the bottom of a bowl of water, whereas spoiled eggs float and can be removed. Floating occurs because, in spoiled eggs, the air cavity is bigger, which makes the egg more buoyant.
- The problem with this method is that the water may penetrate through the eggshell pores so it is important to use clean water, change it frequently and not to leave eggs in the water.

5. Breaking
- In this test, around 10 eggs out of 100 are taken randomly and checked for spoilage by breaking them open to see what is inside. This is the most accurate testing method but it is

not cost effective, so is only used when the other methods are not exercised, for example in large-scale operations.

6. Storing eggs

- Since eggs are perishable food items they need proper storage. They should be kept cool and dry.
- Maintenance of the egg's internal quality depends on the time and conditions of storage, especially the temperature and the presence of tainting substances in the storage environment.
- Eggshells are porous and eggs can quickly absorb foreign odours which will taint the contents.
- It is therefore advisable to avoid storing strong-smelling and volatile materials such as kerosene or varnish near egg stores.

Self sheet # 5	Written test

Direction: - Choose the correct answer from the given alternatives

1) Methods of making milk safe.

A) Boiling **B)** Sterilization **C)** Pasteurization **D)** All

2) All are zoonotic diseases **except**

A) Bovine tuberculosis **B)** Cholera **C)** Toxoplasmosis **D)** Anthrax

Note: Satisfactory rating 3 points unsatisfactory below 3 points

You can ask you teacher for the copy of the correct answers

Answer Sheet

Score _____

Rating _____

Name: _____ Date: _____

Short Answer Question

1._____

2._____

Operation Sheet #1	Performing Dish washing

Steps for Dish washing

1. Decide what to wash first: generally it is best to start with glasses and cups. However, the following description is for washing soiled plates.
2. Fill the first two bowls halfway with warm water (50°C). Hot water (80°C or above) is added to the third bowl. A detergent must be included in the first bowl.
3. Scrape the food from dish surfaces and collect it in a garbage container. Place the dish in the first bowl and wash with the detergent until the grease has gone. Washing plate by plate increases cleaning efficiency. Then place the washed item into the second bowl.
4. Rinse the dish well in the second bowl. Any remaining food particles and soap must be taken away by thorough rinsing. Then place the dish into the third bowl.
5. The process of dish washing in the third bowl is called sanitizing which is a procedure to inactivate and remove the microorganisms that may be found on the surface of the dish. Sanitizing is possible by rinsing the dish in hot water at a temperature of 80°C for 1–2 minutes. Rinsing in warm water that contains chlorine (50–100 ppm) can replace the use of hot water. Immersing the rinsed dish for 15 seconds adequately sanitizes.
6. Dry the dish with a clean cloth or air-dry it. The cleaned and dried dish is then placed in a shelf or rack that has a cover. Dishes must be kept under cover until used. Remove dishes that are not in good condition and replace them with new ones.
7. The water used for washing must be changed frequently as needed. The used water in the first bowl is more frequently changed than that in the second bowl. Continued use of dirty water must not be encouraged. The water temperature in the third bowl must be kept high.

LAP Test	Practical Demonstration

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 5min.

Task 1: Perform dish washing

Reference

1. Palmer Development Group, Water and Sanitation Handbook for Community Water Research Commission, Kenilworth, October 1994.
2. Pickford, J. and Reed, R. Technical Brief No.45: Latrine slabs and seats. Waterlines, July 1995.
3. Puddifoot, J. Pit latrines in Nepal - the refugee dimension. Waterlines Vol.14 No.2. October 1995.
4. .Rivett-Carnac, Guidelines for Ventilated Improved Pit Latrines and Alternative On siteSanitation Systems. Appropriate Technology Information, Pietermaritzburg, November 1989