



NATIONAL OPEN UNIVERSITY OF NIGERIA

FACULTY OF HEALTH SCIENCES

DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCES

COURSE CODE: EHS 304



COURSE TITLE: FOOD SAFETY AND HYGIENE

**COURSE
GUIDE**

EHS 304: FOOD SAFETY AND HYGIENE

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National Open University of Nigeria 2018

First Printed 2018

ISBN:

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Printed by.....

For

National Open University of Nigeria

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Jabi, Abuja

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COURSE UNIT: 2 UNITS

INTRODUCTION

EHS 302 Food safety and hygiene is a two (2) unit course with three (3) modules and nine (9) units. **Food safety** refers to handling, preparation and storing of food in a way to best reduce the risk of individuals becoming sick from foodborne illnesses while food hygiene are the conditions and measures necessary to ensure the safety of food from production to consumption. Along the food supply chain from production to consumption, food safety and hygiene is aimed at ensuring that food is kept wholesome and does not pose any health hazard to the consumer.

WHAT YOU WILL LEARN IN THIS COURSE

In this course, you have the course units and a course guide. The course guide will tell you what the course is all about. It is general overview of the course materials you will be using and how to use those materials. It also helps you to allocate the appropriate time to each unit so that you can successfully complete the course within the stipulated time limit. The course guide also helps you to know how to go about your Tutor-Marked Assignment which will form part of your overall assessment at the end of the course. Also, there will be regular tutorial classes that are related to this course, where you can interact with your facilitator and other students. Please, I encourage you to attend these tutorial classes.

COURSE AIM

The course aims to give you an understanding of food safety and hygiene and its relevance along the food supply chain and in the prevention of food borne illnesses.

COURSE OBJECTIVES

To achieve the aim set above, there are objectives. Each unit has a set of objectives presented at the beginning of the unit. These objectives will give you on what to concentrate / focus on while studying the unit. Please read the objective before studying the unit and during your study to check your progress.

The comprehensive objectives of the Course are given below. By the end of the course/after going through this course, you should be able to:

- i. Define the terms food security, food safety and hygiene
- ii. Mention the components of food security, activities along the food supply chain and the principles of food safety
- iii. Discuss the concept food safety and food hygiene
- iv. State the sanitary requirements of the food processing environment

- v. Mention and list the health and hygiene requirements of food handlers
- vi. Discuss the microbial spoilage of food and the factors that supports microbial growth in food
- vii. Describe the various methods of preventing microbial spoilage in food
- viii. Explain the terms food poisoning and food infection and how to prevent them
- ix. Know the process of sampling food for analysis
- x. Understand the term “Quality Control”
- xi. Define the term food safety law and regulation
- xii. Identify the agencies responsible for food safety law and regulation enforcement
- xiii. Identify the basic steps to ensure food safety at home
- xiv. Identify the requirements for licensing Food and Beverage Company
- xv. Identify the requirement for licensing food and liquor production premises
- xvi. Identify the requirements for licensing water packaging premises
- xvii. Understand the need for workshop for food handlers
- xviii. State the factors that contributes to the risk of food poisoning
- xix. Mention the advantages of food safety training
- xx. State how to prevent food poisoning
- xxi. Mention how to ensure food safety in the kitchen.
- xxii. Discuss proper food preparation and food storage
- xxiii. Explain the concept of food allergies and intolerances
- xxiv. Explain the shelf stability of foods
- xxv. Discuss the use of food labels
- xxvi. Explain what monitoring and inspection is
- xxvii. State the determining indicators during monitoring and inspection
- xxviii. Describe food inspection

WORKING THROUGH THIS COURSE

To successfully complete this course, you are required to read each study unit, read the textbooks materials provided by the National Open University of Nigeria. Reading the referenced materials can also be of great assistance. Each unit has self-assessment exercises which you are advised to do and at certain periods during the course you will be required to submit your assignment for assessment. There will be a final examination at the end of the course. The course should take you about 17 weeks to complete. This course guide will provide you with all the components of the course how to go about studying and hour you should allocate your time to each unit to finish on time and successfully.

THE COURSE MATERIAL

The main components of the course are:

- The Study Guide
- Study Units
- Reference / Further Reading
- Assignments
- Presentation Schedule

STUDY UNITS

The study units in this course are given below:

Module 1: concept of food safety and hygiene

Unit 1: *Concept of Food safety and definitions*

- Food security, food safety and hygiene, food chain, food production, handling, transportation, storage and preparation

Unit 2: *Food processing Environment*

- Sanitary requirement of food processing premises
- Hygiene and health requirement of food handlers

Unit 3: *Food preservation*

- Food spoilage and preservation techniques
- Food poisoning and food infections, their prevention and control

Module 2: Food quality control

Unit 1: *Concept of food sampling and quality control*

Unit 2: *Food safety laws and regulations*

Unit 3: *Licensing of Food and Beverage Companies*

- Licensing of food preparation and water packaging premises, licensing liquor premises

Module 3: Capacity building for food handlers

Unit 1: *Organization of workshop for food handlers*

Unit 2: *Food hygiene Education*

- General overview of safe handling and processing of various food products

Unit 3: *Monitoring and inspection*

There are activities related to the lecture in each unit which will help your progress and comprehension of the unit. You are required to work on these exercises which together with the Tutor marked Assignments (TMAs) will enable you to achieve the objectives of each unit.

ASSIGNMENT FILE

There are two types of assessments in this course. First are the TMAs; second is the written examination. In solving the questions in the assignments, you are expected to apply the information, knowledge and experience acquired during the course. The assignments must be submitted to your facilitator for formal assessment in accordance with prescribed deadlines stated in the assignment file. The work you submit to your facilitator for assessment accounts for 30 percent of your total course mark. At the end of the course, you will be required to sit for a final examination of 1½ hours duration at your study centre. This final examination will account for 70 % of your total course mark.

PRESENTATION SCHEDULE

There is a time-table prepared for the early and timely completion and submissions of your TMAs as well as attending the tutorial classes. You are required to submit all your assignments by the stipulated time and date. Avoid falling behind the schedule time.

ASSESSMENT

There are three aspects to the assessment of this course. The first one is the self-assessment exercises. The second is the tutor marked assignments and the third is the written examination or the examination to be taken at the end of the course. Do the exercises or activities in the unit by applying the information and knowledge you acquired during the course. The tutor-marked assignments must be submitted to your facilitator for formal assessment in accordance with the deadlines stated in the presentation schedule and the assignment file. The work submitted to your tutor for assessment will count for 30% of your total course work. At the end of this course, you have to sit for a final or end of course examination of about a three-hour duration which will count for 70% of your total course mark.

TUTOR-MARKED ASSIGNMENTS

This is the continuous assessment component of this course and it accounts for 30% of the total score. You will be given four (4) TMAs by your facilitator to answer. Three of which must be answered before you can sit for the end of course examination. These answered assignments be returned to your facilitator. You're expected to complete the assignments by using the information and material in your readings references and study units. Reading and researching

into your references will give you a wider view and give you a deeper understanding of the subject.

1. Make sure that each assignment reaches your facilitator on or before the deadline given in the presentation schedule and assignment file. If for any reason you are not able to complete your assignment, make sure you contact your facilitator before the assignment is due to discuss the possibility of an extension. Request for extension will not be granted after the due date unless there are exceptional circumstances.

2. Make sure you revise the whole course content before sitting for the examination. The self-assessment activities and TMAs will be useful for this purpose and if you have any comment please do before the examination. The end of course examination covers information from all parts of the course.

Table 1: COURSE MARKING SCHEME

Assignments	Marks
Assignments 1 – 4 Four assignments	best three marks of the four count at 10% each = 30% of course, marks. End of course examination = 70% of overall course marks
Total	100% of course materials

Table 2: Course Organisation

Unit	Title of Work	Weeks Activity	Assessment (End of Unit)
	Course Guide	Week	
1	<i>Concept of Food safety and definitions</i>	Week 1	Assignment 1
2	<i>Food processing Environment</i>	Week 2	Assignment 2
3	Food Preservation	Week 3	Assignment 3
4	Food quality control	Week 4	Assignment 4
5	<i>Food safety laws and regulations</i>	Week 5	Assignment 5
6	<i>Licensing of Food and Beverage Companies</i>	Week 6	Assignment 6
7	<i>Organization of workshop for food handlers</i>	Week 7	Assignment 7
8	<i>Food hygiene Education</i>	Week 8	Assignment 8
9	<i>Monitoring and inspection</i>	Week 9	Assignment 9

HOW TO GET THE MOST OUT OF THIS COURSE

In distance learning, the study units replace the university lecturer. This is one of the huge advantages of distance learning mode; you can read and work through specially designed study materials at your own pace and at a time and

place that suit you best. Think of it as reading from the teacher, the study guide tells you what to read, when to read and the relevant texts to consult. You are provided exercises at appropriate points, just as a lecturer might give you an in-class exercise.

Each of the study units follows a common format. The first item is an introduction to the subject matter of the unit and how a unit is integrated with the other units and the course as a whole. Next to this is a set of learning objectives. These learning objectives are meant to guide your studies. The moment a unit is finished, you must go back and check whether you have achieved the objectives. If this is made a habit, then you will significantly improve your chances of passing the course. The main body of the units also guides you through the required readings from other sources. This will usually be either from a set book or from other sources.

Self-assessment exercises are provided throughout the unit, to aid personal studies and answers are provided at the end of the unit. Working through these self-tests will help you to achieve the objectives of the unit and prepare you for tutor marked assignments and examinations. You should attempt each self-test as you encounter them in the units.

The following are practical strategies for working through this course

1. Read the Course Guide thoroughly.
2. Organize a study schedule. Refer to the course overview for more details. Note the time you are expected to spend on each unit and how the assignment relates to the units. Important details, e.g. details of your tutorials and the date of the first day of the semester are available. You need to gather together all this information in one place such as a diary, a wall chart calendar or an organizer. Whatever method you choose, you should decide on and write in your own dates for working on each unit.
3. Once you have created your own study schedule, do everything you can to stick to it. The major reason that students fail is that they get behind with their course works. If you get into difficulties with your schedule, please let your tutor know before it is too late for help.
4. Turn to Unit 1 and read the introduction and the objectives for the unit.
5. Assemble the study materials. Information about what you need for a unit is given in the table of contents at the beginning of each unit. You will almost

always need both the study unit you are working on and one of the materials recommended for further readings, on your desk at the same time.

6. Work through the unit, the content of the unit itself has been arranged to provide a sequence for you to follow. As you work through the unit, you will be encouraged to read from your set books.

7. Keep in mind that you will learn a lot by doing all your assignments carefully. They have been designed to help you meet the objectives of the course and will help you pass the examination.

8. Review the objectives of each study unit to confirm that you have achieved them. If you are not certain about any of the objectives, review the study material and consult your tutor.

9. When you are confident that you have achieved a unit's objectives, you can start on the next unit. Proceed unit by unit through the course and try to pace your study so that you can keep yourself on schedule.

10. When you have submitted an assignment to your tutor for marking, do not wait for its return before starting on the next unit. Keep to your schedule. When the assignment is returned, pay particular attention to your tutor's comments, both on the TMAs form and also that written on the assignment. Consult your tutor as soon as possible if you have any questions or problems.

11. After completing the last unit, review the course and prepare yourself for the final examination. Check that you have achieved the unit objectives (listed at the beginning of each unit) and the course objectives (listed in this course guide).

FACILITATORS/TUTORS AND TUTORIALS

Sixteen (16) hours are provided for tutorials for this course. You will be notified of the dates, times and location for these tutorial classes. As soon as you are allocated a tutorial group, the name and phone number of your facilitator will be given to you. These are the duties of your facilitator: He or she will mark and comment on your assignment. He will monitor your progress and provide any necessary assistance you need. He or she will mark your TMAs and return to you as soon as possible. You are expected to mail your tutored assignment to your facilitator at least two days before the schedule date.

Do not delay contacting your facilitator by telephone or e-mail for necessary assistance if you do not understand any part of the study in the course material. You have difficulty with the self-assessment activities. You have a problem or question with an assignment or with the grading of the assignment.

It is important and necessary you attend the tutorial classes because this is the only chance to have face to face contact with your facilitator and to ask questions which will be answered instantly. It is also a period where you can say any problem encountered in the course of your study.

FINAL EXAMINATION AND GRADING

The final examination for EHS 302: Food Safety and Hygiene will be of 1½ hours duration. This accounts for 70 % of the total course grade. The examination will consist of questions which reflect the practice, exercises and the tutor-marked assignments you have already attempted in the past. Note that all areas of the course will be assessed. To revise the entire course, you must start from the first unit to the twelfth unit to get prepared for the examination. It may be useful to go over your TMAs and probably discuss with your course mates or group if need be. This will make you to be more prepared, since the examination covers information from all aspects of the course.

SUMMARY

Food Safety and Hygiene is a course that introduces you to the understanding of the concept of food safety and hygiene especially along the food supply chain i.e. from the farm to fork. It gives a clear understanding of all necessary actions and techniques to be applied in the food production environment and at home to prevent food spoilage and food borne diseases. It also is centred around having a full understanding of the various laws and regulations that governs the establishment of a food industry to ensure that food that is consumed is safe and not causing harm to the consumers. At the end of this course, you will be able to answer the following questions:

- Define the terms food safety and hygiene
- Mention the methods of preserving food
- Mention the food laws and regulations guiding the food industries
- Explain the need for the education of food handlers
- What are the indicators for inspection in the food industry?

The list of questions are expected to answer is not limited to the above list. Finally, you are expected to apply the knowledge you have acquired during this course to your practical life.

I wish you success in this course

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Module 1: concept of food safety and hygiene

Unit 1: *Concept of Food safety and definitions*

- Food security, food safety and hygiene, food chain, food production, handling, transportation, storage and preparation

Unit 2: *Food processing Environment*

- Sanitary requirement of food processing premises
- Hygiene and health requirement of food handlers

Unit 3: *Food preservation*

- Food spoilage and preservation techniques
- Food poisoning and food infections, their prevention and control

Module 2: Food quality control

Unit 1: *Concept of food sampling and quality control*

Unit 2: *Food safety laws and regulations*

Unit 3: *Licensing of Food and Beverage Companies*

- Licensing of food preparation and water packaging premises, licensing liquor premises

Module 3: Capacity building for food handlers

Unit 1: *Organization of workshop for food handlers*

Unit 2: *Food hygiene Education*

- General overview of safe handling and processing of various food products

Unit 3: *Monitoring and inspection*

Module 1: Concept of food safety and hygiene

Unit 1: *Concept of Food safety and definitions*

Unit 2: *Food processing Environment*

Unit 3: *Food preservation*

UNIT 1:DEFINITIONS AND CONCEPT OF FOOD SAFETY

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2.0 Objectives

3.0 Main Content

3.1 Food security

3.2 Food safety

3.3 Food Hygiene

4.0 Conclusion

5.0 Summary

6.0 Tutor marked Assignment

7.0 References / Further reading

1.0 INTRODUCTION

This unit defined the terms food security, food safety and food hygiene. It also gives describes the principles of food safety, hazards that renders food unsafe for consumption and consequences of consumption of unsafe foods.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- Define the terms food security, food safety and hygiene
- Mention the components of food security, activities along the food supply chain and the principles of food safety
- Discuss the concept food safety and food hygiene and the consequences of consumption of unsafe food

3.0 MAIN CONTENT

3.1 Food Security

All people have a right to adequate food that not only meets the minimum requirements for survival but is also **SAFE** and nutritionally adequate for health and well-being (UN General Assembly, 2012). *Food security* is defined as access by all people at all times to sufficient, safe and nutritious food for a healthy and active life.

There are three components of food security:

- **Availability:** Sufficient quantities of appropriate food are available from domestic production, commercial imports or food assistance.
- **Access.** Adequate income or other resources are available to access appropriate food through home production, buying, barter, gifts, borrowing or food aid.
- **Utilization.** Food is properly used through appropriate food processing and storage practices, adequate knowledge and application of nutrition and child care, and adequate health and sanitation services.

Along the food supply chain several activities are carried out which includes;

- Food Production
- Food Processing
- Food Distribution
- Food Preparation
- Consumption of food

In carrying out these activities, care must be taken to ensure that the food that is eventually consumed is wholesome, safe and not injurious to the health of the consumers.

3.2 Food safety

Food is consumed by humans in order to supply the body with nutrients needed for growth, development and to achieve optimal health. The safety of the food consumed determines the health status of the consumer. As a result, it becomes necessary to ensure that the food and water consumed by individuals is free

from all **hazards** that may render the food unsafe for consumption and injurious to the health of the consumer.

Certain diseases (known as Foodborne diseases) have been associated with consumption of contaminated (unsafe) foods. Such diseases arise (immediately or long) after the consumption of contaminated food or water. Foodborne diseases (FBDs) refer to “any disease of an infectious or toxic nature resulting from consumption of contaminated food or water”. They can be caused by physical, chemical or biological (pathogenic organisms) hazards or contaminants during the food supply chain (production, processing, storage, transport and distribution of food, as well as in the household).

Food safety describes the impact of food on human health. It refers to handling, preparation and storing of food in a way to best reduce the risk of individuals becoming sick from foodborne illnesses (Frazier and Weshoff, 1991). It also refers to “all those hazards, whether chronic or acute, that may make food injurious to the health of the consumer. It encompasses ways to prevent foodborne diseases, arising from food contamination with pathogens or chemicals, during production, processing, storage, transport and distribution of food, as well as in the household. Food safety also includes the standards and controls that are in place to protect consumers from unsafe foods (HLPE, 2017). It ensures the prevention of consumption of unsafe food and water which creates a vicious circle of diseases that affects particularly the more vulnerable groups (including children, elderly and the sick (WHO, 2015).

The five principles of food safety include;

- Cleaning the food properly
- Separating raw from cooked foods
- Cooking food properly before consumption
- Storage at the right temperature
- Using safe water and raw materials for food production ((WHO, 2018)

3.2.1. Consequences of Consumption of Unsafe foods

Pesticide residues and certain agricultural practices can increase the risk of endocrine disruption, which multiplies the risk of certain cancers (Aktaret *al.*, 2009; Mnifet *al.*, 2011). Chronic health effects often result from prolonged ingestion of low to moderate levels of mycotoxins (including aflatoxin), pathogens produced by a wide variety of moulds mainly found during post-harvest storage. Aflatoxin, for example, has been linked to stunting (Smith *et al.*, 2015). Lack of cold-chain storage and transport can render perishable foods unsafe to eat and increase the risk of pathogen transmission and attendant

food-borne illnesses. Significant numbers of poor people living in rural areas or urban slums do not have access to safe food and water, and consequently suffer from diarrhoea and other diseases that contribute to malnutrition.

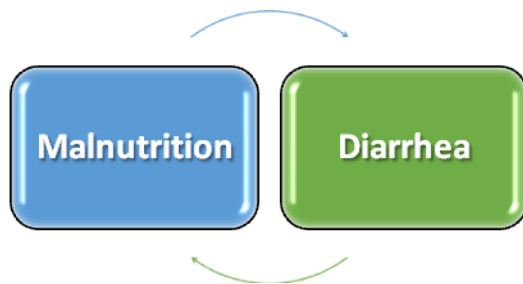


Figure1: Vicious cycle of unsafe food and water

3.3 Food hygiene

These are the conditions and measures necessary to ensure the safety of food from production to consumption (WHO, 2018). All measures put in -place to ensure food safety is referred to as food hygiene.

Along the food supply chain;

- Food can become contaminated at any point during slaughtering or harvesting, processing, storage, distribution, transportation and preparation.
- Lack of adequate food hygiene can lead to foodborne diseases and death of the consumer.

4.0 CONCLUSION

The principles of food safety aim to prevent food from becoming contaminated and causing food borne illness. It encompasses the process along the food chain (production, processing, distribution, preparation and consumption of food) that ensures that food is safe from any form of hazard that may adversely affect the health of the consumers. Food hygiene are those conditions and measures necessary to ensure the safety of *food* from production to consumption.

5.0 SUMMARY

This unit defined food security and it explains that all individuals has a right to food but not just to food alone but f safe food. It also highlights the various activities along the food supply chain from production to consumption. It emphasizes that during these processes, food must be kept safe and free from all forms of contamination. The unit then described the concept of food safety as measures taken to prevent food-borne illness that could arise from the consumption of foods that have been contaminated with pathogenic organisms or chemicals along the food supply chain. It went further to highlight the components of food safety and the consequences of consuming unsafe food. Foods available for consumption must be free from all forms of hazards that could predispose consumers to diarrhoea and consequently malnutrition which increases morbidity and mortality particularly among the vulnerable groups Lastly, the unit described what food hygiene is.

6.0 TUTOR MARKED ASSIGNMENTS

1. What are the components of food security
2. Mention the processes along the food supply chain
3. What is food safety? and describe the importance of food safety to the health of the consumers.
4. What are consequences of consuming unsafe food

7.0 REFERENCES / FURTHER READING

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Unit 2: *Food processing Environment*

CONTENT

1.0 Introduction

2.0 Objectives

3.0 Main Content

- 3.1 Sanitary requirement of food processing premises
- 3.2 Hygiene and health requirement of food handlers

4.0 Conclusion

5.0 Summary

6.0 Tutor marked Assignment

7.0 References

1.0 INTRODUCTION

This Unit will be looking at the food processing environment which includes the food processing premises, the health and hygiene requirements of individuals involved in food processing.

2.0 OBJECTIVES

The objective of this unit is;

- To expose you to the sanitary requirements of the food processing environment
- Give you insight on the health and hygiene requirements of food handlers

3.0 MAIN CONTENT

3.1 Sanitary requirement of food processing premises

Cleanliness and sanitation of the food production plant and premises includes;

- Maintenance of a clean and well sanitized surfaces of all equipment touching the food
- General good housekeeping in and around the plant
- Adequate treatment and disposal of wastes
- Quality control and storage of raw products
- Provision of good water supply

- Prevention of the contamination of food at all stages of food production and during warehousing of finished products

3.1.1 Water Supplies

Water that employees drink must meet public health standard and water that comes in contact with food should meet the bacteriological standards for drinking water. Shortages of water in some food industries have been reported and this has necessitated the re-use of water. Such water to be re-used must be re-treated to prevent microbial contamination. Whenever water is used in form of ice and such ice is in contact with food, it should meet bacteriological requirements for portable water.

3.1.2 Waste treatment and disposal

Solid and concentrated waste should be kept separate from watery waste and may be used for animal feed, fertilizers or other purposes. Precautions should be taken to keep out of waste waters as much wasted liquid and solid food material as possible. It should also be noted that leakage, overflow and spillage of watery waste that can drip into food should be completely avoided. Sewage of human origin should be kept separate from other plat waters because of the possible presence of intestinal pathogens.

Before emptying food waste from a plant into a body of water, it must be so greatly diluted or treated first to reduce the oxidizable compound to a harmless level. Food waste can be treated chemically or biologically.

- Chemical treatment involves the addition of a chemical substance to the waste or sewage form flocculent precipitate
- Biological treatment include dilution by running waste water into large body of water, irrigation and lagooning which involves running waste waters into shallow artificial ponds

3.13 Equipment

All equipment that comes in contact with food should be adequately cleaned and sanitized. It is also important to clean surfaces within the food production unit in order to remove as much food for micro-organisms. Agents used in cleaning are generally referred to as detergents.

Sanitizing

This is done in an attempt to kill most or all of the micro-organisms on equipment or surfaces. Sanitizing agents include, hot water, flowing steam under pressure, halogens (chlorine or iodine) and halogen derivatives

Cleaned –in-place system

Some industries especially dairy industries leave pipelines permanently connected and clean and sanitize them in-place. There are automated appliances for achieving this.

Packaging Materials

These are possible sources of contamination with micro-organisms. All packaging materials should be protected from contamination during handling

3.2 Hygiene and health requirement of food handlers

A food handler is anyone who works in a food business and handles food or surfaces that are likely to come into contact with food. Food handlers include caterers, individuals who work with food at the restaurants, institutions, food industries, airlines, food vendors etc.

3.2.1 Health Requirement of food handlers

Any food handler with symptoms or a diagnosis of an illness (such as vomiting, diarrhoea or fever) must:

- Report that illness to their employer or supervisor
- Not handle food if there is a reasonable likelihood of food contamination as a result of the illness

Routine health examination of employees should be carried out to find cases of carriers of infection. Hand washing is the most effective means of preventing the spread of pathogens.

Food handlers should wash their hands whenever they are likely to be a source of contamination (after using the toilet, smoking, coughing, sneezing, using a handkerchief, eating, drinking or touching the hair, scalp or body)

3.2.2 Hygiene requirements

- Good personal hygiene should be maintained by all food handlers in the food production environment
- A food handler must tie back long hair, and take all practical measures to prevent hair contaminating food
- He or she must not eat, sneeze, blow, cough, spit or smoke around food or food surfaces
- The Food Standards Code does not require food handlers to use gloves. However, if a food handler uses gloves it must be removed, discarded and replaced with a new pair before handling food and before handling ready-to-eat food and after handling raw food

4.0 CONCLUSION

The food production environment should be kept clean in order to prevent the transmission of microorganism to the food being produced. Water for food production and for consumption by employees should be of public health standard. Solid and concentrated waste should be kept separate from watery waste. Waste water should be properly treated before disposal. All equipment that comes in contact with food should be properly cleaned and sanitized. All food handler must maintain high level of personal hygiene and should not handle food if there is a possibility of contaminating the food due to an illness.

5.0 SUMMARY

This unit points out the sanitary requirements of the food production environment. It highlights the sanitary components of the food production environment (water supply, waste treatment, equipment cleaning, packaging materials). It also explains the health and hygiene requirement of the food handler in order to prevent food contamination from the food production environment.

6.0 TUTOR MARKED ASSIGNMENTS

1. What are the health requirements for a food handler before handling food
2. list some sanitizing agents
3. Differentiate between biological and chemical treatment of waste water
4. Mention the sanitary requirements of a food processing environment

7.0 REFERENCES / FURTHER READING

Frazier, W.C.andWesthoff, D.C.(2003)*Food Microbiology*.18th Edition, Tata McGraw Hill, Inc., New York.

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Unit 3: *Food preservation*

CONTENT

1.0 Introduction

2.0 Objectives

3.0 Main Content

3.1 Food spoilage and preservation techniques

3.2 Food poisoning and food infections, their prevention and control

4.0 Conclusion

5.0 Summary

6.0 Tutor marked Assignment

7.0 References

1.0 INTRODUCTION

This Unit will be looking at the concept of food spoilage and the methods of food preservation. The unit will also be looking at the

2.0 OBJECTIVES

The objective of this unit is;

- To provide an understanding of microbial spoilage and the factors that supports microbial growth in food
- To describe the various methods of preventing microbial spoilage in food
- To explain the terms food poisoning and food infection and how to prevent them

3.0 MAIN CONTENT

3.1 Food spoilage and preservation techniques

3.1.1 Food spoilage

This simply means the deterioration in the quality of food which most times is caused by microbial invasion. Micro-organisms cause spoilage in food by feeding and making use of the nutrients in the food making the nutrients unavailable and thereby producing some unexpected mixtures of products (other compounds). During spoilage, micro-organisms produce mixtures of other compounds giving rise to a different flavour, odour and colour.

Microorganisms involved in food spoilage include, bacteria, yeast and mould. These micro-organisms hydrolyse complex carbohydrate to simple sugars and alcohol. Proteolytic organisms break down the protein in food to peptides and amino acids giving rise to off-flavour and foul odour. Organic lipase breaks down fats into fatty acids and glycerol.

Some factors that affect the growth of microorganisms in food include;

- Available nutrients
- Moisture
- Temperature
- Oxygen
- pH

When the food environment is ideal for bacterial growth (sufficient moisture and nutrient and warm), micro-organisms multiply. The principle behind food preservation is therefore to make the food environment un conducive for microbial growth. Therefore, in order to prevent food spoilage, microbial growth should be controlled

3.1.2 Preservation Techniques

The main reason for preserving food is to prevent the growth of microorganisms or delay microbial decomposition.

Techniques for preserving food includes;

1. Use of High temperature (moist heat)
2. Dehydration
3. Use of low temperature
4. Modified Atmosphere Packaging
5. Use of chemicals (Preservatives)

1. Use of High Temperature (Moist Heat)

Techniques include;

- i. Blanching
- ii. Pasteurization
- iii. Sterilization

i. Blanching

This is the preliminary treatment of raw food products with steam or hot water: the food material is immersed into hot water (100°C) for 1sec or exposed to flowing steam for few seconds

It is done to;

- Inactivate enzymes
- Remove excess gases
- Allow for easy filling into cans during canning
- Increase permeability
- Reduce microbial population
- Fix colour of the food material
- Aid in peeling for products to be peeled
- Improve flavour

ii. Pasteurization

This is heat treatment that kills part of but not all the microorganisms in the food. Temperature is usually less than 100 °C aimed at eliminating pathogenic organisms and extend shelf life. The process is intended to sterilize foods by destroying or inactivating organisms that contribute to spoilage, including vegetative bacteria but not bacterial spores. The heat may be by means of steam, hot water, dry heat or electric currents and the food products are cooled immediately after.

Pasteurization is used when;

- When more rigorous heat treatment will may affect the quality of the food
- When the aim is to kill all pathogenic organisms
- When the spoilage organisms are not very heat resistant
- When any surviving microorganism will be taken care of by additional preservative methods to be employed

Pasteurization can be achieved by using;

- Ultra-high temperature: heating at 135°C for 1 sec
- High-temperature-short-time Method: temperatures, at least 72°C, for only 15 seconds
- Low-temperature-long-time: Temperature of about 63°C for 30 minutes. Also called the holding method

iii. Sterilization

This means complete destruction of all micro-organisms and this method of heat treatment destroys some of the food components. Moist heat sterilization is usually done using the autoclave (a device for boiling water under pressure at 15PSI, 121°C for 15mins. It is not normally used in food treatment, but it is usually employed to sterilize hospital devices

2. Dehydration (Dry Heat)

This is the oldest method of food preservation. It is based on the principle that microorganisms need water to survive. In dehydration, moisture content is reduced to a point where the activities of food spoilage organisms are inhibited. Techniques include;

- Sun drying: Commonest and cheap method of drying. Not very reliable method of drying and there is a lot of contamination during the process.
- Used for food products like meat, fish, okra, and some vegetables

Mechanical drying

- i. Hot air oven drying
- ii. Cabinet drying
- iii. Drum drying
- iv. Spray drying
- v. Freeze drying
- vi. Fluidized Bed Drying

Dried Products are usually spoilt by moulds and yeast because they require less moisture for growth. In general, moist heat is usually more efficient than dry heat and dry heat is not suitable for all materials

3. Use of Low Temperature

This is based on the principle that microbial activity can be slowed down or stopped at freezing temperature. Low temperature ranges used in food preservation include;

- Chilling: usually about 10-15⁰C. Suitable for the preservation of fruits, vegetables and tubers
- Refrigeration: between 0-7⁰C and its suitable for the storage of perishable and no-perishable foods'

- Freezing: temperatures between 0⁰C and -20⁰C. Some spore forming and non-spore forming organisms can survive freezing temperatures e.g. *Salmonella* survives 12 months under freezing temperature.

4. Use of Preservatives

Preservatives are chemical agents used to prevent microbial growth. It retards microbial growth by interfering with their cell membrane, genetic activity or enzyme activity. A chemical agent could be;

- Bactericidal or fungicidal (Kill)
- Bacteriostatic or fungistatic (control their growth)

Most times, use of preservatives is combined with other methods. Preservatives used in food should not be injurious to the health of the consumers. They should have been tested for toxicity and put in a group called 'Generally Regarded As Safe' (GRAS). They should not be used indiscreetly (there are regulations that controls their use and permitted levels in foods)

Major preservatives Include;

- Sodium Chloride (NaCl)
- Sugars
- Organic acids and their salts (benzoic acid, ascorbic acid, propionic acid, lactic acid)
- Gases (CO₂, Ozone, ethylene and propylene oxide)
- Halogens (Chlorine, iodine)
- Sulphite
- Nitrates and Nitrites

5. Modified Atmosphere Packaging (MAP)

Modified Atmosphere Package environment is formed from a finely balanced mix of normal atmospheric gases (oxygen, CO₂ and nitrogen) within a high barrier or permeable package.

The finely balanced MAP gas mix slows down the product deterioration process to reduce colour loss, odour and off-taste. A carefully controlled MAP helps to maintain the best respiration rate for the food product to preserve the fresh colour, taste and nutrient content throughout an extended shelf life.

3.2 Food poisoning and food infections, their prevention and control

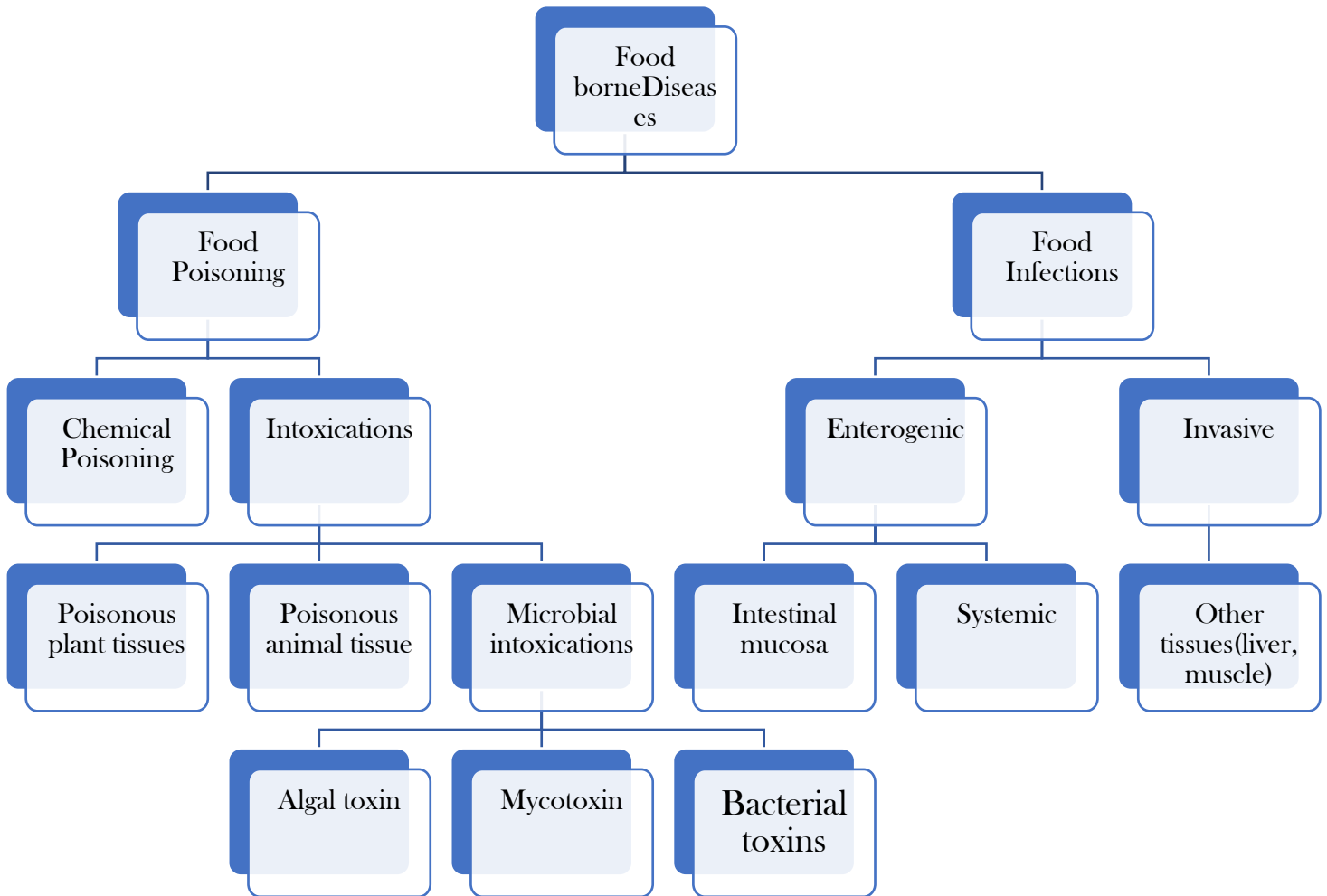


Figure 2: Food Borne Illness Classification (Frazier and Weshoff, 1991)

3.2.1 Food poisoning and Infection

Food poisoning can occur as a result of chemical poisoning or consumption of toxins found naturally in plants or animals or a toxin produced by a microorganism. A bacterial food poisoning is a food borne disease caused by the consumption of a food containing bacterial toxin. Examples of bacterial food poisoning include; *Botulism*, *Staphylococci intoxication*

Food infection is a food borne disease caused by the entrance of bacteria into the body through the ingestion of a contaminated food. Examples of food

infections include; *Salmonellosis*, *Shigellosis*, *Clostridium perfringens* gastroenteritis, *Vibroparahaemolyticus* gastroenteritis

To prevent and control of food poisoning and infections the following should be done;

- Use the appropriate heat treatment for foods
- Gassy or swollen canned foods should be rejected
- Development of a food safety program
- Avoid consumption of food that has been cooked, held and not well reheated
- Maintaining good sanitation throughout the production and handling process
- Food handlers with flu, cold or boil should not be allowed to handle food
- Food labelled as perishable should be frozen
- Raw food should be separated from cooked foods in the refrigeration compartment
- Maintaining good personal hygiene (hand washing with soap and water after using the toilet)
- Prevent contamination of food by vermin by their eradication from the food premises
- Avoid recontamination of food products
- Good Manufacturing Practices (GMP) should be put in place in manufacturing, processing, packaging and handling of food meant for human consumption.
- Consumer education should be carried out

4.0 CONCLUSION

A deterioration in the quality of food as a result of effect of microbial (bacteria, yeast and mould) attack is referred to as microbial spoilage and there are certain conditions that support microbial growth. The food environment should be made uncondusive for the growth of microorganisms. Techniques to prolong the shelf life of food include use of high temperature, use of low temperature, use of preservatives and modified atmosphere packaging. Microbial food poisoning is the ingestion of food containing the microbial toxin while food infection is the ingestion of food contaminated with micro-organisms. It is important to prevent contamination of food either by micro organisms or by the toxins of micro-organisms to prevent food borne illnesses.

5.0 SUMMARY

This unit described microbial food spoilage and the factors that supports microbial food spoilage. It went further to discuss the methods that can be

adopted to prevent microbial food spoilage and preserve the food (use of high temperatures, use of low temperature, use of chemicals and modifying the packaging environment). The unit also explained food borne diseases differentiating between food poisoning and food infection.

6.0 TUTOR MARKED ASSIGNMENTS

1. Describe the methods of preserving food
2. Mention the techniques in preventing food borne illness
3. Differentiate between food poisoning and food infection

7.0 References / Further reading

Frazier, W.C.andWesthoff, D.C.(2003)*Food Microbiology*.18th Edition, Tata McGraw Hill, Inc., New York.

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MODULE 2: FOOD QUALITY CONTROL

Unit 1: Food sampling for analysis, quality control

Unit 2: Food safety laws and regulations

Unit 3: Licensing of Food and Beverage Company, licensing of food production and water packaging premises, licensing of liquor production premises

Unit 1: The food sampling for analysis and quality control

1.0 Introduction

2.0 Objectives

3.0 Main Content

3.1 Food sampling for analysis

3.2 Quality Control

4.0 Conclusion

5.0 Summary

6.0 Tutor Marked Assignment

7.0 References

1.0 INTRODUCTION

This unit explains the procedures for sampling food for analysis as well as quality control and quality assurance systems.

2.0 OBJECTIVES

At the end of this course, learners are expected to:

- know the process of sampling food for analysis
- understand the term “Quality Control”

3.0 MAIN CONTENT:

3.1 Food Sampling for Analysis

Food sampling refer to the processes involved in collecting food samples which will be used for analysis to determine the safety of the food. The food sample to be used for analysis must be carried out by a food safety officer who shall:

- Make the intention of taking sample for analysis known to the person he/she is collecting food sample from.
- Divide each sample into four parts. Each part must be labelled and sealed in airtight wrap and endorsed by the person from whom the sample has been taken. Where such person refuses to endorse, one or more witnesses should be called upon, who will sign (thumb print) in lieu of the endorsement of such person
- One of the parts should be sent for analysis which must be carried out by the Food Analyst under intimation to the Designated Officer, two parts of the samples must be sent to the Designated Officer for keeping them in safe custody and the last part should be sent for analysis to an accredited laboratory, if so requested by the food business operator, under intimation to the Designated Officer.
- When a sample of any article of food or adulterant is taken, the Food Safety Officer shall, by the immediate succeeding working day, send the sample to the Food Analyst for the area concerned for analysis and report.
- Where the part of the sample sent to the Food Analyst is lost or damaged, the Designated Officer shall, on a requisition made to him, by the Food Analyst or the Food Safety Officer, despatch one of the parts of the sample sent to him, to the Food Analyst for analysis.
- An article of food or adulterant seized, unless destroyed, shall be produced before the Designated Officer as soon as possible and in any case not later than seven days after the receipt of the report of the Food Analyst.
- In case of imported articles of food, the authorized officer of the Food Authority shall take its sample and send to the Food Analyst of notified laboratory for analysis who shall send the report within a period of five days to the authorized officer.

- The Designated Officer, the Food Safety Officer, the authorized officer and the Food Analyst shall follow such procedure as may be specified by regulations.

3.2 QUALITY CONTROL

Food quality describes the attributes of a food that influence its value and that makes it acceptable or desirable for the consumer. Food quality include: size, shape, colour, texture, flavour, food composition (ingredients and nutrients), as well as the way food is produced or processed (i.e. “organic”, “cage free”, “without antibiotics”).

It also includes negative attributes such as spoilage, contamination with filth, discolouration, off-odours and positive attributes such as the origin, colour, flavour, texture and processing method of the food. *Quality Control* refer to the daily (or hourly) monitoring of production for conformance to the standards and specification set under a quality assurance system. This implies that quality control is dependent on quality assurance system. Quality assurance system sets the policies, standards, methods and specifications for monitoring the quality of a production. Quality control therefore encompasses all the controllable factors that ultimately influence positively or negatively the quality of the finished product. The primary purpose of quality control is to ensure production of final product which conforms to stringent quality standards.

The sequence of quality control includes:

1. **Agricultural Control:** This include the control of various agricultural practices intended to ensure reasonably economic production required for manufacture. These agricultural practices, if not properly monitored, may render the finished food products unsafe for consumption.

2. **Buying Samples Control:** buying samples are samples of what the supplier intends to deliver for the bulk delivery of a raw material. Buying samples are controlled by subjecting the sample raw materials to storage and other practices to ascertain the quality of the raw materials in order to judge subsequent deliveries.
3. **Raw Materials Examination:** This refers to giving required raw materials specifications to suppliers and checking samples of the raw materials supplied visually, chemically and microbiologically to ensure conformance with standard specifications.
4. **Instrumentation:** This refers to the control of advance instruments used to ensure commercial viability of a food manufacturing operation in the face of changes in the food market and in the structure of the food industry. This include: controls of optimized system, gas chromatography and mass spectrometry, high performance liquid chromatography, and auto-analyzer used in food analysis.
5. **Batch trials:** This involve preparation of a small batch trial of the food for appropriate examination.
6. **Process Control:** This assures that staff on the floor are doing their work correctly so as to avoid invalidation of all previously control precautions. The different stages of production process is subjected to testing to ensure conformity to standard specification in order to ensure safety of the finished products.
7. **Finished Product Control:** This involve subjecting the finished product before packaging and storage, to testing, to ensure that it meets the desired result based on specification. In addition, testing other criteria such as metal contamination, proper labelling of the packaging materials, etc.
8. **Storage/Packaging Control:** This include ensuring that appropriate choice of packaging materials that will promote safety of the finished products is used. This also include materials that will support safety of the foods under

appropriate conditions of temperature, humidity, lighting, etc. as well as adopting first-in, first-out method.

4.0 CONCLUSION

To ensure that the food made available to consumers are safe, there is need to sample the food for analysis following the appropriate procedure. For sustainable production of safe food, quality control at the various stages of processing along the food chain must be ascertained.

5.0 SUMMARY

This unit discussed the concept of quality control and it defined quality control as the monitoring of all production stages from farm to fork to ensure conformance to standard procedures set under the quality assurance system. It also explained the need and procedure for food sampling for analysis. The sampling of food for analysis must be carried out by food safety officer who must ensure that the appropriate steps are followed to ensure healthy food system.

6.0 TUTOR MARKED ASSIGNMENT

1. Highlight the steps in sampling food for analysis
2. Describe the various stages along the food chain where quality control must be ensured

7.0 REFERENCES

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UNIT 2: FOOD SAFETY LAWS AND REGULATIONS

1.0 Introduction

2.0 Objectives

3.0 Main Content

3.1 Definition of Food Safety Law and Regulation

3.2 Organs of Government Involved in Food Safety Regulation and Surveillance

3.3 Basic Steps to Food Safety at Home

4.0 Conclusion

5.0 Summary

6.0 Tutor Marked Assignment

7.0 References

1.0 INTRODUCTION

This unit explains the definition and concept of food safety law and its role in ensuring food safety. It also explains the agency responsible for food safety laws and regulations in Nigeria.

2.0 OBJECTIVES

At the end of this course, learners are expected to be able to:

- define the term food safety law and regulation
- identify the agencies responsible for food safety law and regulation enforcement
- identify the basic steps to ensure food safety at home

3.0 MAIN CONTENT

3.1 Definition of Food safety law

Food safety law refers to legislation which regulates the production, trade, handling of foods, regulation of food control and food safety. Food law specifies the minimum quality requirements to ensure the foods produced are unadulterated and not subjected to fraudulent practices intended to deceive the consumers. Food laws also cover the total food chain from farm to fork. i.e.

quality control of feed given to animals, on-farm controls an early processing through to the final distribution and consumption by consumers.

Food safety regulation is a scientific discipline describing all the activities and stakeholders along the food supply chain from farm to fork (e.g. handling, preparation, and storage of food) in order to prevent foodborne illness. This includes a number of routines that should be followed to avoid potentially severe health hazards.

3.2 Organs of Government Involved in Food Safety Regulation and Surveillance

Food safety is a serious issue globally. The legislative and administrative organs of government playing regulatory and surveillance roles include: The United Nations (UN) specialized agency, the Food and Agriculture Organization (FAO) helps member countries to apply food standards in order to protect consumers.

The Food and Drug Administration (FDA) and the United States Department of Agriculture (USDA) Food Safety Inspection Service (FSIS) also regulate food safety, while the Cooperative Extension Programme of the USDA, through the Expanded Food and Nutrition Education Programme (EFNEP) serves low income families to address such issues as child care, nutrition education, food preservation, food safety and budgeting. The Federal Ministries of Health and Agriculture, Standards Organization of Nigeria (SON), and the National Agency for Food and Drugs Administration and Control (NAFDAC) play similar roles (Ifenkwe, 2012).

National food laws and regulations should be updated, amended and easy to understand and in line with international standards. Implementation of food laws and regulations is therefore key and essential to ensure safety of food made available to consumers. In Nigeria, the governing council of the National Agency for Food and Drug Administration and Control (NAFDAC) by sections 5 and 30 of the National Agency for Food and Drug Administration and Control Act Cap NI Laws of the Federation of Nigeria (LFN) 2004 is the agency responsible for food laws and regulations in order to ensure safety of food

3.3 Basic steps to food safety at home

There are four basic steps to food safety at home:

- Clean - always wash your fruits and vegetables, hands, counters, and cooking utensils.
- Separate - keep raw foods to themselves. Germs can spread from one food to another.
- Cook - foods need to get hot and stay hot. Heat kills germs. Chill - put fresh food in the refrigerator right away.

4.0 CONCLUSION

Food safety laws and regulations describes the process by which food made available to consumers are being regulated to ensure conformity to standard and production of safe and wholesome foods which will promote optimum health of the consumers.

5.0 SUMMARY

This unit defined food law as the minimum quality required to be achieved by any food or beverage produced for consumption throughout the food supply chain, in order to ensure production of safe and unadulterated foods and beverages to consumers is referred to as food laws. It highlighted the organs of governments responsible for enforcement of food laws and regulations to ensure compliance varies for different countries and they include: UN specialised agencies, FAO, USDA, FDA, SON, NAFDAC among others

6.0 TUTOR MARKED ASSIGNMENT

1. What do you understand by food law and regulation in relation to food safety?
2. Highlight the agencies responsible for food safety laws and regulation enforcement
3. Distinguish between food safety law and regulation

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Codex Alimentarius Food Hygiene 4th Edition(2009). NAFDAC Pre-Packaged Food (labelling)

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Unit 3: licensing of food and Beverage Company, licensing of food production and water packaging premises, licensing of liquor production premises

1.0 Introduction

2.0 Objectives

3.0 Main Content

3.1 Definition of food and beverage industry

3.2 Requirements for licensing of Food and Beverage Company and food and liquor production premises in Nigeria

3.3 Requirements for licensing of water packaging premises in Nigeria

4.0 Conclusion

5.0 Summary

6.0 Tutor Marked Assignment

7.0 References

1.0 INTRODUCTION

This unit explains the requirements for licensing of food and Beverage Company, food production and water packaging premises and liquor production premises.

2.0 OBJECTIVES

At the end of this course, learners are expected to be able to:

- identify the requirements for licensing Food and Beverage Company
- identify the requirement for licensing food and liquor production premises
- identify the requirements for licensing water packaging premises.

3.0 MAIN CONTENT

3.1 Definition of Food and Beverage Industry

The food and beverages industry refer to all companies involved in processing raw food materials, packaging, and distributing them. This includes fresh, prepared foods as well as packaged foods, and alcoholic and non-alcoholic beverages. Any product meant for human consumption, aside from pharmaceuticals, passes through the food and beverage industry. There are however standards or requirements that any food and beverage company must meet before obtain license which permits them to operate.

3.2 Requirements for licensing of Food and Beverage Company and licensing of food and liquor production premises in Nigeria

1. Organization and Personnel

There should be an adequate organisational structure that clearly defines names and qualifications of key personnel. There should be adequate number of qualified personnel to perform and supervise the various processes. The in-house and in-process Quality Control of functions may be carried out by the production manager while comprehensive /detailed product analysis should be performed by a public analyst registered by the Institute of Public Analysts of Nigeria (IPAN). There should be adequate general and specific training for employees and should be conducted regularly by qualified individuals. Also, the quality control and production units shall be distinct and independent units that function and report directly to the management.

Personnel should wear clean protective apparels such as hand gloves, head covering, nose and mouth mask to protect products from contamination and practice good sanitation and hygienic habits. Eating, drinking, chewing and smoking in the production and storage areas should be prohibited. All personnel should have access to medical treatment and checks for communicable diseases and the records should be kept. Any person shown at any time to have apparent illness or open lesions that may adversely affect the safety or quality of product should be excluded from direct contact with the product until the condition is corrected. All personnel should be instructed to report any health conditions that may have adverse effect on the production of the product.

2. Buildings and Facilities

The facility for food production should be suitably adapted to comprise a minimum of four rooms designated as the cloak room, packaging material store, production section and finished product store. There should be defined areas of adequate size to accommodate the different operations in a logical order of production flow corresponding to the sequence of the operations. The entire factory premises should be fenced to demarcate it from all other buildings (residential or commercial).

The factory must not be located near a cemetery, abattoir, quarry, sewage treatment plant, dump site, saw mill, oil depot, cement factory or any other areas that could be a source of contamination for processing, manufacturing, production and packaging of food products. Floors, walls and ceilings shall be made of smooth hard surfaces that can be easily cleaned and disinfected routinely and Ceiling and windows should conform to standard. Adequate ventilation, cooling and exhaust systems should be provided where appropriate to minimise condensation in all the sections and in high-risk food manufacturing.

3. Cold Storage

A cold room should be provided for materials (raw material, packaging material or finished product) that require special storage conditions and should have the following features: It should be an enclosure fitted with air cooling/freezing facilities. Thermometer should be installed such that it can be read off without opening the cold room. Temperature-monitoring chart should be maintained to ensure that the cold chain is constantly monitored. Stand-by generator or alternate power source should be installed. Adequate illumination should be provided in the cold room.

4. Production

Where water forms part of the production process, at least one-third (1/3) the height of the wall (lintel level) from the floor shall be covered with ceramic tiles. Functional air conditioning or cooling system shall be installed in the production section to enhance ventilation. However, for production section where heat and possibly dust from powdered raw materials emit, extractor fans and/or dust extractors shall be used to enhance ventilation in this room. Illumination shall be via natural and/or electric lighting and the room shall be sufficiently lit. Production equipment installed in this room should allow for smooth flow of production process and movement of personnel. The floor and walls should be made of smooth, hard surface that can be easily cleaned and disinfected routinely. Adequate drainage should be in place where necessary.

5. Raw Materials and Finished Product Store

The facility shall maintain separate rooms/sections for the storage of raw materials and finished products. These rooms could be a dry store, cool room or cold room depending on the nature of the product. Other features required in this room shall include; Adequate for its intended use. Illumination shall be via natural and /or electric lighting and the room shall be sufficiently lit. Ventilation shall be via air conditioners, extractor fans or purified air system. The floor shall be made of smooth, hard surface that can be easily cleaned and disinfected routinely.

Storage of finished products shall be on pallets or shelves of sufficient strength to carry the weight of the products. The arrangement should allow for easy cleaning and movement of personnel. Self-closing doors and windows should be screened with insect-proof net. Provision should be made for separate

storage for quarantined and approved items. Provision of thermometer and hygrometer to monitor temperature and humidity and chart.

7. Equipment

The design, material, construction, positioning and maintenance of equipment should be adequate and suitable for its intended use. Layout and design must aim to minimize the risk of cross-contamination and permit effective cleaning and maintenance. The parts of the equipment that make contact with products should be made of non-toxic/non-reactive materials such as food grade stainless steel.

8. Water Supply and Treatment Water used in the production of food products and washing of production equipment, should be potable water. The source of water shall be public mains, spring or borehole (of not less than 150ftdepth depending of the topography of the area). The distance of the borehole from the nearest septic tank should not be less than 30meters.

The borehole should be fitted with a submersible pump of adequate power to pump the raw water out of the borehole. Raw and Treated water tanks should be made of PVC, stainless steel or galvanized steel.

9. Raw and Packaging Materials and Sources

Raw and packaging materials should be sourced from approved vendors. All incoming materials should be stored under appropriate storage conditions and conform to specification. Thermometer and hygrometer should be installed in the raw/packaging materials room for proper monitoring. Temperature- and humidity-monitoring chart should be maintained.

10. Validation of Equipment and Process

All equipment and processes must be validated. Validation is the establishment of documented evidence which provide a high degree of assurance that a specific method, procedure, process and equipment will consistently produce a product meeting its

11. Quality Control

The in-house laboratory should be adequately equipped to carry out tests on the critical parameters on their raw materials, in-process and finished products. The requirements in the laboratory include; Qualified, trained and competent quality control personnel; Adequate equipment to carry out the critical physical, chemical; and microbiological parameters on the raw materials, in-process and finished products and documented accordingly.

12. Calibration of Equipment

Calibration should be carried out on laboratory and production equipment on a daily basis before the equipment can be used for production and adequate documentation should be kept.

13. Hazard Analysis and Critical Control Point (HACCP) System

A plant should design and implement Hazard Analysis and Critical Point System.

14. Environmental Sanitation and Personnel Hygiene

Appropriate sanitation measures should be taken to avoid contamination risks of all kinds:

The entire factory, equipment, water system, toilet and washing facilities, should be cleaned frequently and thoroughly in accordance with the Standard Operational Procedure (S.O.P) for cleaning. Eating, Drinking and Smoking

should not be permitted in the production, laboratory and storage areas. All operators should wear appropriate protective apparels. Production staff should undergo food handler's test at least twice a year.

15. Documentation

Appropriate records of all activities should be documented and maintained accordingly

16. Consumer Complaint and Recall

All consumer complaints should be handled by technical personnel, thoroughly investigated, documented. All records of recalled products must be kept. In the event of any recall, NAFDAC must be notified of all actions at receipt of consumer complaint, during investigation and actual recall activity. Root Cause Analysis should be carried out and Corrective Action and Preventive Action (CAPA) plan developed.

17. Distribution System, Transportation, Handling and Label

Record of product distribution network must be properly kept for easy recall of defective products. Distributors' names, addresses, fax, phone number, email, etc. should be maintained. Products should be handled and transported under conditions that prevent deterioration, contamination, spoilage and breakage to ensure that the product safety and quality is maintained up to the time of delivery to the consumer. Food product label should be in accordance with the provisions of the extant NAFDAC Pre-packaged Food (Labelling) Regulation

3.3 Requirements for licensing of water packaging premises in Nigeria

1. **Organization and Personnel, Buildings, Cloakroom, and. Packaging Materials store** should be designed as the food production premises above

Floor and walls should conform to the standard as in food production premises above. Windows should be screened with insect-proof nets and should be cleanable.

2. Production Section

Floor and walls should have smooth hard surface, made of non-shedding and durable materials, easy to clean and where necessary, disinfect. Drainage system should be adequate to prevent flooding. Windows should be screened with insect-proof nets and should be cleanable. An air conditioner should be provided. Illumination and ventilation should be adequate.

3. Finished Product Store

Same as production section floor, walls, windows, ventilation and illumination

4. Facilities and Equipment

Source of water should be same as production premises, Tanks and Reservoir should be made of Polyvinyl Chloride (PVC) or stainless steel. Underground reservoir (where available) should be made of concrete and fully tiled. **Pipes** should be made of stainless steel or PVC. Use of asbestos pipes is not allowed. Form, Fill, Seal Machine should be designed to minimize man-material contact, safe to use, easy to clean and environmentally friendly. The equipment may be a fully automated device. The bottling line must be full automated.

5. Water treatment process

The facilities required for the production of drinking water should include the following;

The borehole shall be fitted with a submersible pump of adequate power to pump the raw water out of the borehole; treated PVC water tank or stainless steel. In case of galvanized steel, it shall be coated internally with food grade

rubber paint. Industrial modules containing sand bed and activated charcoal shall be provided.

Micro filters of adequate mesh sizes should be provided for proper filtration. The last filtration point should have the least mesh size (e.g. 0.5 microns). An appropriate UV sterilizer should be provided at the appropriate point (just before filling) in the water treatment process. The Treatment process shall comprise of; Disinfection: (such as chlorination at 2-4 parts per million (ppm), reverse osmosis, ozonation etc. should be applied; Filtration: This process is achieved by passing the water through sand bed filters and then through activated carbon filters to remove the chlorine, colour, odour and taste from the water; Sterilization: This is achieved by passing the water through appropriate ultraviolet sterilizer to kill off any other microbes that may have escaped the disinfection stage.

6. Hygiene Station and Toilet Facilities

Hygiene station and toilet facilities should be provided for personnel and should be kept clean at all times. Washing facilities should be equipped with food grade liquid hand soap, hair driers or service towels and sanitizer. The walls and floors should have smooth surface, easy to clean and disinfect. The hygiene station should be located before or within the cloakroom. Toilets should not open directly to the production area. Sewage, refuse and other wastes within the premises should be disposed in a safe and sanitary manner. The disposal should be in accordance with the laid down rules by the local Waste Management Authority.

7. Sanitation

Any building used in the production, processing and packaging of drinking water should be maintained in a hygienic condition. Standard Operating

Procedures (SOP) assigning responsibility for cleaning must be in place, describing in detail, the cleaning schedules and frequency, as well as equipment and materials to be used in cleaning the buildings and facilities. The building should be regularly fumigated with approved food grade fumigants.

8. Consumer Complaint and Recall

All consumer complaints should be handled by technical personnel, thoroughly investigated and documented. The outcome of investigation should be communicated to management in order to prevent future occurrence.

9. Distribution System

Record of product distribution network must be properly kept for easy recall of defective products. Distributors' names, addresses, fax, phone number, email, etc. should be documented.

10. Transportation and handling

Products should be handled and transported under conditions that prevent deterioration, contamination, spoilage and breakage to ensure that the product safety and quality is maintained up to the time of delivery to the consumer. All packaged water should be stored in a cool dry place and away from sunlight.

4.0 CONCLUSION

All food and beverage companies, food and liquor production premises as well as packaged water production premises must conform to the regulatory standard before they can be licensed.

5.0 SUMMARY

The unit highlighted the requirement for the establishment of any food and beverage company. For any Food and Beverage Company and food and liquor production premises to be licensed in Nigeria, their organisation and personnel, building and facilities, cold storage, production, raw materials and finished product store, equipment, water supply and treatment, Raw and Packaging Materials and Sources, Validation of Equipment and Process, quality control, validation of equipment, HACCP system, documentation, Environmental Sanitation and Personnel Hygiene, Distribution, Transportation, Handling and Labelling systems must comply to the laws and regulations of NAFDAC. It also explains the requirements for licensing of water packaging company. The water packaging premises in Nigeria must also meet the required standard as stated in the laws and regulations of NAFDAC before they can be licensed.

6.0 TUTOR MARKED ASSIGNMENT

1. Describe the requirements for licensing of food and beverage companies
2. Highlight the various stages of production of packaged water production facility, specifying the standards that must be met before license can be obtained from regulatory agency.

7.0 REFERENCES

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Module 3: Capacity building for food handlers

Unit 1: *Organization of workshop for food handlers*

Unit 2: *Food hygiene Education*

Unit 3: *Monitoring and inspection*

UNIT 1: ORGANIZATION OF WORKSHOP FOR FOOD HANDLERS

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3.1 the need for workshop for food handlers

3.2 factors contributing to the risk of food poisoning

3.3 advantages of food safety training

4.0 Conclusion

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6.0 Tutor marked Assignment

7.0 References

1.0 INTRODUCTION

This unit explores the need for training food handlers on the subject of food safety and hygiene, the importance of this training to the company, employee and the customers. The need for food handlers to be aware of factors that may increase susceptibility to food borne infections was also considered

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- State the need for workshop for food handlers
- Mention the factors contributing to the risk of food poisoning
- State the advantages of food safety training

3.0 MAIN CONTENT

3.1 The need for workshop for food handlers.

Training in food safety is a legal requirement that food handlers are supervised and instructed and/or trained in food safety and hygiene matters in accordance with their level of involvement with food. Several reports have been received about the incidences of food that was not safe enough for consumption and most times these occurrences have made headlines. Recall that several rumours have been spread about “poisoned beans” and some products have been alleged to have adverse effect on the consumers at one time or the other. Even though the facts of these insinuations were never let out to the consumers, but they called for caution.

Food-borne and water borne diseases kill millions—mostly children – every year in many poor communities and careless countries. You will recall that cholera out-break some communities in Nigeria claimed lives for several months because of contaminated water courses despite emergency attention by health care professionals. In most markets in developing and under developed countries, food items are exposed to flies, rain, wind and dusts and water that have been contaminated from source. The quality of portable water available cannot be vouched for if they were to be scrutinized hygienically. The sources of contamination ranged from the production procedures through delivery to retailing in the open markets and even superstores.

On the other hand, in developed countries where industrialization is at its peak, industrial scale processing of food is very common. The food processing entails adding some food additives for preservation and quality. However, some of these additives have been indicted to predispose the consumers to some chronic diseases. It is worthy of note that some radioactive substances have also been reported to be found in some foods because of industrialization.

Hence, it is very important to provide training on safe food handling to food specialists, caterers, food vendors and all other important players in the food value chain.

3.2 Factors contributing to the risk of food poisoning

The threats to health posed by unsafe foods vary from one individual to another. Some groups are more vulnerable, they include: children under the age of five, pregnant women, people over the age of 70 years and people with compromised immune system such as People Living Positive (PLP). Also, some environmental factors increase vulnerability. These include:

- Eating out frequently
- Lack or inadequate access to clean water
- Poor sewage facilities in the households, schools and work places
- Poor waste disposal facilities and attitude
- Poor personal and environmental hygiene

The interplay between all these factors can predict the risk of exposure to unsafe foods. These exposures to unsafe food contribute to the burden of diseases in Nigeria. It is therefore important for food handler at every level to be aware of the risk their services may pose to customers and consumers

3.3 Advantages of food safety training

Food safety training is essential to the commercial viability of a company/organisation and the overall health of the population. If food hygiene and safety is neglected it will increase the risk of food contamination which can lead to food borne illnesses. This can ruin the reputation of the company and result in litigation, loss of sales/profits and loss of credibility. Food safety and hygiene workshop or education is therefore an important investment in order to protect the health people. Other advantages include:

- Assists companies in becoming more efficient, competitive and profitable
- increases staff efficiency
- Reduces wastage
- Assists in the production of safe food
- Complies with food legislation requirements
- Promotes a good company image

Things to consider when planning food hygiene and safety workshop

- Consider the use of visual aid to improve comprehension of learners
- Include participatory exercises to improve understanding
- Use consistent terminology throughout the program

After training, it is important for Food Company to provide the enabling environment and resources for the implementation of the knowledge acquired during the training requires. This will improve the morale of staff and promote staff retention while ensuring the safety of food products.

4.0 CONCLUSION

A good food safety programme must be the core of food safety culture of any food company or entrepreneur because the safety and health of employee and guest will depend on it.

5.0 SUMMARY

Food consumption is very important to all humans and it does have health implication. Also, everyone may have to eat outside the home at one point or the other. Therefore, the safe handling of foods at all levels and in every form must be emphasized. Knowing that contaminated food can compromise health of its consumer, it is important to ensure the safety of meals served both at home and at institutional levels such as restaurants, cafeterias etc. for this to be in place, there must be adequate training of food handlers to be able to deliver international standard of food safety and handling practices.

With good training on food safety and hygiene, the risk of food poisoning will be sufficiently reduced, the health burden of food-borne illnesses will also be reduced to barest minimum. Trainings and workshop will improve staff morale, and efficient service delivery. Also, food safety training is essential to the commercial viability of a company/organisation as well as their reputation.

6.0 TUTOR MARKED ASSIGNMENTS

1. List out the possible cadre of staff that will be required to be trained on food safety and hygiene in a three-star hotel.
2. Make a case for the need of the local public health department to organise food safety and hygiene workshop for food vendors working in public primary school in your neighbourhood

7.0 REFERENCES / FURTHER READING

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UNIT 2: *FOOD HYGIENE EDUCATION*

Content

1.0 Introduction

2.0 Objectives

3.0 Main Content

3.1 Preventing food poisoning

3.2 Food safety in the kitchen.

3.3 Proper food preparation and food storage

3.4 Food allergies and intolerances

3.5 Shelf stability of foods

3.6 The use of food labels

4.0 Conclusion

5.0 Summary

6.0 Tutor marked Assignment

7.0 References

1.0 INTRODUCTION

This unit explains the various areas of food handling strategies that handlers can employ to ensure safety of food right from shopping to the time food is actually served. This is because at various point of food preparation and processing, there are ample opportunities for food to be contaminated. There is therefore need for food handlers to ensure cleanliness of the kitchen environment, utensils, and storage facilities among others.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- State how to prevent food poisoning

- Mention how to ensure food safety in the kitchen.
- Discuss proper food preparation and food storage
- Explain the concept of food allergies and intolerances
- Explain the shelf stability of foods
- Discuss the use of food labels

3.0 MAIN CONTENT

3.1 Preventing food poisoning

The term food borne illness refers to illnesses transmitted to human being through poisonous substances in foods (toxicants) or pathogenic (disease causing) microorganisms. In most illnesses, the acute symptoms are mild with abdominal cramps head ache, vomiting and diarrhoea. Unfortunately, some of these symptoms also come with some ailment such as mal-absorption, malnutrition in children. Sometimes, these symptoms can be very fatal especially in people with malnutrition and compromised immune systems.

There have been cases of food borne diseases where hundreds of people died of infection in these cases. Consumers have little protection against such large – scale calamities, they must trust government inspectors to enforce strict standards to prevent all but truly unavoidable incidences. However, most incidents of food borne illness arise from small setting such as your kitchen, restaurants and local food joints.

Most commercially prepared foods are usually safe and batch numbering makes it possible to recall contaminated foods through public announcements via newspaper, television, radio stations etc. raw foods such as meats, fresh vegetable fruits from the market picks up microbes in transit and these microbes multiply before it gets to the hand of the final consumer.

Here are few points to consider while shopping;

1. Properly plan your route: when shopping, buy non-perishable foods first and then perishable ones last.
2. Always buy fresh foods
3. Pay careful attention to the quality of what you are buying such as damaged packaging, bloated cans, bad odours etc.

4. Pack your foods safely and properly: pack your foods like raw meat and fish properly to avoid contamination of food that are to be eaten fresh such as fruits and some vegetables.
5. Try to keep the quality of what you have bought while in transit as much as possible.

3.2 Food safety in the kitchen.

Foods can provide ideal condition for microorganisms to grow. Microbes require warmth, moisture and nutrients to thrive. To control microbial growth on foods, here are some tips that can help:

- Keep hot foods hot, keep cold foods cold
- Keep your kitchen sparkling clean
- Allow food to reach sufficient, time and internal temperature to kill all microbes while cooking
- Keep yourself, your kitchen and your food clean – there are some tips to help or guide you
- Wash hands thoroughly with soap and water after using the toilet before eating and before preparing meals

Keep the kitchen clean: It is amazing that even the bathroom and toilet are sometimes usually cleaner than the kitchen because they receive more attention. The most contaminated items in the kitchen are the sponge and napkins, therefore;

- ✓ Rid sponge from food debris by rinsing it properly after use
- ✓ Change kitchen napkins and dish clothes frequently
- ✓ Use hot soapy water or disinfectant to clean kitchen surfaces
- ✓ If you are ill, stay away from food and cooking to prevent contamination.
- ✓ Wash every utensil used after cooking
- ✓ Wash items such as sponge, napkins, chopping boards with disinfectant such as bleach (one capful per gallon of water). The good thing here is

that chlorine can kill most harmful organism but if the household waste gets into the water ways, it can be poisonous to fish.

- ✓ The use of non-porous boards for cutting and washable cloths for wiping is encouraged
- ✓ Rinse food produce with clean water
- ✓ To prevent the spread of bacteria, separate raw meat or sea foods from other foods.

3.3 Proper food preparation and food storage

This is an aspect that most people neglect, and this has led to various contaminations, deteriorations, spoilages and ultimately wastages. In order to prevent these, several things need to be in place. This includes:

1. Buy refrigerated or frozen foods after selecting non-perishables.
2. Do not pack meat or poultry with torn or leaking packs.
3. Do not buy food whose expiry dates has passed
4. Procuring appropriate kitchen utensils and equipment
5. Proper setting up of the fittings and wares in the kitchen to make food preparation convenient.

Having done these,

Keep hot food hot

- ✓ Cook meats well enough until the internal temperature is raised to kill microorganisms
- ✓ Cook eggs properly before eating
- ✓ When serving food, maintain a high temperature
- ✓ Heat leftovers thoroughly before eating

Keep cold foods cold

- ✓ Refrigerate perishable foods immediately: within 2 hours—1 hour when the temperature is above 90 °F (32.2 °C).
- ✓ Pay attention to temperature of refrigerator and freezer. The refrigerator should be at 40 °F (4.4 °C) or below and the freezer at 0 °F (-17.7 °C) or below.
- ✓ Perishable food such as meat and poultry should be wrapped securely to prevent meat juices from getting onto other food.
- ✓ Wrap meat and poultry again with foil or plastic wrap that is recommended for the freezer.
- ✓ Refrigerate leftover properly
- ✓ Thaw meats and poultry in the refrigerator and not at room temperature.
- ✓ Meat and poultry defrosted in the refrigerator may be refrozen before or after cooking. If thawing was not done in the fridge, cook before refreezing.
- ✓ Canned foods are safe as long as they are not exposed to freezing temperatures, or temperatures above 90 °F. If the cans look ok, they are safe to use. Discard cans that are dented, rusted, or swollen. High-acid canned food (tomatoes, fruits) will keep their best quality for 12 to 18 months; low-acid canned food (meats, vegetables) may stay for 2 to 5 years.
- ✓ Keep a clean kitchen
- ✓ Use warm soapy water to wash hands, utensils dishes cutting boards and working tables
- ✓ Avoid cross contamination by washing every surface before reuse
- ✓ Mix foods with utensils not hands
- ✓ Avoid coughing or sneezing over foods
- ✓ Wash or replace sponges and towels regularly
- ✓ Clean up food spills and crumbs
- ✓ Ensure prompt filling of crevices in the kitchen and utensils

In general:

- ✓ Throw out foods with off odours
- ✓ Do not even taste food that is suspected
- ✓ Do not buy or use items that appears to have been opened
- ✓ Follow label instruction for storage and preparing package and frozen foods

3.4 Food allergies and intolerances

Food allergies is one of the phenomena of our time as many people show immune response to the consumption of certain foods while other problem not involving the immune system that result from exposure to food substances is known as food intolerance. Although allergic reaction may not show any symptom, but some may have symptoms and the symptoms may affect the digestive tract that may cause nausea, or vomiting, rashes on the skin, and inflammation of the nasal passage and lungs or asthma.

However, there can be fatal, generalized reaction called anaphylactic shock which is a whole – body allergic reaction to an offending substance which symptoms may include abdominal pain, nausea, vomiting, diarrhoea, inflamed nasal membranes, chest pain, swelling and low blood pressure.

Identifying food that triggers immediate allergic reaction is easy because symptoms will correlate closely with the time of eating the food. Sometimes when reaction is delayed, it will be difficult to identify the offending food. In cases like these, the symptoms may not appear till a day or more have passed such that many foods will have been eaten too.

Foods implicated for allergic reactions are nuts, eggs, milk, soybeans, wheat, peanuts, chicken, fish, shellfish, snails etc.

On the other hand, an intense dislike of a food may be a biological response to a food that once caused trouble. This is called food aversions. Food aversion in children may be nature's effort to protect from allergies. Therefore, parents are advised to watch for signs of food dislikes and to take them seriously.

Note: food allergies cause illness, but diagnosis is difficult. To determine whether allergy exist, tests are imperative, food aversion can be related to allergies or to adverse reaction to foods. In case of any of this incidence, it is important to consult a physician.

3.5 Shelf stability of foods.

Foods that can be safely stored at room temperature, or "on the shelf," are said to be "shelf stable." These non-perishable products include beef, country hams, canned and bottled foods, rice, pasta, flour, sugar, spices, oils, and foods processed in aseptic or packages and other products that do not require refrigeration until after opening. Not all canned goods are shelf stable. Some canned food, such as some canned meats and seafood, are not safe at room temperature. These will be labelled "Keep Refrigerated."

To ensure shelf stability of foods, perishable foods must be treated with heat or dried to kill pathogenic microorganisms that can cause illness or food spoilage microorganisms. Food can be packaged in sterile, airtight containers. All foods eventually spoil if not preserved.

3.5.1 Ways to improve shelf stability of foods

1 Canning: This is the method of food preservation where airtight, vacuum-sealed containers are used for packaging. After packaging, the product is heated to about 250 °F (121 °C). This procedure destroys microorganisms and enzymes are also inactivated. This procedure results in a sterile product with a vacuum seal that will prevent invasion of new bacteria. This will keep the food product

stable, however, once the container is opened, it can be contaminated by bacteria, then spoilage can commence. Any unused portions must then be refrigerated in clean containers.

2 Drying is a very common method of food preservation. It is very simple and easy to use. Drying have been the major technology available to rural dwellers where food preservation is concerned. Examples of dried foods are dried beans, grains, pepper, fish among others. Drying have been used to improve shelf life by reducing water content of foods. This makes the food or substrate not suitable for microbial growth.

Types of drying methods

Natural drying: This is done in open air where the heat from the sun dries the foods. This method can be as simple as spreading vegetables and grains in the sun. This is good for acidic foods such and fruits and some vegetables.

However, this method may not work well for perishable foods like meat and fish

Shade drying: This drying happens in the without heat. Some leafy vegetables and grains can be dried through this method

Heat drying: This is done by placing foods or meat in a heat source such as oven or dehydrator. Using this method required following the instruction of the appliance usage. This is important to ensure safety. It is important however to first cook meat, fish and poultry before drying. Cooking will ensure that any bacteria or microbes present are destroyed because drying temperature is not sufficient to ensure safety of these foods. Also, the drying process must be fast enough to have removed sufficient water that may be necessary to support the growth of microorganism.

Salting: This is the use of salt in drying foods. The mechanism is such that salt binds or removes water in the food such that the growth of microorganisms will not be supported in the food. Salt is an important food additive that have been used for preservation of foods for thousands of years. This method is very common among Africans. Foods such as fish, crayfish games etc. are usually cured with salt before drying in an oven or in smoke.

Freeze drying: This method of drying is used for drying soups, fruits and vegetable in a special vacuum cabinet where the ice is turned to vapour without turning to liquid state (sublimation). This method keeps the food dried for as long as you want it, and food still maintains their original nutrients, texture and flavour. However, whenever there is need to use these freeze-dried foods, it is necessary to first rehydrate them. They must also be packaged in moisture-proof sealed containers.

3.6 The use of food labels

Health and nutrition information on food labels is an important public health tool to promote a balance diet and hence, a healthy society. The information on food labels help consumers understand the nutritional values and health benefits of a particular product and sometimes aid comparison between two or more similar products. It can also help us see how some foods fits into our overall diet, make healthy choices based on relevant nutrition information and understand the relationship between certain foods and diseases.

As a consumer of any food product especially processed foods, you deserve to know what you are about to consume. It is your right. These can be found on the packaging of such products

Food label is any tag, brand, mark, pictorial or any descriptive matter written, printed, stencilled, marked, embossed or impressed on or attached to a container of food (Codex Stan 1-2009). Manufacturers have found food label as useful

tool in marketing products and sometimes with ambiguous health claims. Some of these health claims are tied to nutrition information which is a component of a food label that provides consumers with information about the nutritional content of the food product in order to help them make informed decision in choosing nutritionally appropriate food

3.6.1 Things to look out for on labels

Ingredients: This is very important because some might be allergic to one or two of the ingredients used in manufacturing such products. Some could have been told by a physician to avoid certain foods or additives for health reasons. There is need to be health conscious!

Serving size: This expresses the quantity that should be taken at once by an individual though most times taking more than the serving size is not harmful, but it can help know when such product is being taken in excess.

Nutrition information: This shows the amount of energy (calories), protein, fat, fat soluble vitamin A, D, E and K, water soluble vitamins C, B vitamins, minerals and sometimes the percent of recommended daily intake that such nutrients can supply to an individual to meet the daily requirement

Health claims: Any health claim on any product should be supported by substantial scientific evidences before such claim could appear on product label. Consumer must beware of deception especially in countries where is no reliable regulating body for food and products label.

Manufactured and Expiry dates: This is very important for health and wellbeing. This is because when food expires, it means the food is no longer safe for consumption.

4.0 CONCLUSION

The importance of food hygiene education for food handlers cannot be over emphasized. Proper handling of food starts from when the food staple is shopped, careful attention is need in food preparation and processing to avoid any form of contaminant being introduced into the food. Also. Of paramount importance is the hygiene of persons and the environment where food is being produced.

5.0 SUMMARY

Having said that food borne illness is when food is contaminated by toxic chemicals or pathogenic organism, the symptoms can be acute, serious or mild and sometimes can be life threatening as seen in cases of cholera outbreak which may claim many lives. Caterers and other food handlers must pay attention to food preparation processes to ensure that foods are not contaminated at any point of the food preparation or processing chain.

Many times, commercially processed foods are safe and if any contamination is detected, it is easy to just call back those foods using the batch number on the food package. However, contamination can be introduced after the purchase of such products if proper storage measures are not in place. Meat and other perishable products like fish and some vegetables are good substrate for microorganism growth so they harbour microorganisms and their deterioration is quite fast. Hence, cleanliness of surface areas on the kitchen, utensils, sponge etc must be paramount as contamination can be introduced right there in the kitchen.

Diverse but appropriate preservative and storage methods can help reduce the risk of food contamination and poisoning, understanding of food labels and other information on food pack can also reduce the risk of food borne illness. It is therefore important for food handlers to be armed with adequate information on food safety and hygiene practices to be able to always produce safe foods thus safeguard the health of the populace.

6.0 TUTOR MARKED ASSIGNMENTS

1. If you are called to inspect a food and beverage cafeteria, list the various points of food preparation chain you will pay attention to in your inspection.
2. Explain the various factors that can contribute to food spoilage
3. List the food storage methods you will employ in ensuring the shelf stability of meats.
4. What are those things you will look out for on the label of a packaged food product?

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UNIT 3: MONITORING AND INSPECTION

Content

1.0 Introduction

2.0 Objectives

3.0 Main Content

3.1 Monitoring and inspection

3.2 Determining indicators

3.3 Food inspection

4.0 Conclusion

5.0 Summary

6.0 Tutor marked Assignment

7.0 References

1.0 INTRODUCTION

This unit shows the import of monitoring food business outfits. Monitoring is not only to apprehend erring vendors and food handlers but also to ensure proper documentation for evaluation to be able to provide evidence for future programmes and matters of policies.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- Explain what monitoring and inspection is
- State the determining indicators during monitoring and inspection
- Describe food inspection

3.0 MAIN CONTENT

3.1 Monitoring and inspection

Monitoring of food safety will involve inspection of food and food environment with the aim of systematically gathering information on food safety to provide the understanding of the state of the food system in the country. However, before the issue of monitoring arises, there must have been policies in place. Then, the adherence and implementation of these food laws and policies should be monitored and evaluated for effectiveness. Any shortcomings should be noted and ways to correct such should be suggested. The main reason for monitoring is to provide information to stakeholders and decision maker on compliance to food safety policies, identified challenges and successes and to control erring food institutions. A very important component of this exercise is the data gathering which is necessary to be able to provide evidence for policies. Therefore, constant feedback is necessary to safeguard the health of the populace while facilitating future plans and resource allocation.

3.2 Determining indicators

When conducting evaluation, it is important to have indicators which might be variables that are measurable. This will help to reflect the situation or help to measure change related to a food safety programme as well as compliance of players in the food sector.

One major indicator may be matters of policy. A good monitoring and evaluation team must be able to provide answers to some fundamental questions that may be used as indicators. For instance:

- Is there a national food safety policy that is reflected in laws, regulations?
- Have resources been allocated to establish institutions that will ensure implementation of such policy?
- Are there food safety programmes and is there sufficient staff to carry out the policies?

The answers to these questions will help to

- Evaluate the relevance of such policy in protecting the health of the population of the country.
- Measure political commitment of country leaders and stakeholders
- Determine the effectiveness and efficiency of some policies implementation.
- Control the adherence of food industries and vendors to rules and policies because they will not like to be found erring during routine visits.

It is important however, to acknowledge that monitoring and evaluation results depend largely on the appropriateness of the set of data to be collected.

Quantitative and/or qualitative methods of data collection can be used in evaluation. Prospective surveys and visits to food environment can be good ways of data collection. Also, retrospective data can be generated from past surveys. These data can be analysed and inferences generated.

3.3 Food inspection

Food inspection is carried out on food businesses to ensure compliance to rules and regulation or stipulated guidelines. Food inspection is done by designated personnel who should possess the qualification to identify and evaluate compliance of food industries and vendor to the laid down rules and regulations. They also check the safety of food products. Inspectors usually don't have to make an appointment with business owners, they have the authority to enter and inspect any food service or manufacturing premises, and they may inspect raw materials, production or preparation procedures and the final product. This can be done anytime during the official working hours.

The inspection must be according to the stipulated guidelines backed by law of the land, it must also follow the appropriate code of practice. Food inspectors must be able to distinguish between the action recommended for the sake of

good practice and actions required to comply with legal requirement. The food inspector could take action against the food business in order to protect the health of the public

4.0 CONCLUSION

Monitoring and inspection of food business premises and food handling practices of handlers is very important to be able to safeguard the health of the consumers. However, monitoring and inspection is not only for apprehending offenders but also gives the opportunity for information gathering and evaluation of food system and practices. This is important to be able to provide feedback and recommendations for future engagements.

5.0 SUMMARY

The monitoring and inspection of food business environment and processes is very important to be able to ensure compliance of food handlers to laws, guidelines and regulations of food processing and preparation. While inspection is done to assess compliance, monitoring does not just focus on compliance, but it could help in understanding the state of food system in the nation. Monitoring must be aimed at systematically gathering information that will be evaluated and help make some scientific inferences that can help understand the food system. This information is very necessary to be able to predict future trends, suggest innovative measures that can impact the food system and sometimes the economy.

6.0 TUTOR MARKED ASSIGNMENTS

1. Investigate the food safety policies in place in your country
2. What are the factors to consider in monitoring food business premises?
3. Differentiate between monitoring and inspection
4. Highlight some advantages of inspection to the consumers.

6.0 REFERENCES / FURTHER READING

Provencher V., Jacob R.(2016). Impact of Perceived Healthiness of Food on Food Choices and Intake. *Curr Obes Rep*, **5**(1), 65-71.

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